2 Sheets—Sheet 1.

B. B. HOTCHKISS.

SHELL.

No. 189,358. Patented April 10, 1877.

Fig. 1.

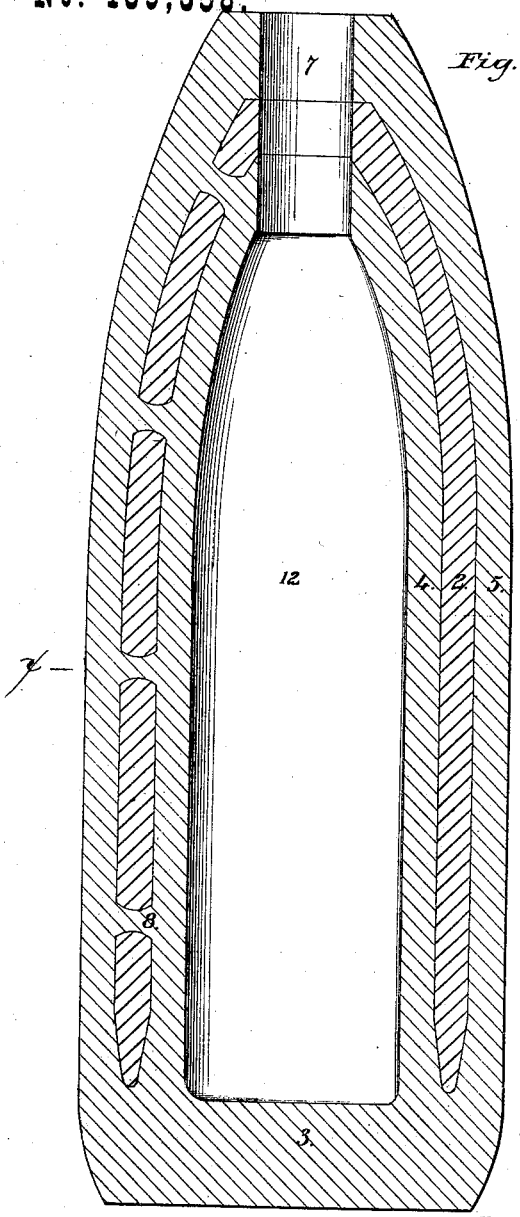


Fig. 2.

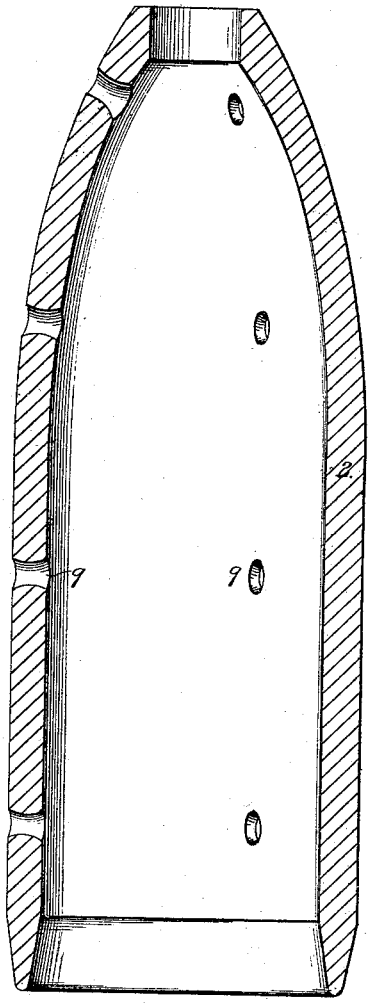
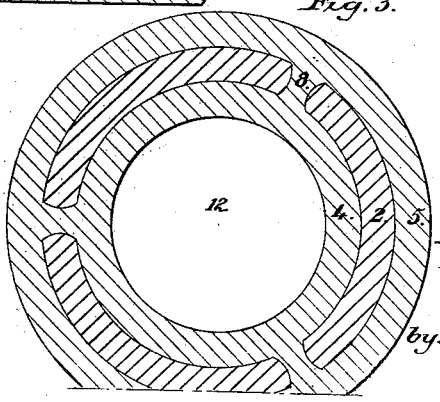


Fig. 3.



Witnesses:

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2 Sheets—Sheet 2.

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SHELL.

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Fig. 4.

