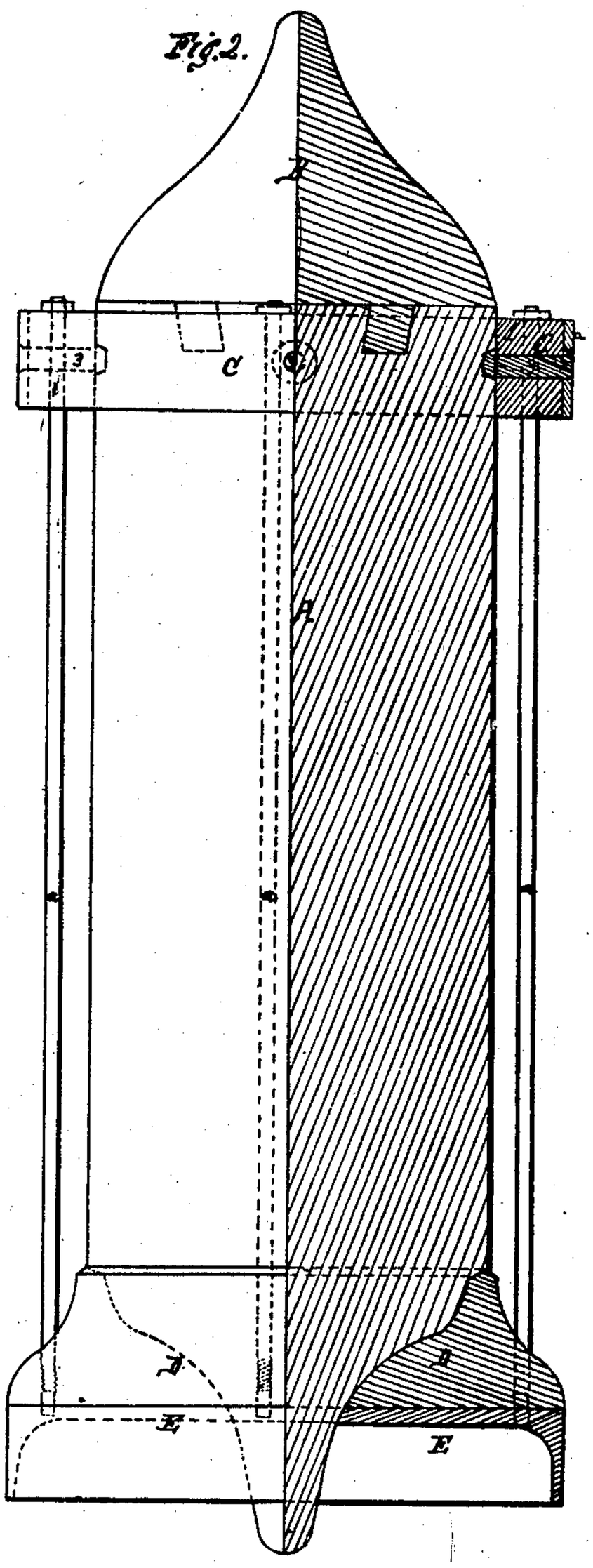
2 Sheets—Sheet 2.

A. H. EMERY.
Projectile.

No. 36,773.

Patented Oct. 28, 1862.

Fig. 2.



Witnesses
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2 Sheets—Sheet 1.

