J. VAVASSEUR.

Method of Attaching Rings to Projectiles.

No. 160,855. Patented March 16, 1875.

Fig: 3.

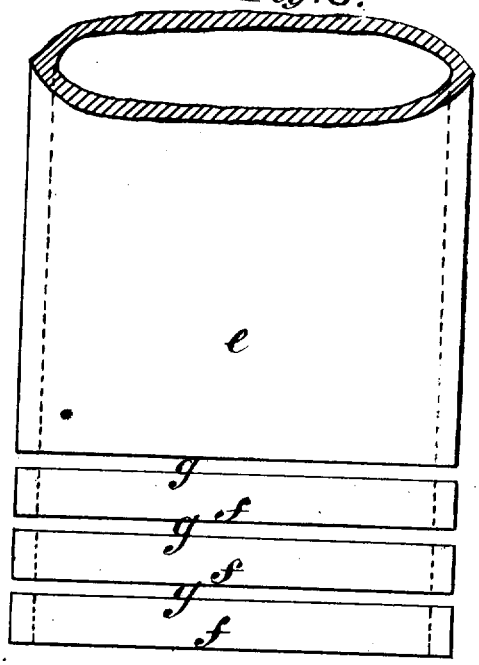


Fig: 1.

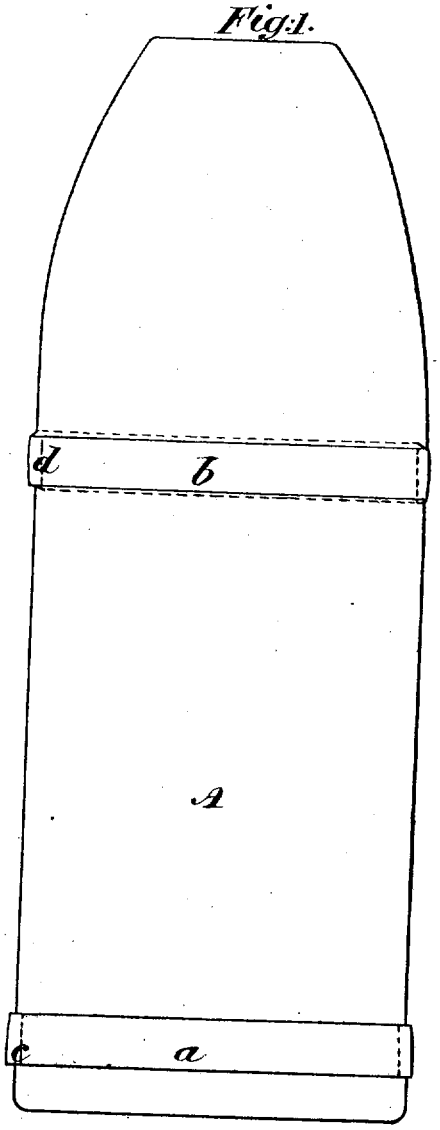
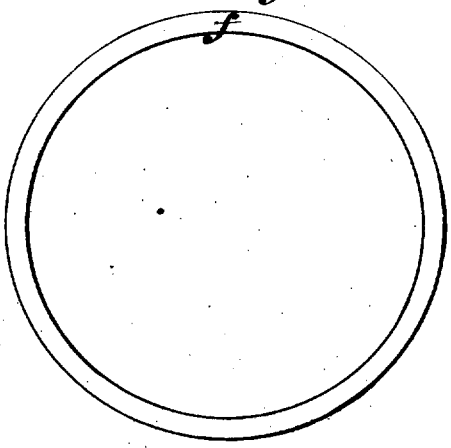


Fig: 2.



Witnesses

E. H. Young

Wm. J. Payton

Josiah Vavasseur *Inventor*

by his Atty

W. D. Baldwin

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JOSIAH VAVASSEUR, OF BEAR LANE, SOUTHWARK, ENGLAND.

IMPROVEMENT IN METHODS OF ATTACHING RINGS TO PROJECTILES.

Specification forming part of Letters Patent No. **160,855**, dated March 16, 1875; application filed July 31, 1874.

To all whom it may concern:

Be it known that I, JOSIAH VAVASSEUR, of the London Ordnance-Works, Bear Lane, Southwark, in the county of Surrey, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Projectiles for Ordnance; and I, the said JOSIAH VAVASSEUR, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention relates to improvements in projectiles for ordnance, and particularly to that class of projectiles in which the rotation due to rifling is given by means of bands or rings fixed into grooves formed around the projectile.

Hitherto I have formed such bands or rings from a strip of metal or wire wound round the projectile and forced into the groove, the ends of such strip being brought together and soldered or simply butted.

According to my present invention, I employ for this purpose solid rings or tubes of copper or other suitable metal, or rings or tubes having a joint in the circumference, but with the ends completely united, in order to avoid the difficulty of forming the joint in the rings consequent on the former construction, and I afterward insert such solid metal rings into the grooves formed to receive them in the projectile.

Various ways of inserting the solid metal rings into the grooves may be adopted. In some cases I take a solid drawn tube of copper or other suitable metal, the inside diameter of which is only so much larger than the outside diameter of the body of projectile as to admit of being slipped or driven onto it. I divide or cut across the tube transversely, so as to obtain rings of suitable width. I slip or drive these rings onto the projectile until they come above the grooves turned to receive them, and I then pass the projectile through a conical die slightly smaller than the metal ring. The latter is thereby contracted or reduced, and forced into the groove of the projectile.

I continue the operation by passing through dies successively smaller than the first, until the ring or band is secured on the projectile; or I use solid drawn tubes with inside diameter smaller than the body of the projectile, and, having cut off rings or bands from the same, I cause them to expand by heating, until they are sufficiently large to pass over the projectile, so that on cooling they will contract into the grooves, and I further reduce them by passing the projectile through conical dies.

When the projectile is for a breech-loading cannon, the outside diameter of the bands or rings is made larger than the body of the projectile, so that when the projectile is fired the rings are forced into the grooves of the gun, and cause the projectile to rotate.

In the drawings annexed, Figure 1 shows a projectile for a breech-loading gun, having solid or complete metal rings *a b*, fixed, as above described, into grooves formed around the body of the projectile, in order to give rotation to it when fired from a gun.

One method of forming the rings *a b* is shown at Figs. 2 and 3, in which *e* is a metal tube, either drawn from a solid tube of metal without joint, or, if jointed, each ring is completely united at such joint before being applied to the shot. *f f* show rings obtained by dividing or cutting the tube transversely at the points *g*.

The interior diameter of the rings is such as to allow of their being either slipped or driven on, or expanded by heat, and passed over the body of the projectile A, Fig. 1, until they come above, or can shrink into, the grooves formed around the body.

The projectile is then passed, together with the rings, through conical dies, each successively smaller than the one preceding it, so that the rings *a b*, Fig. 1, are thereby contracted in diameter, until secured on the projectile with sufficient firmness to enable the desired rotation to be given to the projectile when fired from a rifled breech-loading gun. The sides of the grooves may, if desired, be undercut, as represented by the dotted lines in Fig. 1.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I claim as my improvements in projectiles for ordnance—

The hereinbefore-described method of inserting a soft-metal ring in the groove of a projectile by reducing the diameter of the ring, in the manner substantially as set forth.

Witnesses: J. VAVASSEUR.
WILMER M. HARRIS,
THOMAS LAKE,
Both of No. 17 Gracechurch Street, London.