Dec. 26, 1944. W. J. LANDEN ET AL 2,365,708

PROJECTILE

Filed June 7, 1941

Fig. 1.

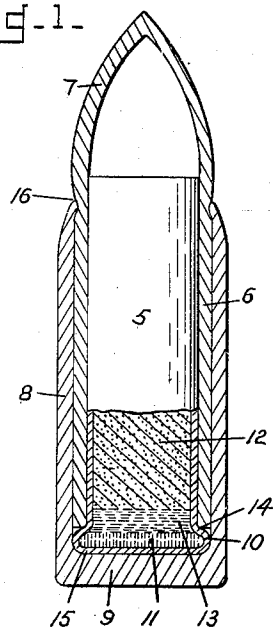



Fig. 2.

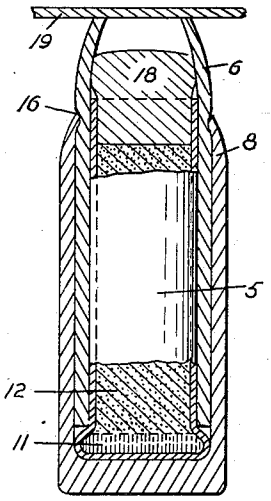



Fig. 3.

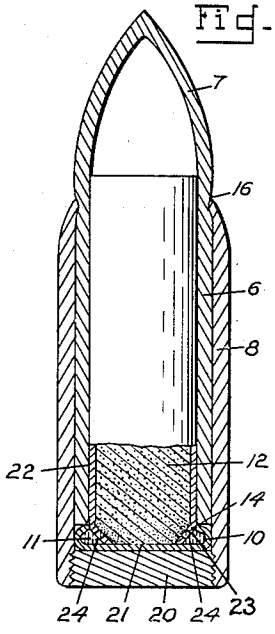



Fig. 8

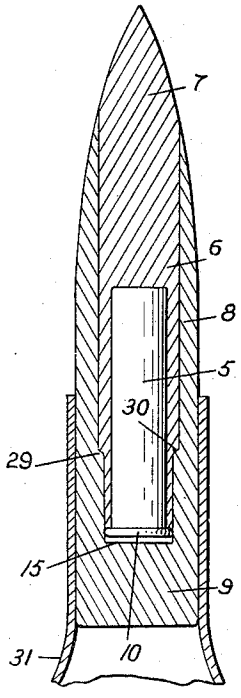



Fig. 5

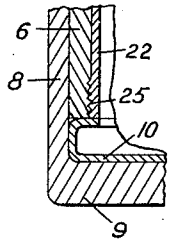



Fig. 6.

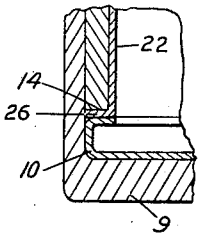



Fig. 4.

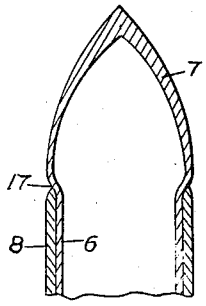
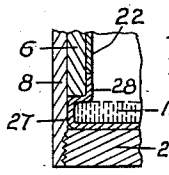



Fig. 7.




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# UNITED STATES PATENT OFFICE

2,365,708

## PROJECTILE

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2 Claims. (Cl. 102—56)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to projectiles for either rifled or smooth bore weapons.

In small caliber projectiles of the incendiary and explosive type, the methods of loading and of providing a safe and efficient ignition means should be correlated to facility of manufacture. Accordingly it is proposed in this invention to utilize a commercially available rim fire cartridge case or similar readily available hollow rim capsule in association with elements of a jacket whereby the primer composition at the base of the projectile will be ignited on impact.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

Figure 1 is a longitudinal sectional view of one form of the invention.

Figures 2 and 3 are longitudinal sectional views of modified forms of the invention.

Figures 4, 5, 6 and 7 are detailed sectional views of portions of the devices illustrating various modifications of means for securing against setback.

Figure 8 is a longitudinal section of a modification with the capsule shown in elevation.

Referring to the drawing by characters of reference, Figure 1 shows a projectile comprising a cartridge case 5, an inner shell 6 having an ogival nose 7 and an outer shell 8 having a base 9.

The cartridge case 5 is of a standard rim fire type. A primer composition 11 may be spun into the rim 10 in the usual manner or as shown may occupy the entire base of the cartridge case. The space usually carrying the propellent charge is filled with a main charge of an incendiary or explosive compound 12, and a booster or sub-igniter charge 13 may be inserted between the primer and the main charge 12. The front end of the cartridge case may be closed by a cap of the type sometimes used in blasting caps and commercial detonators or by a lacquer or wax seal.

The inner shell 6 is fitted over the case 5 and its edge 14 is positioned in front of the rim 10. The outer shell 8 is fitted over the inner shell with its base 9 supporting the base 15 of the cartridge case. The outer shell receives the impact of the propelling charge and takes the rifling of the gun barrel. One simple expedient for transmitting the driving force of the outer shell to the other parts consists in connecting the inner and outer shells by crimping them as shown at 16. An alternate method of transmitting the driving force consists in forming a bead 17 on the inner shell 6 and forcing it into engagement with the front edge of the outer shell 8, as shown in Fig. 4. Sensitivity may be regulated by controlling this engagement.

