

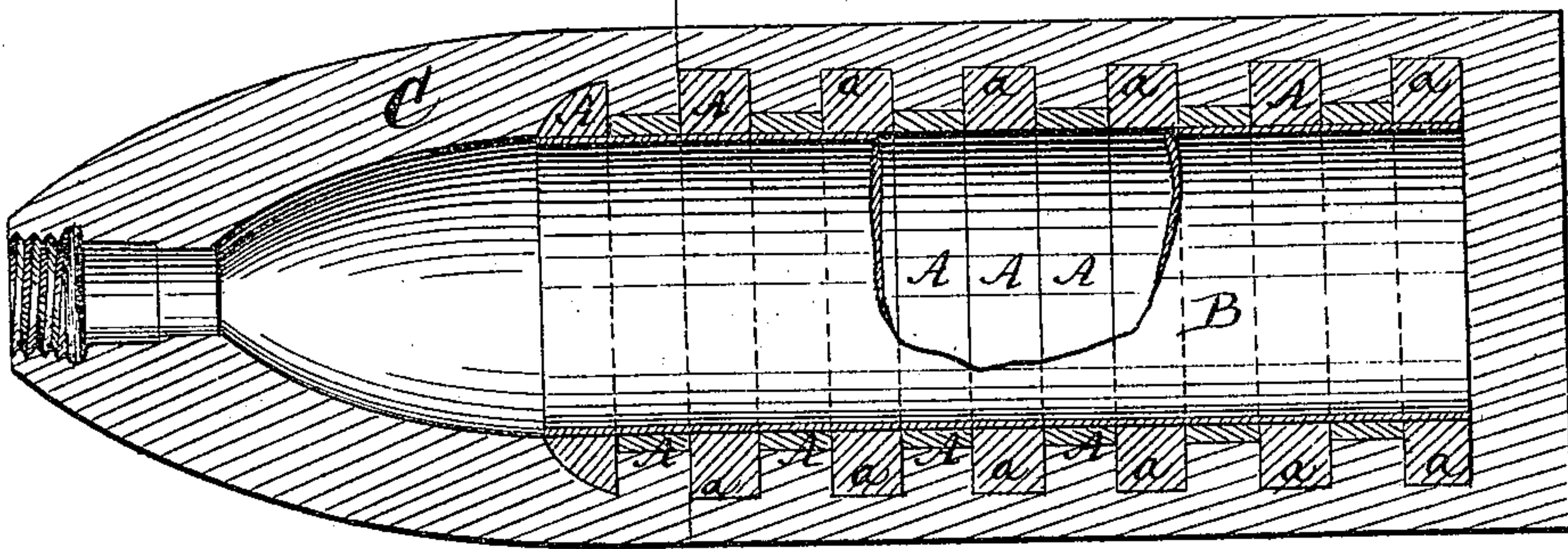
L. W. BROADWELL.

PROJECTILE.