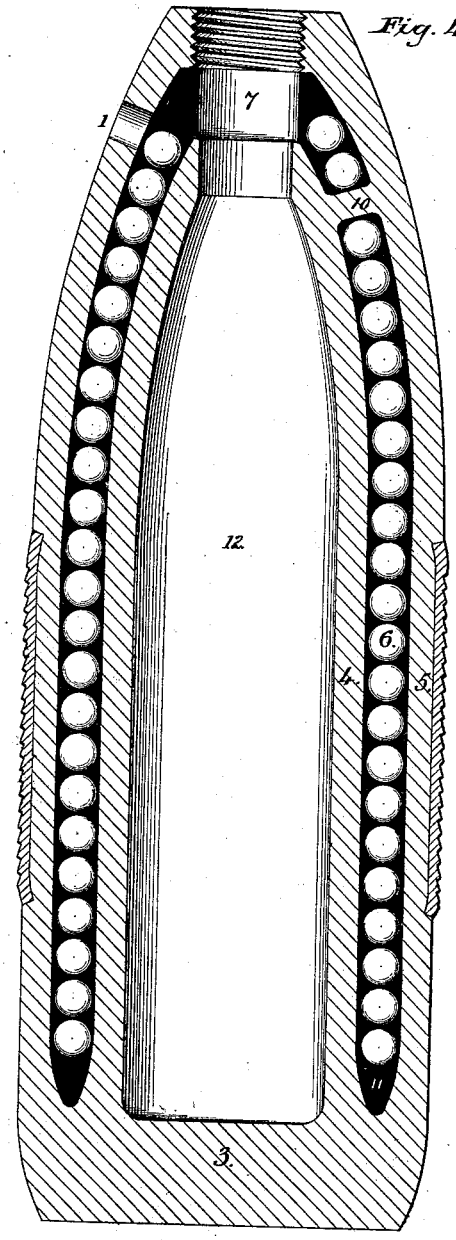


Fig. 5.

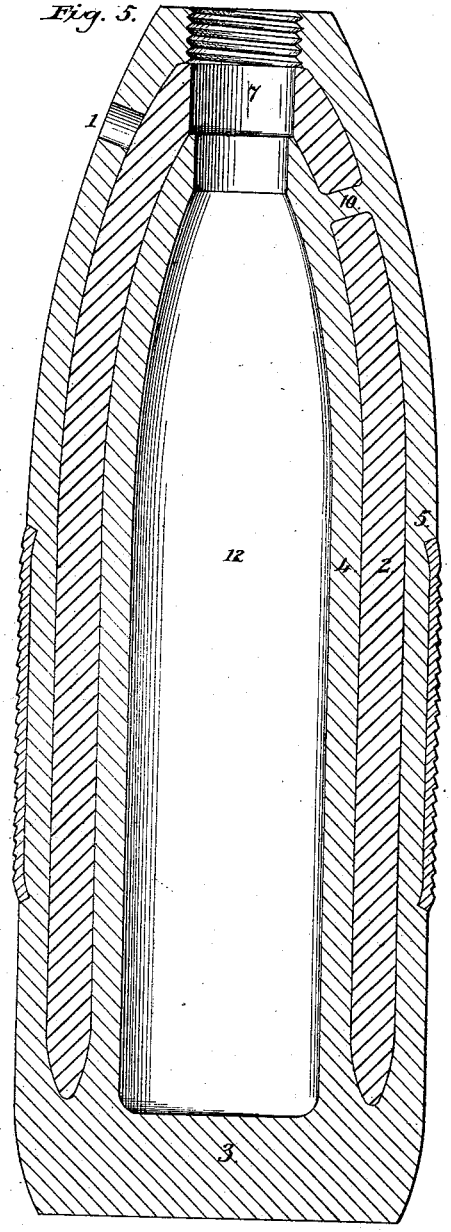
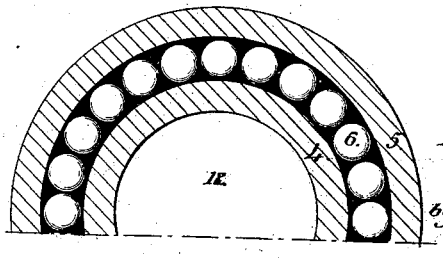


Fig. 6.



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UNITED STATES PATENT OFFICE.

BENJAMIN B. HOTCHKISS, OF NEW YORK, N. Y.

IMPROVEMENT IN SHELLS.

Specification forming part of Letters Patent No. **189,358**, dated April 10, 1877; application filed December 1, 1876.

To all whom it may concern:

Be it known that I, BENJAMIN B. HOTCHKISS, of the city, county, and State of New York, now temporarily residing in the city of Paris, France, have invented certain new and useful Improvements in Projectiles, of which the following is a specification:

In the accompanying drawings, Figure 1 is a longitudinal section of a projectile; Fig. 2, a similar view of its intermediate shell; Fig. 3, a transverse section on plane *x* of Fig. 1; Fig. 4, a longitudinal section of a shell filled with shrapnel; Fig. 5, a similar view of a modification, and Fig. 6 a transverse section of Fig. 4.

