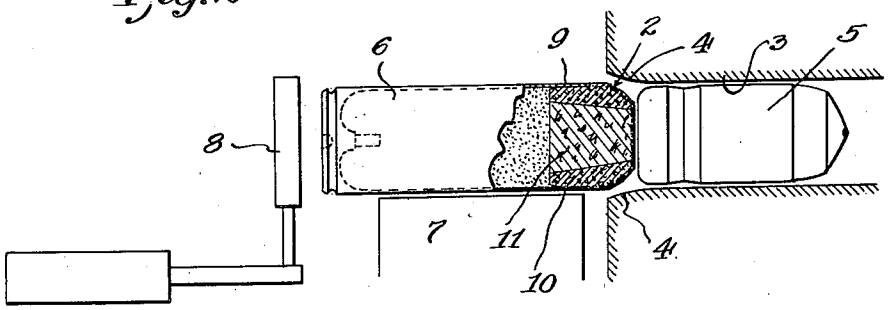
June 23, 1936. H. F. VICKERS 2,045,004

CARTRIDGE PLUG

Filed Aug. 17, 1934

Fig. 2



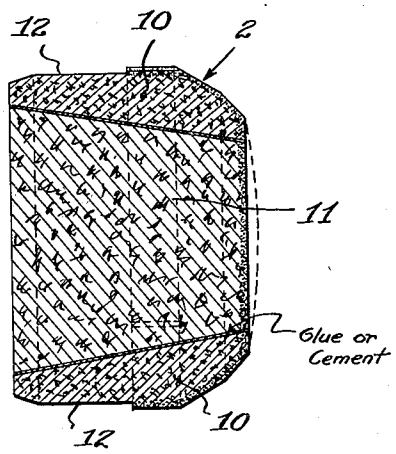


Fig. 1

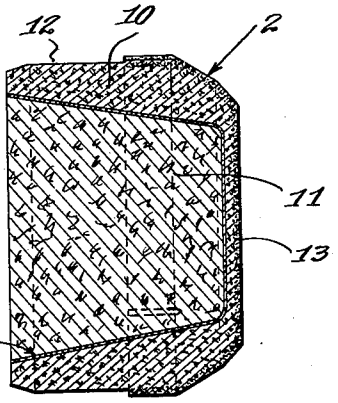


Fig. 3

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CARTRIDGE PLUG

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20 Claims. (Cl. 102—42)

This invention relates to a cartridge plug and more particularly to a plug of composition material shaped and positioned to act as a powder retainer, cushion and protector.

In the ramming or loading of the explosive charge or cartridge case into the breech of high power guns, and particularly those of the larger type, much difficulty has been experienced in damage to the case by impact or abrasive action with the mouth of the breech caused by striking the side of the entrance to the bore of the gun. The cartridge case is fabricated with a very thin wall and it is extremely difficult with the rapid loading required in the normal firing of these guns, whether manual or automatic, to prevent the front ends of the heavy cartridge cases from striking the entrance to the bore with a sidewise damaging action. Furthermore, the plugs such as have been used in the past have had to be of a quite soft and frangible material to insure the breaking up of the plug into fine particles to prevent injury to persons below and in front of the gun. Thus, even though a plug of the type above described projected laterally past the front edge of the cartridge case, it would be sheared off by the loading action.

It is an object of the present invention to provide a compact ammunition plug for the cartridge case so fabricated and positioned as to act as a positive guide for the end of the cartridge case when being inserted into the breech of the gun so as to protect the end of the case from any damage by impact or abrasive action in the event that the case should strike the side of the entrance to the bore and to, at the same time, provide a plug so constructed that it will break up into such fine pieces as will not cause damage by falling on the gun crew.

