(No Model.) 2 Sheets—Sheet 1.

# J. M. POLLARD.

## CARTRIDGE.

No. 478,020. Patented June 28, 1892.

Fig. 1.

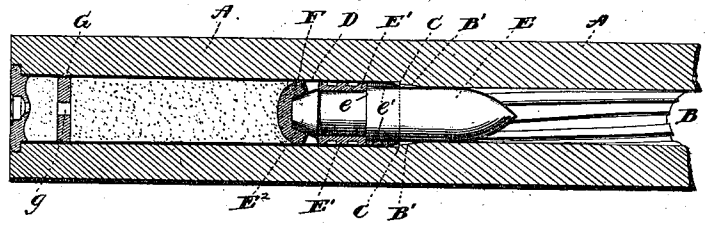



Fig. 2.

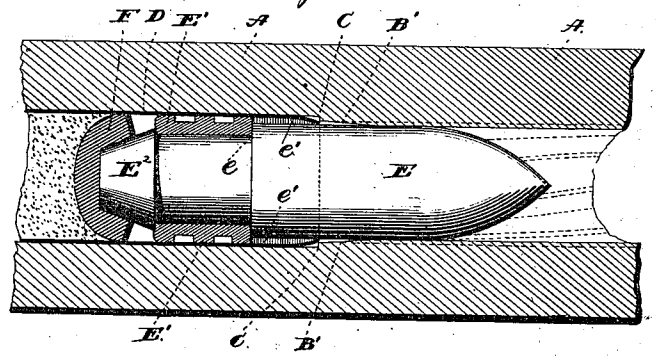
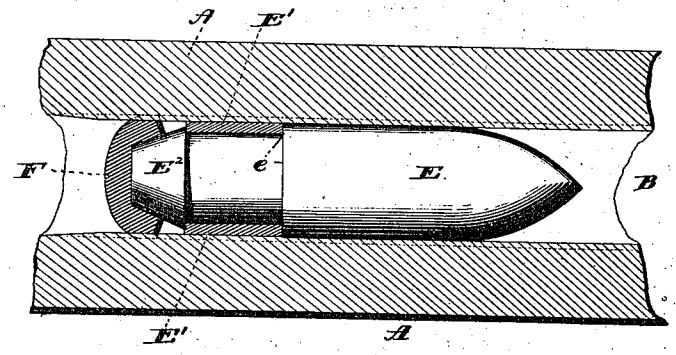



Fig. 3.




Witnesses
Chas. J. Williamson
Henry C. Hazard.

Inventor
James M. Pollard
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his Attorneys

(No Model.) 2 Sheets—Sheet 2.

# J. M. POLLARD.

## CARTRIDGE.

No. 478,020. Patented June 28, 1892.

Fig. 4.

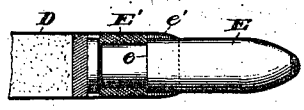


Fig. 5.

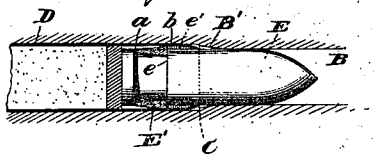


Fig. 6.

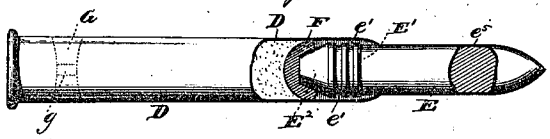


Fig. 7.

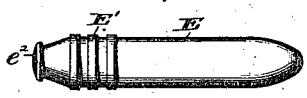


Fig. 8.

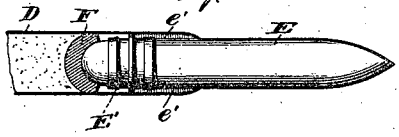


Fig. 9.

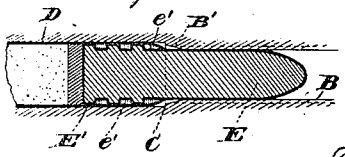


Fig. 10.

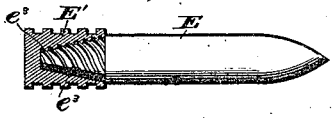


Fig. 11.


Witnesses
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his Attorneys

# UNITED STATES PATENT OFFICE.

JAMES M. POLLARD, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO GEORGE S. PRINDLE AND PHILIP G. RUSSELL, OF SAME PLACE.

## CARTRIDGE

SPECIFICATION forming part of Letters Patent No. 478,020, dated June 28, 1892.