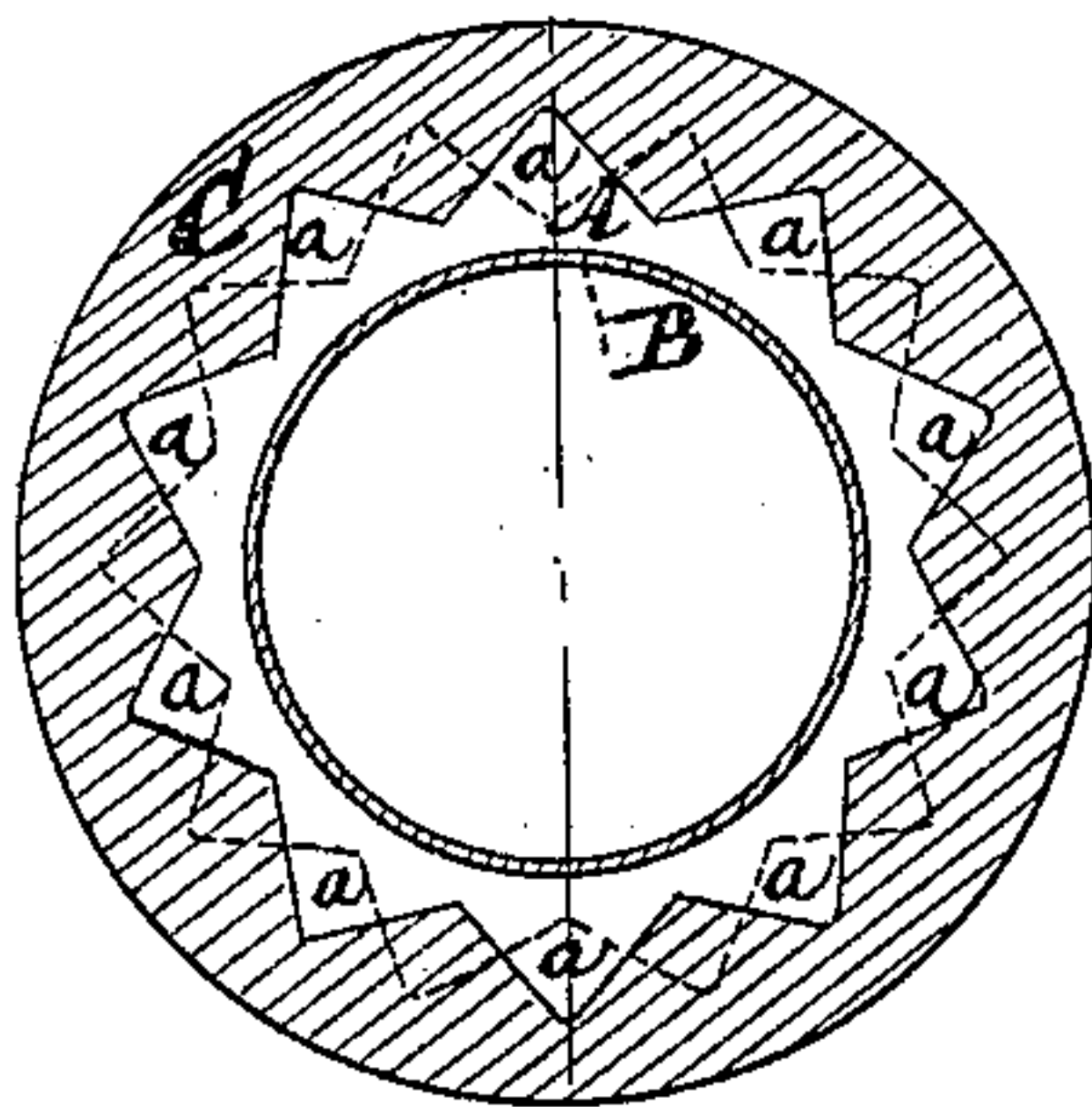
No. 174,771.

Patented March 14, 1876.

*Fig. 1.*



*Fig. 2.*



*Witnesses*

*John Becker*  
*Fred Haynes*

*L. W. Broadwell*  
*By his Attorney*  
*Prout & Allen*



# UNITED STATES PATENT OFFICE.

LEWIS W. BROADWELL, OF HIETZING, NEAR VIENNA, AUSTRIA.

## IMPROVEMENT IN PROJECTILES.

Specification forming part of Letters Patent No. 174,771, dated March 14, 1876; application filed November 27, 1875.

*To all whom it may concern:*

Be it known that I, LEWIS WELLS BROADWELL, a citizen of the United States, temporarily residing at Hietzing, near Vienna, Austria, have invented certain Improvements in Projectiles; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention consists in the combination, in a projectile, of an external solid casing with an inner series of rings, constructed with radial projections, arranged to alternate with each other, as more fully hereinafter set forth.