More specifically, the present invention contemplates a plug having a guiding and protecting surface of relatively hard material, and a core of relatively soft material, the composition of the hard material being such as to withstand all impacts and abrasive actions between the cartridge and the side of the entrance to the bore, and the composition of the core being such as to act as a powder retainer and cushion and, at the same time, so weaken the outer annular hard material as to cause the entire plug to break or be blown into small pieces as it leaves the muzzle of the gun. The exposed surface of the plug, or that part which contacts with the side walls of the bore, is preferably impregnated with graphite so as to insure a minimum of friction between the plug and the sides where it rides into the bore and between the sides of the plug and the surface of the projectile.

Other features including particularly structural details will be more clearly brought out in the specification and claims.

In the drawing:

Fig. 1 is a sectional view of the preferred form of my cartridge plug.

Fig. 2 is a partially diagrammatic view illustrating the manner of mounting the plug at the end of the cartridge case and the general arrangement and manner of ramming the cartridge case into the breech of the gun.

Fig. 3 illustrates a modified form of plug wherein the core portion does not project entirely through the end of the plug.

The plug forming the subject matter of this invention, and generally designated 2 in the drawing, may assume various shapes consistent with the design of the gun cartridge and projectile. The general shape shown in the drawing illustrates one satisfactory embodiment. Fig. 2 is diagrammatically illustrative of the general arrangement of parts and conditions under which the composite plug of the present invention is designed to operate. A typical gun breech is illustrated as at 3 and the entrance to the bore of the gun as at 4. A projectile 5 is shown positioned in the bore preparatory to being rammed to firing position, and a cartridge case 6 is shown in position above the breech plug 7, from which position it is designed to be forced into the bore of the breech by rammer mechanism diagrammatically illustrated as at 8. The cartridge case 6 is normally of very thin construction and it will be obvious from the general arrangement of parts as shown in Fig. 1, that when this cartridge case is rammed home, the chances are that one portion thereof will strike the side wall of the bore. Of course, if there is great care and precision, it will be understood that the cartridge case could be exactly centered and rammed home without damage thereto, but under normal firing conditions, speed is the essential element, with the result that the cartridge cases are practically thrown into position and rammed home with no possible thought as to whether or not the end of the cartridge case will or will not strike the side wall of the bore before being rammed into firing position.

To afford complete protection for the end 9 of the cartridge case, I have formed the plug 2 of an outer annular ring 10 and inner core 11, the ring and core being formed of different materials as will be presently described. The outer

annular ring 10 is the part that gives the cartridge complete protection. The rear portion of the plug 2 is reduced to form a shoulder 12 which fits within the end 9 of the case and is cemented therto. The diameter of the main body of the plug is substantially the same as that of the cartridge case so that in the shoving of the cartridge into position any side impact will take place between the plug and the wall 4. As this impact is sometimes quite severe, the outer ring 10 of the plug is formed of relatively hard material, such as finely ground cork of relatively high tensile strength. Any other suitable material may be used, such as finely ground cork, wood flour, etc. Obviously, the nature of the binding material and the degree of molding pressure may vary, the main point being that this outer ring must be hard enough to withstand the impact and abrasive action caused by striking the side of the entrance to the bore. It must also withstand any tendency to shear so that the end 9 of the cartridge case may be guided into firing position without any marks or indentations of any kind on the thin front edge thereof.

If the entire plug were made of the same material such as the tough relatively rigid material forming the outer ring, this would greatly resist the pulverizing or breaking up action when the gun is fired, with the result that even if the plug is broken up the pieces themselves would be relatively large and dangerous when leaving the muzzle of the gun. To insure the breaking up of the outer ring into relatively small harmless particles, the core 11 is formed of relatively soft material such as coarsely ground cork with low tensile strength, or any similar material, preferably light and readily frangible, adapted to be quickly broken up or otherwise destroyed upon explosion of the charge. The preferred material of this core is coarsely ground cork held together by a binder, the soft core being cemented to the hard outer ring, or otherwise secured thereto.

