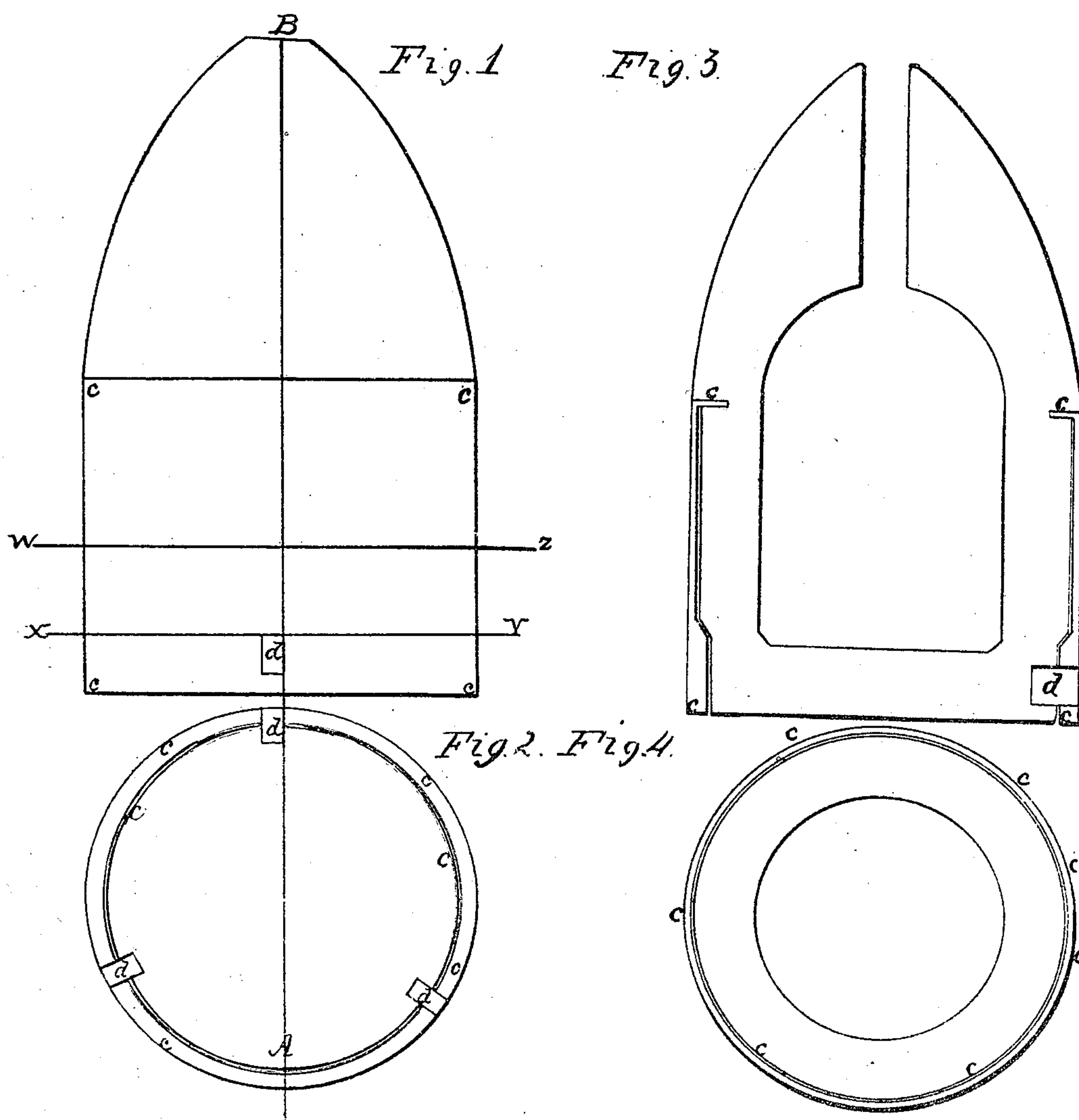


T. T. S. LAIDLEY.  
PROJECTILE FOR RIFLED CANNON.

No. 18,049.

PATENTED AUG. 25, 1857.



# UNITED STATES PATENT OFFICE.

T. T. S. LAIDLEY, OF THE UNITED STATES ARMY.

## IMPROVED PROJECTILE FOR RIFLED CANNON.

Specification forming part of Letters Patent No. 18,049, dated August 25, 1857.

*To all whom it may concern:*

Be it known that I, THEODORE T. S. LAIDLEY, of the Army of the United States, have invented a new and Improved Mode of Making Projectiles for Cannon; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of my invention is to effect such a combination of wrought and cast iron, so securely joined together that the shot or shell so formed shall have the expansive properties of a wrought-iron shot, and the advantage of breaking into many fragments, like a cast-iron shell, at its explosion, the two metals being so closely and firmly united that neither shall be broken or the junction of the two ruptured by the force of the discharge of the gun, the shot at the same time being less expensive than a wrought-iron shot.

The nature of my invention consists in firmly attaching to an elongated shot or shell a wrought-iron covering by fastening both ends of the covering to the body of the shot, either by imbedding the turned-in ends of the cylinder or covering in the cast metal of the shot, or by means of plugs, dowels, or rivets firmly imbedded in the cast-iron and passing into or through the wrought-iron envelope, or by a combination of these methods, leaving a space between the cast and wrought iron, except at or near the ends, which shall connect by means of channels with the rear part of the shot, for the passage of the gas from the discharge of the gun, which, passing between the two metals, shall expand the wrought covering and cause it to fill the grooves of the rifled cannon, causing it to take up a rotary motion around its longer axis, which is communicated to the cast shot by the many and strong connections, or the fracture of the cast-iron. Where the junction of a shot to a wrought-iron cylinder is made by merely imbedding one end of the cylinder into the cast metal of the shot, the projectile, being subjected at the moment of the discharge to a violent torsional strain in conforming to the twist of the gun, and at the same time receiving a direct blow, rarely fails being broken at the junction of the two metals, or the one being torn from the other.