In carrying out my invention the inner wall of the projectile is composed of a series of rings, arranged one above another, and the outer wall is composed of a solid casing, cast in a mold, with the rings as a matrix. The rings have their inner surfaces smooth, so that when placed one above another they form a tubular chamber for holding the charge of powder or other explosive. On the exterior surfaces of the rings are angular or other suitably-shaped radial projections, which fit into correspondingly-shaped recesses formed in the casing when it is cast around them. Between these projections the metal is very thin, in order to enable it to be easily broken by the explosion of the charge. When the rings are in place together the projections on each ring are immediately above or below, or in line with, the thinnest portions or spaces between the projections of the contiguous rings. The upper and lower sides of the rings may be plain and smooth; or they may be formed with a fillet or projecting rib on one side, and a groove or recess of corresponding form on the other side, so that when the rings are placed one above another the projection on one ring will enter the recess in the next one, and thus retain the entire series of rings in position.

In some cases the radial projections may extend above or below the upper or lower sides of the rings, and enter corresponding recesses in the contiguous rings, care being taken to arrange them so as to break joints, as before described.

Before being built up to form the tube or inner wall the rings are washed or coated with founder's blacking or other suitable preparation, in order to preserve their identity as sep-

arate rings, and also to prevent actual adhesive contact with the casing or outer wall when it is cast around them in the mold. If preferred, however, the rings may be built up to form the tube, and then washed or coated with the blacking.

When the upper and lower sides of the rings are plain and smooth they may be built up around a tube of thin sheet metal, which will constitute a lining for the inner wall, and hold the charge intact until the explosion. The outer surface of the casing may be grooved or chambered for the insertion of windage-rings or rifling bands or strips, in the usual manner.

I do not confine myself to the number of rings, nor to the number or shape of the radial projections, so long as they are arranged with the smallest sectional areas of one ring directly in line with the largest sectional areas of the next adjoining rings, the object being to cause the force of the explosion to effect the disintegration of the parts forming the projectile, and break it into the greatest number of effective pieces.

The accompanying drawing represents a projectile constructed according to my invention, Figure 1 being a longitudinal section, and Fig. 2 a transverse section.

The rings A are formed with projections *a*, extending radially from their outer surfaces, said projections being here shown as tapering or wedge-shaped, with the metal of the ring very thin between every two of the projections, so as to allow the ring to be readily broken into pieces by the force of the explosion. The rings so constructed are built up around a thin metal tube, B, to form the inner wall, and the casing or outer wall C is formed by casting in a mold around said inner wall, which thus serves as a matrix, having been previously coated with the blacking, as before described.

In a projectile constructed as herein described the breaking-up action is as follows: As all the rings are out of positive adhesive contact with each other and with the casing or outer wall, said rings separate at the line of junction, and also at the smaller sectional areas, and exert a corresponding influence upon the outer wall or casing, which is thereby broken into small fragments, instead of into

large pieces, by splitting longitudinally, as is usual in projectiles as heretofore constructed.

The construction may be suitably modified to adapt it to shrapnel without departing from the principles of the invention. In such case the inner surfaces of the rings, instead of being plain and smooth, may be provided with projections arranged to break joints, as before described.

The star rings, with their alternating radial projections, form corresponding indentations in the outer shell when cast upon them, all of which form initial points of fracture, and produce complete breaking up of the outer shell, and at the same time leave it strong enough to withstand the force of the explosion in firing, as the initial points of fracture are on the interior of the outer casing, the interior sur-

faces of the rings being flush with each, or nearly so, forming a smooth and continuous powder-chamber, rendering an interior lining unnecessary.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination, in a projectile, of the external solid casing C with the series of rings, constructed with radial projections *a*, and arranged to have such projections alternate with each other, substantially as described.

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

L. W. BROADWELL.

Witnesses:

JOS. CHLADEK,  
A. HENNY.