The exposed surface of the plug, including the nose or part which contacts with the projectile, is preferably impregnated with graphite or other material to produce a minimum of friction, both at the point of contact between the plug and the projectile and on the sides where the plug rides into the bore. Thus even though the plug is slightly oversized, the contacting surfaces being graphited and also being slightly compressible, even though tough, it will be easily slipped into the bore. The graphite also reduces any tendency to shear. It will be understood that the nose of the plug in the form shown in Fig. 1 may vary in shape, the greater the taper the greater will be the cushion effect between the soft core and the projectile, as will be understood by those skilled in the art. The resiliency and cushioning effect being also variable by the nature of the materials used in making up the core.

In the modification illustrated in Fig. 3, the same general arrangement of relatively tough and hard outer ring and relatively soft inner core is used but the material forming the outer ring 10 is so molded as to form the complete nose of the plug as at 13. This form of plug would be adapted for use where it would be desirable to reduce the cushioning effect between the core and the projectile.

It will thus be seen that I have provided an extremely compact and efficient ammunition plug wherein a single plug is effective to completely protect the cartridge case and, at the same time, act as an efficient cushion and powder retainer; such combination of results being obtained by fabricating certain portions of the plug in accordance with the functions to be performed by such respective portions. The outer annular wall of the plug being of such toughness and tensile strength as to withstand all impacts and abrasive actions to protect the edge of the shell, the core of the plug being of such composition as to complete the function of a powder retainer and to act as a cushion between the charge and the projectile, and the composition of the material forming the core, together with the location and size of the core, being such as to insure disintegration and breaking up of the complete plug into fine particles so as not to cause damage.

What I claim is:

1. A cartridge and cartridge plug therefor, comprising a unitary cartridge casing, a cartridge plug of granular material having a completely frangible portion fitting within the end of said casing and an exposed portion protruding beyond the casing and a substantial part of said exposed portion being of substantially the same diameter as the outer diameter of the end of the casing and adapted to protect the same against impacts and abrasions during loading action, the central portion of said plug being formed of relatively soft frangible material as to readily break up into fine pieces upon the explosion of the charge, at least a part of the outer exposed portion of the plug being of relatively hard material to withstand impacts and abrasions during loading action, said outer portion of relatively hard material extending only to such depth as to break up in relatively small pieces upon the expelling and breaking up of the plug as a whole.

2. A completely frangible cartridge plug comprising a hollow, relatively rigid shape maintaining and protecting outer shell of granular material having one part adapted to project within the end of a cartridge case, and a core for the outer shell of relatively soft material, the outer shell having another part adapted to project out of the cartridge case and extending laterally over and protecting the edge of the cartridge during loading and the inner core increasing the frangibility of the plug upon explosion of the charge and expelling of the plug from the cartridge.

3. A completely frangible unitary cartridge plug for a cartridge case comprising a shape maintaining and protecting outer shell formed of relatively tough granular material, and a shape maintaining core of relatively soft granular material, a part of said plug being of a size adapted to fit within the end of a cartridge case and at least a portion of said outer shell projecting out of the case and being of a greater diameter than said first part for protecting the cartridge during loading and the inner core increasing the frangibility of the plug upon explosion of the charge and expelling of the plug from the cartridge.

4. A completely frangible unitary cartridge plug for a cartridge case comprising a shape maintaining and protecting outer shell having an annular portion formed of molded cork having relatively high tensile strength, and a core of relatively soft material, a portion of the plug being of a size adapted to fit within the end of the cartridge case, a substantial portion of the outer shell being positioned ahead of and extending laterally over and protecting the edge of the cartridge during loading and the inner core increasing the frangibility of the plug upon explosion of the charge.

5. A completely frangible unitary cartridge plug formed of a composition of materials and adapted to be positioned within the end of a cartridge case, one material being relatively tough, rigid and granular and molded in the shape of an annular outer shell having a substantial portion extending ahead of and extending laterally over and protecting the edge of the cartridge case, and another material being relatively soft and deformable as to readily break up into fine pieces upon the explosion of the charge and molded in the shape of a core filling the annular shell, said annular tough portion being of such shallow thickness as to readily break up into small pieces along with the core upon the explosion of the charge and expelling of the plug from the cartridge.