On impact with a target, the inner shell 6 is arrested in its motion while the remaining elements continue forwardly. The resultant compression of the rim 10 between the base 9 and the edge 14 initiates the priming 11 which in turn sets off the charge 12. Ignition may be facilitated by notching or otherwise varying the form of the edge 14.

In the modification of the invention shown in Figure 2 the ogival nose portion 7 of the inner shell 6 is removed and the cartridge 5 is, as in Fig. 1, loaded with an explosive material 12. In this modification, however, a penetrating projectile 18 is securely seated in the mouth of the cartridge 5. The effect produced by the compound projectile will not be unlike that produced by large caliber weapons using projectiles similar to those shown in the patents to Hoxie, No. 911,591, Dunwoody, No. 1,150,667 and Taylor 1,335,406. The initial impact of the shell 6 on a target plate 19 sets up a strain in the plate which will be greatly augmented by the succeeding impact of the penetrative projectile 18 against the already strained plate. For support against setback the inner and outer shells 6 and 8 may be connected by either of the expedients shown in Figures 1 and 4.

In the modification shown in Figure 3, the inner and outer shells may be connected together as previously described prior to loading. For convenience in loading, this modification has been provided with a removable screw threaded base plate 20. The priming material 11 is contained in the rim 10 of a capsule 21 supported at its base on the base plate 20 with the rim behind the edge 14 of the inner shell. In this modification the explosive or incendiary charge 12 is contained in a capsule 22 having a suitably shaped rearward extension 23 to support it against setback and being provided with perforations 24 for the passage of the igniting flame. It is not, however, essential to the invention that the charge 12 be contained in a capsule of any sort and it is contemplated that the charge be loaded directly into the inner shell 6. The use of a removable base plate has the obvious ad-

vantage of safety in manufacture as no explosive or incendiary charges are in place during the crimping operations.

Various other modifications may be made in the base construction as shown in Figures 5, 6, 7 and 8 without departing from the spirit of the invention. In Figure 5 the explosive containing capsule 22 is supported against setback in the inner shell 6 by a suitable threaded connection as at 25. In the modification shown in Figure 6 the capsule 22 is supported by having an outwardly turned flange 26 engaged between the edge 14 of the shell 6 and the rim 10 of the capsule. In Figure 7 the primer 11 is confined in a capsule 27 having a forwardly extending portion 28 which may be of any length and may or may not serve to contain the explosive charge 12 or a part thereof.

In the modification of the invention shown in Figure 8 the outer shell 8 may be of gilding metal or the like and the inner shell member 6 of steel or other hard metal having a solid ogival nose portion 7. The cartridge case 5, shown in in elevation, is inserted into the interior of the shell 6 as in Figure 1 with the primer containing rim 10 arranged behind the rear edge of the shell 6. A shoulder 29 formed in the outer shell and a cooperating shoulder 30 on the inner shell serve to support the inner shell against setback. A small clearance may be provided between the base 15 of the cartridge case and the base 9 of the outer shell. Upon impact of the ogival portion with a target, the outer shell will tend to continue forward. The wedging action of the shoulder 30 against the softer material of the outer shell will tend to expand the outer shell leaving it free to drive forward against the inner shell crushing the primer between the rear edge of the inner shell and the base of the outer shell. Prior to loading in a gun and firing of the propellent charge the base of the projectile will be supported by the neck of the cartridge case 31 against any tendency to expand radially to allow crushing of the primer. After firing the walls of the bore will continue to support the outer shell until the projectile leaves the barrel. It will be seen that the projectile will be safe in storage and handling as well as bore safe in firing.

It will be noted that as the priming charge is preloaded in the rim, the operation of the priming unit is independent of centrifugal force and the device will function equally well in rifled or smooth bore weapons.

We claim:

1. A projectile comprising an outer cup-shaped shell of a relatively soft metal having an interior forwardly facing shoulder, an inner shell member of a relatively hard metal slidably fitted in and extending forwardly of said outer shell and having an exterior rearwardly facing shoulder engaging said first mentioned shoulder to support the inner shell against setback with its rear edge spaced from the bottom of the outer shell, a main charge in said inner shell, a capsule inserted in said inner shell having a rim positioned in the space between the rear edge of the inner shell and the bottom of the outer shell, said capsule containing at least a part of said main charge, and a priming charge in the rim, said shoulders being positioned in the portion of the projectile adapted to be engaged by the neck of a cartridge case for support thereby against radial deformation.

2. In a projectile, an outer shell closed at its base, an inner shell spaced from the outer shell and containing an explosive charge, a capsule at the rear end of the inner shell and containing a priming charge, said capsule extending circumferentially beyond the periphery of said inner shell, an intermediate shell slidably fitted in the space between the inner and outer shells with its forward end extending beyond the forward end of the outer shell with its rear end adjacent to and in line with the rim of the capsule, said intermediate shell being adapted to act as a firing pin upon impact of the projectile, and means for maintaining the outer and intermediate shells relatively positioned against the forces of setback.

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