July 29, 1924. 1,502,925

C. W. STONE

PROJECTILE

Filed July 30, 1918

Fig. 1.

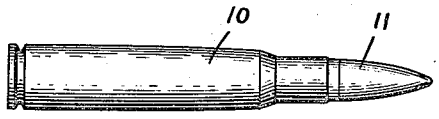
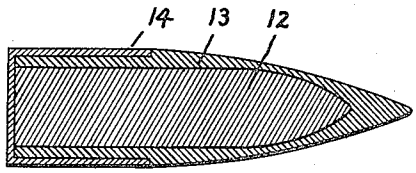


Fig. 2.



Inventor.
Charles W. Stone
by Albert G. Davis
His Attorney.

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UNITED STATES PATENT OFFICE.

CHARLES W. STONE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PROJECTILE.

Application filed July 30, 1918. Serial No. 247,393.

To all whom it may concern:

Be it known that I, CHARLES W. STONE, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Projectiles, of which the following is a specification.

My invention relates to improvements in projectiles and has for its main object the increasing of the penetrating power of the projectile without increasing either its weight or its muzzle velocity.

More specifically my invention has for its object the production of a composite projectile which, as a whole, will have substantially the same weight and shape as the standard projectile it is intended to displace so that the muzzle velocity, trajectory, range and accuracy of flight will not be affected but in which the principal part of the energy is stored in a core of hard, tough material which has a very high specific gravity so that the area of impact may be reduced without elongating the projectile, thus increase its effectiveness in penetration.

I have found that the metal tungsten has, in the highest degree, the properties necessary for the penetrating element of a projectile. It is exceedingly hard and tough and retains its ruggedness to a very marked degree at the high temperature which it may attain upon impact. It has a specific gravity of about 19, which is materially higher than the specific gravity of steel, so that the necessary weight may be obtained within relatively small dimensions. As a projectile, therefore, the metal tungsten has all the necessary properties for penetrating steel and armor plate. It has the disadvantage, however, owing to its hardness, that it will not take the rifling of the rifle barrel. In fact with tungsten in contact with the rifle barrel the wear would be excessive. Furthermore, due to its high specific gravity it would be heavier than the usual projectile so that with the same charge of explosive the breech pressures would be increased and the entire rifle would have to be modified. The Springfield rifle, for instance, using the service ammunition has certain definite characteristics which it is my intention to maintain and I therefore provide ammunition which is interchangeable with the service ammunition.

In carrying out my invention, therefore, I provide a composite projectile having a core of a heavy metal, such as tungsten, of relatively small section and an outer jacket of a very light metal, such as aluminum, so that the combined weight is substantially that of the projectile of the service ammunition. Aluminum not only is materially lighter than copper or copper-nickel alloy but besides aluminum and its alloys are so soft that the shell acts as a lubricant for the heavy core when the core penetrates a target. The attachment between the jacket and the core is such that they will rotate together, but when the impact occurs the jacket may strip off leaving the smaller core to penetrate.

In the accompanying drawing illustrating one embodiment of my invention, Fig. 1 shows a complete cartridge or shell, and Fig. 2 shows the projectile therefor.

Referring to the drawings, 10 represents the usual cartridge casing and 11 represents the projectile. This projectile it will be observed is the same general shape as that of the projectile of the service shell of the Springfield rifle and has substantially the same weight. The projectile comprises a core 12 of hard, tough material, preferably tungsten. The tungsten may be either wrought or sintered, in order to make the core hard, coherent and not readily deformed by impact. If sintered it may be alloyed with a small percentage of other materials. Wrought tungsten is very satisfactory so far as my present investigations show, but my invention is not necessarily limited either to the use of tungsten or to a particular structure of the tungsten metal, or any particular method of producing tungsten. In case wrought ductile tungsten is used, however, it will be produced in accordance with the Coolidge Patent No. 1,082,933 filed June 19, 1912.

It will be noted that the core is smaller in diameter than the bore of the gun, but as shown is larger in cross-section than the surrounding jacket 13 which is of the proper size to fit the bore of the gun. This jacket must be of very light material since the core is relatively heavy and the two together must have substantially the same weight as the projectile of the service ammunition, which is ordinarily composed of lead or steel with a copper-nickel covering. I have

found that aluminum or an aluminum alloy which is materially lighter than steel is a satisfactory metal for this purpose. As shown, the point of the bullet consists of this soft metal which is bored out from a solid slug so as to admit the core. In the illustration, I have shown a cap 14 of other material surrounding the base of the projectile. This material may be soft steel, copper or copper-nickel and is provided so that the projectile will take the rifling. Obviously, the cap 14, the jacket 13 and the core 12 must all be secured together so that they will all be rotated by the rifling.

It will be seen that I have devised a projectile for a shell which while being interchangeable with service ammunition since it employs the same charge of explosive, and has the same range, trajectory, muzzle velocity and accuracy of flight is nevertheless very much more effective in penetration.

While I have described my invention as embodied in concrete form and in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto as various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An armor piercing projectile consisting of a core of tungsten in a hard, tough condition and a jacket of material capable of stripping from said core upon impact and so much lighter than tungsten that the projectile as a whole has a weight corresponding to a standard lead projectile.

2. An armor piercing projectile comprising a core of tungsten smaller than the bore of the gun in which it is to be used and a jacket of aluminum having substantially the diameter of the bore.

3. An armor piercing projectile comprising a core of wrought tungsten, a jacket of aluminum projecting beyond the point or nose of said core and having a materially smaller cross-sectional area than said core and a cap of steel engaging with the base of said bullet.

4. An armor piercing projectile having a weight substantially equal to that of a standard lead projectile of the same dimensions and comprising a core of a hard, tough metal having a higher specific gravity than lead and a jacket of lighter material.

5. An armor piercing projectile comprising a core of hard, tough, wrought tungsten substantially smaller than the bore of the gun with which it is to be used, and a jacket of metal so much lighter than tungsten that the projectile as a whole has a weight substantially equal to that of a standard lead projectile of the same dimensions.

6. An armor piercing projectile comprising a hard, tough core consisting substantially of tungsten having the properties of wrought metal, a jacket of aluminum and a cap of metal having a hardness intermediate the hardness of the core and jacket.

7. An armor piercing projectile comprising a core of wrought tungsten substantially smaller than the bore of the gun with which it is to be used, a jacket of aluminum encasing the nose of said bullet, and a cap of metal harder than aluminum adapted to take the rifling of the gun surrounding the base of the core.

8. An armor piercing projectile comprising a core of tungsten in a coherent state and a jacket of materially lighter material, the core and jacket of said projectile being proportioned to have a size and weight corresponding to a standard lead projectile.

In witness whereof, I have hereunto set my hand this 24th day of July 1918.

CHARLES W. STONE.