6. A completely frangible unitary cartridge plug formed of a composition of materials, one material being relatively tough and rigid and molded in the shape of an annular outer shell, and another material being relatively soft and deformable as to readily break up into fine pieces upon the explosion of the charge and molded in the shape of a shape maintaining core filling and increasing the frangibility of the annular shell, a portion of the plug being of a size adapted to fit within the end of a cartridge case and a portion of the surface of the plug extending forwardly of and being of approximately the same diameter as the outer diameter of a cartridge to contact with the bore of the gun and being impregnated with a lubricating material.

7. A completely frangible cartridge plug formed of a composition of materials and adapted to fit within the end of a cartridge case, one material being relatively tough and molded in the shape of an annular outer shell having a substantial portion of substantially the same diameter as the outer diameter of the cartridge case extending ahead of and protecting the end of the cartridge case, and another material being relatively soft and deformable and molded in the shape of a self-sustaining core filling and increasing the frangibility of the annular shell, a portion of the surface of the outer shell being covered with lubricating material, said annular tough portion being of such shallow thickness as to readily break up into small pieces upon explosion of the charge and expelling of the plug from the cartridge.

8. A completely frangible unitary cartridge plug comprising a hollow member of cork and a core member filling the same, said core member being relatively deformable and said hollow member being less deformable, said two members being joined together to form a powder retainer and a cushion, a portion of the plug being of a size adapted to fit within a cartridge case and a portion of said hollow member being positioned ahead of and being of substantially the same diameter as the outer diameter of and fitting against the end of the cartridge to protect the same during loading operation.

9. A completely frangible unitary cartridge plug comprising inner and outer members, one of which is composed of relatively hard slightly resilient granular material and the other of relatively deformable shape maintaining granular material, the member of relatively hard material having a portion adapted to extend into and a portion adapted to extend out of and contacting with and protecting the end of a cartridge shell during the loading action, and the other member increasing the frangibility of the first member upon explosion and expelling of the plug from the cartridge.

10. A completely frangible cartridge plug comprising inner and outer members formed of cork, a portion of the outer member being annular in shape and the inner member forming a core fitting within said outer portion, a part of both portions being of a shape and size adapted to fit within the end of a cartridge case, a portion of the outer member extending out of and being of substantially the same diameter as the outer diameter of end of the cartridge case to protect the same against impacts and abrasion during the loading action.

11. A completely frangible unitary cartridge plug comprising an outer annular member of relatively hard material and shouldered to form one portion adapted to enter the end of a cartridge case and another portion of greater diameter adapted to contact with and protect the end of the cartridge case when rammed into the gun breech, and a core of relatively soft material fitting within and extending the length of said annular member to form a cushion between the charge and the projectile.

12. A completely frangible unitary cartridge plug comprising an outer annular member of relatively hard material and shouldered to form one portion of substantially the same diameter as the internal diameter and adapted to enter the end of a cartridge case and another portion of greater diameter adapted to contact with and protect the end of the cartridge case when rammed into the gun breech, and a core of relatively soft material fitting within and extending the length of said annular member to form a cushion between the charge and the projectile, the forward end of the core member adapted to contact with the projectile.

13. In combination, a completely frangible unitary cartridge plug comprising an outer annular member of relatively hard material and shouldered to form one portion of substantially the same diameter as the internal diameter and adapted to enter the end of a cartridge case and another portion of greater diameter adapted to contact with and protect the end of the cartridge case when rammed into the gun breech, and a core of relatively soft material fitting within and extending the length of said annular member to form a cushion between the charge and the projectile, the forward end of the plug including a portion of the outer member and a portion of the core being coated with graphite.

14. A completely frangible cartridge plug formed of granular material the central and greater portion of such granular material being of such composition and frangibility as to readily break up into fine pieces upon the explosion of the charge, the circumferential surface of said plug being shaped to form one portion adapted to enter the end of a cartridge case and another portion of greater diameter adapted to contact with and extend ahead of the end of the cartridge case, said latter portion being of relatively hard material to protect the end of the cartridge case against impacts or abrasions during the loading action, said portion of relatively hard material being of such shallow thickness as to readily break up into relatively small pieces at the same time as the remainder of the plug breaks up into fine pieces.