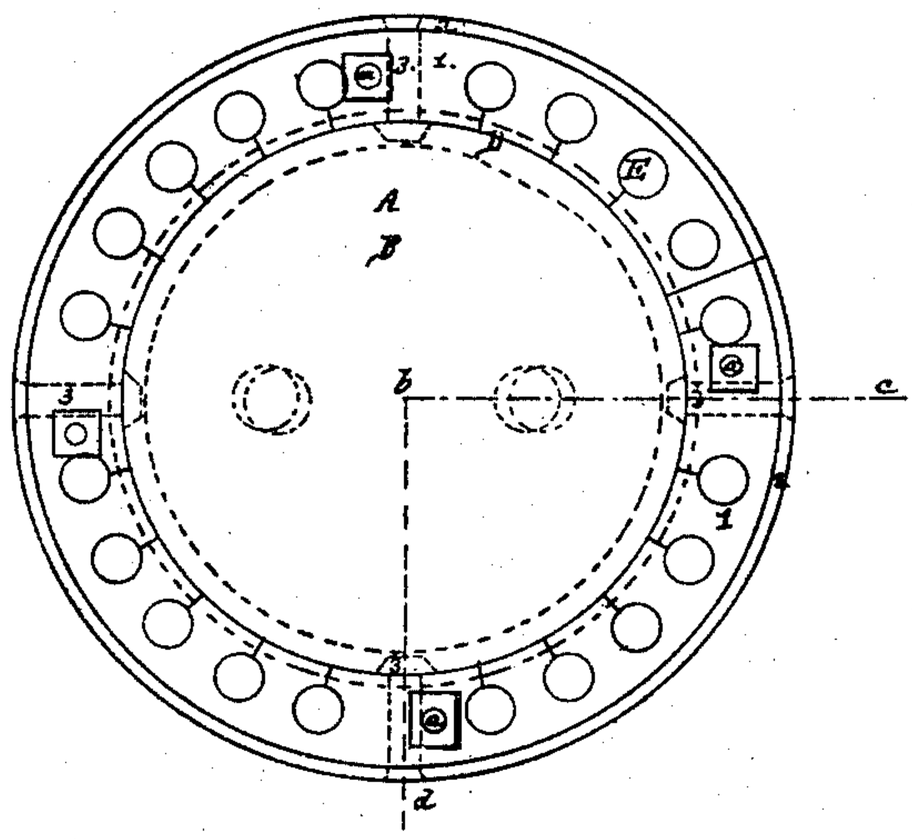
A. H. EMERY.

Projectile.

No. 36,773.

Patented Oct. 28, 1862.

Fig. 1.



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UNITED STATES PATENT OFFICE.

A. H. EMERY, OF NEW YORK, N. Y.

IMPROVEMENT IN PROJECTILES FOR RIFLED ORDNANCE.

Specification forming part of Letters Patent No. **36,773**, dated October 28, 1862.

To all whom it may concern:

Be it known that I, A. H. EMERY, a civil engineer, of No. 17 West Washington Place, in the city, county, and State of New York, have invented a new and Improved Method of Constructing Projectiles; 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 and making part of this specification, in which like letters represent like parts.

The nature of my invention consists in providing sub-caliber projectiles having flat heads, or of a form approximating thereto, with a soft metallic point of such form as to reduce the atmospheric resistance to the passage of the projectile, and of such density as to cause the center of gravity of the projectile to be in front of the center of volume; in providing sub-caliber projectiles with a compound metallic sabot constructed in a cheap and substantial manner, which shall hold the center of the rear of the shot in the axis of the bore, while it transmits to the projectile the entire pressure on the section of the bore, shuts off the windage, and rifles the projectiles in rifle-guns; and in connecting or fastening this sabot to the case or guide-band which centers the front part of the projectile, for the purpose of holding the sabot in its proper position during transportation and loading, and for the purpose of keeping the case or guide-band from being blown from the projectile before the windage is closed or shut off.

To enable others skilled in the art to make use of my invention, I will now proceed to describe the construction and use of my projectiles.

I make projectiles for any gun of such weight as to give the best effect without overstraining the gun from which they are fired, and of the best form for great range and penetration, and to fulfill all these conditions the projectiles must be sub-caliber, or they would be too heavy, as they are very long in proportion to their diameters.

For the purpose of penetrating armor I make the body of the shot of steel with the front end hardened, as of wrought or cast iron, with the front end case-hardened. That such shot shall penetrate to the greatest depth, and shall not slip or glance on inclined plates, it is necessary to make the front end flat, or nearly so, though it may be slightly concave or convex; but such projectiles meet with much atmospheric resistance, owing to their flat heads, and for the purpose of correcting this evil I make use of a soft metallic point. One of these square or flat head shots is shown in the drawings, where A is the body of the solid shot. The shot is shown complete, a front end view in Figure 1 and a side view in Fig. 2, where one half is complete and the other in longitudinal section, the section being made of the cutting-plane *b c*, shown in Fig. 1. The body of the shot A is made of steel hardened at the front end, or of wrought or cast iron, with the front end case-hardened, the latter being the best and least expensive.

