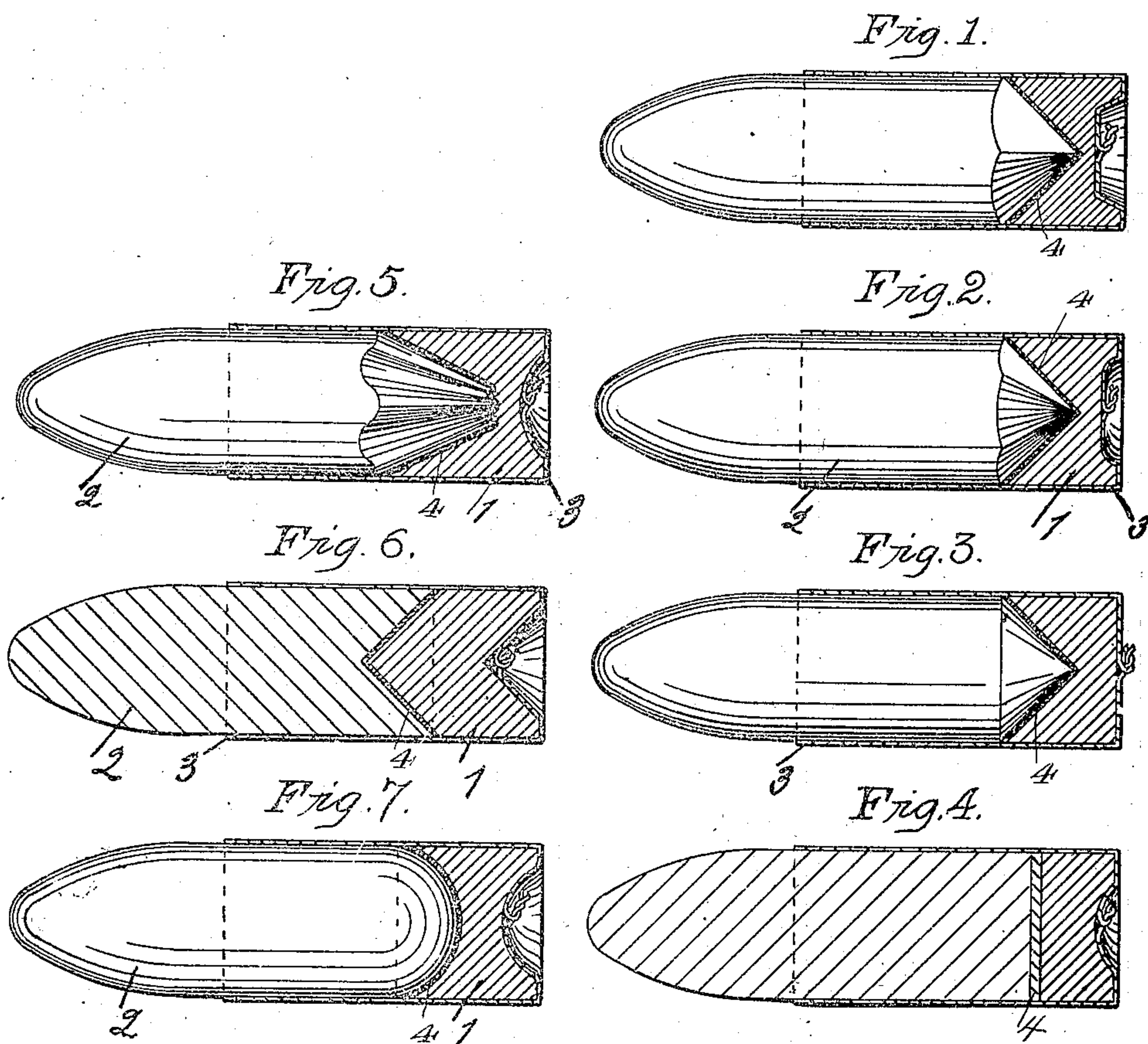


(No Model.)

A. BALL.
COMBINED PROJECTILE AND GAS CHECK.

No. 405,690.

Patented June 25, 1889.



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INVENTOR

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WITNESSES

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ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE.

COMBINED PROJECTILE AND GAS-CHECK.

SPECIFICATION forming part of Letters Patent No. 405,690, dated June 25, 1889.

Application filed February 21, 1887. Renewed May 3, 1889. Serial No. 309,546. (No model.)