15. A completely frangible unitary cartridge plug, for a cartridge case, formed of granular material, the central and greater portion of said

granular material being relatively soft and frangible so as to break up into fine pieces upon explosion of the charge, a part of the plug being shaped and of a diameter to protrude within the end of a cartridge case, a portion of the outer surface of the plug being of greater diameter and positioned ahead of and adapted to contact with the end of a cartridge case to protect the same against impacts and abrasions during loading action, said outer surface portion being impregnated and relatively hard compared to the central portion to withstand impacts and abrasions during loading action, but being only of such thickness as to break up in relatively small pieces upon the expelling and breaking up of the plug as a whole.

16. In combination, a completely frangible unitary cartridge plug, for a cartridge case, formed of granular material having varying cross-sectional characteristics, including a portion adapted to enter the cartridge case and an exposed outer annular portion of relatively tough material adapted to be positioned ahead of and of substantially the same diameter as the outer diameter of the end of the cartridge case and shaped to protect the end of the cartridge case against impacts or abrasions during loading action but being of such shallow thickness as to readily break up into relatively small pieces at the same time as the remainder of the plug breaks up into fine pieces, and a central portion of relatively soft and frangible material to accentuate the breaking up action of the plug as a whole upon explosion of the charge and expelling of the plug.

17. A completely frangible unitary cartridge plug, for a cartridge case, formed of comminuted cork, the central portion of said comminuted cork being relatively soft and frangible so as to break up into fine pieces upon explosion of the charge, part of the plug being shaped and adapted to protrude within the end of a cartridge case, a substantial portion of the outer surface of the plug extending ahead of and being substantially of the same diameter as the outer diameter of the end of the cartridge case and adapted to protect the same against impacts and abrasions during loading action, at least a part of said outer surface portion being impregnated and relatively hard compared to the central portion to withstand impacts and abrasions during loading action, said impregnated and relatively hard portion extending inwardly only to such depth as to break up into relatively small pieces upon the expelling and breaking up of the plug as a whole.

18. A completely frangible unitary cartridge plug, for a cartridge case, formed of granular material, the central portion of said material being shape maintaining but relatively soft and frangible so as to break up into fine pieces upon explosion of the charge, part of the plug being shaped and adapted to protrude within the end of a cartridge case, a substantial portion of the outer surface of the plug being of greater size than said first part and positioned ahead of and substantially of the same diameter as the outer diameter of the end of the cartridge case to protect the same against impacts and abrasions during loading action, at least a part of said outer surface portion being relatively hard compared to the central portion to withstand impacts and abrasions during loading action, said outer relatively hard portion extending only to such depth as to break up into relatively small pieces upon the expelling and breaking up of the plug as a whole.

19. A completely frangible cartridge plug comprising inner and outer members of granular shape maintaining material, a portion of the outer member being annular in shape and the inner member forming a core fitting within said outer portion, a part of both portions being of a shape and size adapted to fit within the end of a cartridge case, a portion of the outer member extending forwardly of and being of substantially the same diameter as the outer diameter of the end of the cartridge case to protect the same against impacts and abrasion during the loading action, said inner member being formed of relatively frangible material to accentuate the breaking up action of the plug as a whole upon explosion of the charge and expelling of the plug from the cartridge.

20. A cartridge and cartridge plug therefore, comprising a cartridge casing, a completely frangible unitary cartridge plug formed of cork and having a portion fitting within the end of said casing and an exposed portion protruding beyond the casing, the central and greater portion of said plug being formed of relatively soft frangible material compared to the outer portion of the plug as to readily break up into fine pieces upon the explosion of the charge, at least a part of the outer exposed portion of the plug being of relatively hard material to withstand impacts and abrasions during loading action, said outer portion of relatively hard material being only of such depth as to break up into relatively small pieces upon the expelling and breaking up of the plug as a whole.

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