Attached to the front end of the shot by any convenient method is the soft-metal point B, which has the form shown in the drawings, so that it shall have but little atmospheric resistance, and which is made of any soft metals, either separately or in combination, which give great density with barely sufficient rigidity to withstand the shock of firing without injury before leaving the gun. For this purpose a lead point, with an addition of a small proportion of tin or antimony, is found to be very good. Such points not only reduce the atmospheric resistance, but they have the advantages of increasing the density of the whole projectile and of rendering the shot more likely to keep point on by placing the center of gravity in front of the center of volume, while they increase the penetration by giving a heavy impact blow to the plate, from which the latter has no time to recover before there is added to it the pressure of the body of shot proper, and the pressure on the head of the shot necessary to penetrate the plate is reduced by nearly the whole blow of the soft point, only a small amount of work being necessary to press the point out of the way, while shell points and wood points reduce the density of the projectile, and thus its range, and at the same time place the center of gravity in the rear of that of volume, rendering the shot likely to rotate about a transverse axis, and the wood has the disadvantage of causing the shot to glance on inclined plates, and it acts like or as an elastic cushion between the front of the shot and the plate, reducing the depth of penetration. The sabot for this shot is made of two pieces of metal, D and E, D being made of

some hard and very firm strong metal which shall hold the rear of the shot in the center of the bore, and transmit to it the pressure of the powder on the section of the whole bore, and is best made of steel or wrought or cast iron, while E is made of some soft metal or metals which shall be sufficiently soft to press into the grooves of the rifling to shut off the windage and rifle the shot or shell, either of which may be used as a sub-caliber projectile with one of these compound sabots. The part E is made sufficiently strong to rifle the shot, and is best made of brass or malleable iron, the former being preferable. Were this sabot D and E all made of one piece of the form here shown, cast-iron or steel could not be used, as they would not work well to press into the grooves to shut off the windage and rifle the shot, and I should then have to use best either brass or wrought-iron; but the expense of a sabot of this form and of the requisite strength of either brass or wrought-iron when made in one piece would usually preclude its use. The part E, is for convenience of transportation and in handling the projectile, fastened usually to the part D. Wood cannot be well substituted for this sabot, as the extreme pressure of the gas will always press it through between the shot and sides of the bore with disastrous results; but a wood sabot may be advantageously placed between the two parts D and E of the metallic sabot, where it acts like an elastic cushion to relieve the sabot of the sudden strain in starting the projectile.

The metallic sabot D E is fastened to the case or guide-band C for the purpose of retaining it in its proper position in regard to the projectile A, and for the purpose of keeping the guide-band C as a case which may be used in its place from being blown away before the shot starts by the gas that escapes before the windage is shot off. This precaution is necessary on account of the extreme lightness of the guide-band or case C, which is used for the purpose of centering the projectile in the bore of the gun, and which is made very light, as much so as is consistent with the requisite strength.

The sabot is never fastened to the projectile, as it must separate from the latter as soon as it leaves the gun; but it will be held against the shot sufficiently firm to rifle it by the entire pressure of the powder.

The sabot is fastened to the guide-band C by the rods *a* or any other convenient method.

The case or guide-band C as here made is constructed of the wooden ring 1 and the brass band 2, fastened together by the rivets 3. This band C may be widened to form an entire case for the cylindrical part of the shot or shell, and is always made light and in such a manner as to leave the projectile as soon as the latter leaves the gun.

The removal of the guide-band C and sabot from the shot when it leaves the gun, reducing the section and exposing a pointed rear of the projectile, very much lessens the atmospheric resistance.

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

1. The construction and use of a soft metallic point arranged with a sub-caliber projectile, substantially as and for the purposes herein described and set forth.

2. The construction and use of the compound metallic sabot arranged with a sub-caliber projectile, substantially as and for the purposes herein described and set forth.

A. H. EMERY.

Witnesses:
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