To all whom it may concern:

Be it known that I, ALBERT BALL, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in a Combined Projectile and Gas-Check or Sabot; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to combine with a bullet or projectile made of hard metal—such as iron, steel, &c.—a gas-check or sabot that will not be upset by the action of the explosive, and that will not injure the rifling of the barrel of the gun, and also to so connect the projectile and the sabot that when the latter is forced into the grooves of the rifle by the explosive it will impart rotation to the projectile and yet readily separate from it upon leaving the gun. These objects are important, and means heretofore used have failed to accomplish them with sufficient certainty of action and simplicity of construction.

I make the sabot or gas-check, preferably, of soft metal—such as lead, tin, or alloys of lead and tin, &c.—that can be easily melted in a ladle and run into molds of proper shape. The metal, however, may be swaged into the form desired. The gas-check may also be made by swaging or molding paper, papier-maché, vulcanized fiber, "leatheroid," or leather, or it may be made from asbestos, jute, flax, or cotton, these substances being treated or mixed with paste, shellac, starch, or gum compounds, or compounds of tallow, paraffine, barberry-tallow, or beeswax, and then pressed into the proper form.

Figs. 1, 2, 3, 5, and 7 represent side views of the projectiles or bullets, the gas-checks and outside wrapping being shown in section. Figs. 4 and 6 represent longitudinal sections of both gas-check and bullet.

The sabot in each figure is indicated by 1, the projectile by 2, and the exterior envelope or wrapper by 3, and 4 indicates a substance interposed between the sabot and the projectile to prevent their adhesion. The body of the sabot is made with a depression in one end to receive a correspondingly-shaped end

of the projectile. These have equal diameters, and the wrapper that surrounds them both is a right cylinder and closely embraces the surface both of the projectile and the sabot. This wrapper is made of linen or cotton cloth, of paper, or of tin or lead foil or other equivalent material, which is rolled or wound tightly around the projectile and sabot after they have been placed in proper relative position. The end of the wrapper extending beyond the base of the sabot is twisted or pinched together and may be cemented or soldered, if thought desirable.

In some cases I provide a recess in the end of the sabot or gas-check and press the folded or twisted end of the wrapper into it. This recess gives greater lateral effect to the explosive, whereby the material of the sabot is forced into the grooves of the rifle more thoroughly.

The wrapper extends over the whole length of the gas-check and across one of its ends, and also over a large part of the projectile. It prevents the hard metal of the projectile from wearing the rifling of the gun-barrel and holds the sabot and projectile together securely for handling or transportation, and in operation, when the soft material of the gas-check has been forced into the grooves of the gun by the explosion, it tends to impart the rotary motion of the same to the projectile. An efficient means for producing this latter effect is provided in the extended contact between the parts. Heretofore sabots have been combined with projectiles so as to leave an air-chamber between them, or between one of them and the covering or wrapper. It is characteristic of my improvement that it leaves no air chambers or spaces about or at the base of the projectile; but this is placed in full contact with the sabot over an area as large at least as a cross-section, there being interposed only a thin layer of some substance—such as soapstone, plumbago, or a mixture or compounds of these, or a layer of paper or similar material—to prevent adhesion. The sabot, therefore, bears practically upon the whole base of the projectile at the very beginning of any movement caused by the explosion and communicates motion to the projectile at once. In constructions heretofore made wherein the sabot did not fit the pro-

jectile there was in operation an interval during which the sabot was independently moved forward and the air expelled from intermediate spaces, and during which the force of the explosion did not fully reach the projectile.

The simultaneous forward and rotary movement of the sabot and the projectile is further insured by my construction. (Indicated in Figs. 1 and 2.) As there shown, the projectile is provided with an extension which is angular in cross-section, and it fits a similar-shaped recess in the sabot, whereby independent rotation, so long as the parts are held in contact, is prevented. An equivalent is shown in Fig. 5, wherein the extension is represented as made with a corrugated surface, and various other equivalent forms will readily suggest themselves.

The pointed form of the projectile has the further effect to force the material of the gas-check to move laterally and into the grooves of the rifle as soon as the gun is fired and while the inertia of the projectile is at first being overcome. It is obvious that the height of the cones or pyramids on the base of the projectiles may be varied without materially affecting the operation. They should probably not be made so high, however, as to pierce through the sabot, or the latter should be made sufficiently long to leave a body equal in diameter to the projectile, for the reason that a ring of soft material is more liable to be upset or otherwise displaced by the effect of the explosion, and the best result is secured by having the entire space of the barrel of the gun from the point of the bullet to the base of the gas-check filled as solidly as practicable, and by giving to the latter a sufficient body to prevent its moving unequally or irregularly, as is the case where light rings or plates are used, and especially when they are so placed as to leave chambers or air-spaces between them and the bullet or between either of them and the covering. I also prefer to make the sabot of the relative length indicated, or about as long on its exterior as the diameter of the bore of the gun, whereby upsetting or any backward or irregular movement of the surface of the soft metal is obviated.