Shells and similar explosive projectiles, which depend for efficiency upon their capacity to separate into numerous fragments when they are exploded, have heretofore been constructed with thick walls strong enough to sustain the force of the firing-charge by which they are projected to the point where they are to be exploded. The strength thus imparted to them is found to so resist the exploding-charge as to prevent it from breaking the shell into a large number of pieces.

The object of my invention is to furnish a shell with walls which may be easily broken into a large number of fragments under the force exerted by the exploding-charge.

This is accomplished by casting the shell with multiple walls, the surfaces of which adhere together so slightly as to practically form separated sections; but, in order that the shell may be strong enough to resist fracture from the force by which the shell is projected from the gun, its multiple walls are constructed as an integral part of the base of the shell, which is of a thickness strong enough to prevent its being ruptured at the weak points, or natural lines of fracture, by the shock of the exploding-charge which projects it from the cannon.

The invention therefore consists, primarily, in a shell having multiple walls arranged parallel, or nearly so, with each other, and united to a solid base. It, however, includes some details of construction fully hereinafter pointed out.

In producing this projectile, a shell, 2, of the form of a hollow open-ended cone, with numerous holes, 9, formed in its sides, as shown in Fig. 2, is first cast by the ordinary process. This shell is then suspended by its smaller end upon a core-piece whose dimensions are such as will leave a space between its exterior and the interior surface of the shell 2 equal to the thickness desired for the inner wall 4.

This core and the shell 2 are then suspended in a mold of the common construction, which mold has an inner contour of the shape of the exterior of the complete shell shown in Fig. 1. The metal poured into this mold flows around the inner shell 2, and through its holes 9, thus forming an inner wall, 4, and an exterior wall, 5, secured together by the solid bottom 3, and enveloping the inner shell 2, as is seen in Fig. 1. The said inner and outer walls and the inner shell will also be firmly held together by the anchors 8, which are formed by the metal which has flowed through the holes 9. The inner and outer walls and the inner shell, whose temperature has been raised by the molten metal, will, as the metal cools, shrink toward the center, the said parts being thus held closely together. The head of the shell may then be bored out to form the fuse-opening 7, and is ready to be charged and filled and provided with a fuse-plug for use. The space between its outer and inner walls may be left clear to receive shrapnel, or a tier of balls, as is shown in Fig. 4. But this form of the projectile requires a slight change in the mode of its formation; for instance, a center core must be provided to form the charge-chamber 12, and a hollow core must be suspended concentrically over it to form the chamber 11 between its outer and inner walls, in a manner familiar to those acquainted with the art of casting hollow bodies. An opening, 1, should be left in the outer wall to facilitate the filling of the chamber 11 with shrapnel, which opening may be closed by a plug when the shell is prepared for use. When the shell is produced by this mode of casting, its inner shell 2 may be formed by pouring molten metal through the opening 1. This form of shell shows but one anchor, (marked 10,) while the construction shown in Figs. 1 and 3 illustrates three sets of them, each set being comprised of three anchors, 8, extending radially to connect the inner and outer shells. Except in shells of great diameter, one anchor, as in

Figs. 4 and 5, will be found sufficient, and though it is not absolutely essential that any of these anchors shall be used, any number may be employed.

As before remarked, the uniting of the walls 4 and 5 to the base 3, as an integral part thereof, provides a structure capable of resisting the strain to which it is subjected by the charge which projects it from the gun. While it is formed so as not to be liable to rupture under the influence of the firing-charge, it may be observed that if one wall is fractured in this manner, the other wall will hold the weakened part in place, so that the shell may still be projected from the gun without injuring the same, or preventing the shell from continuing its flight with the same precision as if uninjured. Projectiles thus constructed are efficient weapons, as experiment has determined that the percentage of pieces into which they will burst is largely above that of any of the shells now in common use.

A sabot or packing and fuse of any approved form may, of course, be employed.

What is claimed is—

1. A shell constructed of multiple walls united to a solid base, as an integral part thereof, said walls being arranged parallel, or nearly so, with each other, whereby is provided between them a narrow chamber, adapted to receive and support a separate shell, or tier of balls, and a central chamber of great cubical area for the reception of the bursting charge, all substantially as described.

2. A shell having multiple walls united to a solid base, as an integral part thereof, and inclosing between them a separate shell, substantially as described.

3. A shell having multiple walls united to a solid base, and secured together by one or more anchors, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:

H. T. MUNSON,

M. B. PHILIPP.