I propose by my invention to increase the

number of connecting points or surfaces between the two metals, placing them at different points of the projectile, so that the motion imparted to one shall be communicated to the other without bringing so great a strain on any one part, thereby preventing the severance of the wrought from the cast iron, or the fracture of the latter.

To enable others skilled in the manufacture of military projectiles to make and use my improved projectile, I will proceed to describe its construction and mode of manufacture and use, referring to the drawings which accompany this specification, and which form a part thereof, in which—

Figure 1 is a plan of shot with a cylindrical covering, fastened by having one end turned in and imbedded in the cast-iron and the other fastened by dowels passing through the wrought-iron and imbedded in the cast metal. *c c c c* is the wrought cylinder, and *d* one of the dowels.

Fig. 2 is a cross-section on X Y. *d d d* are three dowels; *c c c c*, the covering of sheet-iron; *e e e e*, the free space between the wrought and cast iron.

Fig. 3 represents a longitudinal section on A B, showing the turned-in end of the cylinder, the dowel, passage for the gas, the cavity of the shell, fuse-hole, &c.

Fig. 4 is a cross-section on W Z, showing the covering thinned down and free to be expanded out by the pressure of the in between the two metals—the body and its covering.

The general shape of my projectile may be that of any of the various elongated balls for small-arms. The cylindro-conoidal form is preferred.

The wrought-iron cylinder may be formed of the proper dimensions from a sheet rolled to the prescribed thickness at the different parts; or it may be first formed of uniform thickness and afterward turned out to the desired dimensions. The front end may be turned in by means of dies and punches or swages, and holes punched in at the proper places for the dowels or rivets. The cylinder may be left thicker at the front end, likewise, with a view of cutting annular indentations in it to hold grease; and dowels or rivets may be inserted to relieve the strain on the front end of the cylinder when it is desired to use heavy charges.

Instead of using dowels, the rear end may also be turned in and imbedded in the cast metal, thus firmly securing the cylinder at both ends, in which case passages must be made from the rear end of the shot communicating with the vacant space between the cast-iron and the envelope.

The dowels or rivets, when used, may be made of various forms, those being preferred that oppose the least obstacle to the entrance of the gas into the space between the two metals. They may pass through or merely into the wrought-iron covering, and may be made to fit closely, or with play to admit of the expansion of the covering, as desired. The cylinder being formed of the true size of the projectile, its end being turned in, and the dowels or rivets being in place, the interior surface is covered over with a thin coat of loam and dried. It is then placed in the mold for the shot made to receive it, and the molten metal is poured in. The casting being cleaned and gaged, and the exterior opening of the passage between the two metals being slightly enlarged by chipping off the square angle of cast-iron, the projectile is ready for use. Being rammed home on the charge, at the moment of the discharge the gas enters the free space between the cast-iron and the envelope, and, being there confined, expands the covering sheet-iron and makes it fill the grooves of the rifled cannon. The rear part of the covering being too thick to be expanded, that part of the ball which bears against the bore of the gun is thrown forward nearer the center of gravity, insuring greater accuracy.

The advantages that I claim for my projectile over any other yet invented are, first, the perfect junction of the covering to the main body of the ball, the two being joined at numerous and different points, diffusing the strain communicated from one to the other over a great surface and different parts of the ball, thereby preventing the breaking of the cast-iron by the shock of the discharge, and rendering it impossible to sunder one from the other; second, the ball is of such a shape, the covering of wrought-iron being supported by the cast, that it cannot be injured by rough handling or blows of one thrown against another in transportation, which is not the case when soft metals, such as those used in packing, are used, or where the cylinder extends to the rear of the cast-iron, unsupported from

the interior; third, the increased thickness of the wrought-iron in rear prevents that part from expanding and moves the bearing-surface to the front nearer or opposite the center of gravity, insuring greater accuracy; fourth, the junction of the covering with the body of the shot being so much more firm than any other yet used, larger charges of powder can be used, giving the projectile a greater initial velocity and greater range, larger charges than one-ninth the weight of the ball breaking the shot, where the cylinder is fastened to the butt of the projectile, and therefore cannot be used.

I do not claim, of course, as my invention the attachment to elongated shot or shells of a cylinder of wrought-iron fastened to the body of the shot by imbedding its bottom or sides in the cast metal of the shot, "the cylinder attached to the butt of the shot or shell, and its sides to project beyond;" neither do I claim the arrangement of a belt or packing of soft metal, which is to be forced out by the gas passing into certain vacant spaces between it and the main body of the shot; but

What I do claim as my invention, and for which I desire Letters Patent, is—

1. The formation of a cast-iron shot or shell, with a wrought-iron covering of a portion or whole, which is fastened to the main body of the shot at or near both ends by imbedding one or both turned-in ends in the cast metal of the shot, or by means of dowels, pins, or rivets imbedded in the cast metal and joining the two metals, the body with the covering, firmly and securely, or by a combination of these methods, leaving an intermediate portion of the covering free to be expanded by the action of the gases of the discharge passing through certain channels or passages between the covering and the body of the shot made or left for that purpose.

2. Making the wrought-iron covering thicker at its rear end, which admits annular spaces being cut into it to hold grease, or for the action of the atmosphere to keep the ball true in its flight, as in the improved ball for muskets, and also throws the bearing parts of the projectile nearer the center of gravity, insuring greater accuracy.

T. T. S. LAIDLEY.

Witnesses:

JOHN FITCH,  
GEO. W. MORELL.