From the above description it will be seen that the covering, which tightly embraces all the sabot and a large part of the projectile, and the extended bearing provided between the two latter, which is in no case less than the area of a cross-section of the bullet, combines with its pyramidal or corrugated base to hold the parts together.

The explosion crowds the material of the sabot into the rifled grooves and also the wrapper, which serves as a part of the gas-check, but only incidentally, since the grooves would be filled and the windage obviated were no covering employed. It may also be noted that the friction between the gas-check and the bullet would be sufficient to impart the rotary

motion of the former to the latter without the covering, since the bearing between the two extends transversely through the whole area of a cross-section of the bore. The lateral expansion of the soft material of the sabot into the grooves partially disrupts the covering, and as the projectile has little or no friction to overcome in the barrel and no resistance except that due to the air in said barrel its velocity will be sufficient the instant it escapes from the gun to sever its connection with the sabot, which will be retarded by friction in the grooves, the separation of the parts being aided by the material interposed to prevent adhesion.

Sabots of compound form, embracing an exterior ring and an interiorly or centrally located cup, plug, or other piece, have been applied to projectiles, and I do not, broadly, claim a sabot having a lateral extent equal to that of the projectile and in contact with the same.

In another combination a projectile has been provided with exterior spiral grooves on its forward portion and also on its rear portion, which latter was embraced by a sabot having similar interior grooves. The projectile was also provided with a central longitudinal opening and a device located therein adapted to cause the rotation of the projectile by the resistance of air. Provision was also made in the sabot for sufficient windage to cause rotation of the projectile by impact upon the walls of the posterior grooves of the same before it left the barrel.

In my sabot and projectile there are no spiral grooves or lines, nor any modification of form to produce rotation either before or after leaving the barrel, the grooves of the barrel alone being relied upon for this effect.

My construction, though resembling in a general manner as to its main features devices heretofore described, is more economical and efficient than any known to me. It is homogeneous in its composition and simple (not compound) in its structure, and is less liable to be disrupted in the barrel than those which are composed of an exterior ring having an exterior cup or plug or those having deep exterior and interior grooves and made smaller than the projectile to provide sufficient windage to revolve it in the barrel.

Heretofore a rubber sabot having a diameter equal to that of the projectile and closely fitting its base without an interposed film has been described, and also a complex sabot entirely inclosed in a cloth covering. In use this last-described sabot was separated from the projectile by pins or wedge-shaped pieces. In neither construction was there a covering common to the two parts. Such combinations I do not claim, nor do I claim covering both a sabot and projectile having uniform diameter, and thereby holding them in contact; but my claim is limited to the particular combinations pointed out.

Having thus described my invention, what I

desire to claim and secure by Letters Patent is—

1. A projectile having a pyramidal base provided with a sabot of homogeneous composition and simple structure applied closely to the whole area of its base, and secured to it by a temporary fibrous covering that closely fits both the sabot and the projectile, substantially as specified, whereby motion in a forward direction will be simultaneously imparted to them by the explosion.

2. A projectile having a pyramidal base provided with a sabot of homogeneous composition and simple structure applied closely to the whole area of its base, and secured to it by a temporary fibrous covering that closely fits the sides of them both, and is secured at the rear of the sabot in a recess formed therein, substantially as set forth.

3. A projectile having a sabot of homogeneous composition and simple structure applied to the whole area of its base, a film to prevent adhesion interposed between the sabot and projectile and normally in contact with the

whole transverse area of each, and a covering closely embracing the sabot, projectile, and interposed film, whereby the parts, being of substantially uniform diameter, are held in close relation to each other until the covering is torn, when the projectile issues from the barrel, substantially as specified.

4. A projectile having a base angular in cross-section, and having a sabot of homogeneous composition and simple structure fitting the whole area of the base, and a covering tightly embracing both with an interposed film to prevent adhesion, substantially as set forth, whereby the main body of the projectile is adapted to be rotated with the sabot in a gun-barrel and separated from it as soon as it leaves the barrel.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT BALL.

Witnesses:

FRANK A. BALL,
C. BELLE DUTTON.