Application filed January 17, 1889. Renewed November 20, 1891. Serial No. 412,471. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES M. POLLARD, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Cartridges; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a longitudinal section of one of my improved cartridges in place in the barrel of a gun having its bore shaped in accordance with my invention; Fig. 2, a similar view of the same, on an enlarged scale, with the rear portion of the cartridge broken away; Fig. 3, a similar view of a portion of the barrel, showing the projectile and wad as they appear after having left the cartridge and passed forward beyond the taper at the rear end of the bore proper in front of the cartridge-chamber; Fig. 4, a longitudinal section of the forward end of one of my cartridges with the projectile of a different shape and provided with a different form and kind of gas-ring; Fig. 5, a similar view showing still another form of gas ring or band; Fig. 6, a view in side elevation of one of my cartridges provided with a modified form of projectile, a portion of the cartridge being broken away to show the wad and gas ring or rings; Fig. 7, a detail view of one of the gas-ringed projectiles provided with an enlargement at the rear end of its tapering base; Fig. 8, a longitudinal sectional view of the forward end of one of my cartridges with a projectile having a modified form of gas-ring; Fig. 9, a similar view showing a modified form of projectile, also in longitudinal section; Fig. 10, a detail view, partly in section, of a modified form of projectile; and Fig. 11 a detail view of a portion of a projectile having a plane cylindrical gas-ring with patch thereon.

Letters of like name and kind refer to like parts in each of the figures.

In ball-cartridges as heretofore made where a large charge of powder has been desired the cartridge has either been made very long or the shell has been bottled. The long cartridge has been found inconvenient to carry and hard to clean and, where a magazine is used, to take up too much room. The bottle-necked cartridge has also been found undesirable as being hard to clean and very objectionable for use in magazine-guns, as it cannot be fed properly on account of its shape. With these objections to the cartridges as heretofore made in view my invention has for its object to make it possible to use large charges of powder without increasing the length of the cartridge and without bottle-necking the cartridge-shell.

It is also the object of my invention to insure not only that the projectile shall take the grooves of the rifling most closely and receive its twist in the best manner, but that said projectile shall be properly lubricated in its passage through the bore of the gun and that the bore shall be at each discharge thoroughly cleaned and freed from residuum or fouling, which always collects in a gun in which ordinary cartridges as heretofore made are fired.

It is, further, the object of my invention not only to make it possible to use a large charge of powder without increasing the length or changing the shape of the cartridge-shell, but also to much increase the effectiveness of a charge of powder of a given size.

With these objects in view my invention consists in the cartridge, in the construction, arrangement, and combination of the parts thereof, and in the combination of such cartridge with the barrel having the bore of the peculiar shape at its rear end, as hereinafter specified.

In the drawings, A designates the barrel of a gun, which can be of any of the well-known makes, and B designates its bore. Instead of having the cartridge-chamber adapted to receive a cartridge having its front bullet-receiving end of substantially the same caliber as the bore of the gun, as heretofore, I make the chamber of a greater caliber than said bore. As shown in Fig. 1 of the drawings the caliber of the bore is .45, while that of the cartridge-chamber at its front end is .50. I do not, however, limit myself to such rela-

tive sizes of calibers, but contemplate making the difference between the chamber and bore greater or less, as desired.

Within the bore of the gun, just forward of the shoulder C at the end of the cartridge-chamber, is a conically-faced annular shoulder B′, forming a short conical forwardly-tapering passage whose sides run from the shoulder C forward and inward until they reach the inner faces of the lands of the rifling. This tapering passage connecting, as described, the larger cartridge-chamber with the main portion of the bore of smaller caliber, serves a purpose to be hereinafter described. The shoulder C is to be so situated, as usual, that the end of the cartridge-shell D within the chamber shall fit close to it when the shell is opened or expanded, as by firing, and the shoulder is of such thickness that its inner edge shall be flush with the opened shell end.

With the difference described between the diameters of the cartridge-chamber and the bore proper of the gun I can obviously use a larger cartridge, and consequently have a larger charge of powder, without increasing the length of the cartridge or bottle-necking the shell. This means that for a given bore of gun I can use a straight cartridge of a given length which will contain a much larger charge of explosive than could be put in any straight cartridge of the same length heretofore made and used for the same bore.

The projectile E for use with my cartridge can be of any of the ordinary well-known forms adapted to fit the bore and take the grooves of the rifling by upsetting or otherwise; but I prefer a projectile having its main portion adapted to fit the bore of the gun and project forward therein when the cartridge is in place in its chamber, as shown in the drawings, and provided with a portion larger than the bore of the gun, adapted to be compressed or reduced in size as it passes through the tapering part or passage to the bore proper. This compressed or reduced portion will then fit the bore and take the rifling so closely that there can be no windage or escape of gas and the projectile must be given proper twist by the rifling.

In Figs. 1 and 2 the projectile E is shown as provided with a metal gas-ring E′, of some soft metal, preferably an alloy of tin and lead, but, if desired, of tin, annealed copper, or Babbitt or other metal. This ring, which is grooved circumferentially or cannelured, is of greater external diameter than the body of the projectile and fits the interior of the cartridge-shell. It can be fixed in any desired way on the projectile-body; but in the figures referred to I show it as fitting in a groove around said body. The rear end of the projectile behind this ring is made conical or tapering to prevent vacuum behind the projectile in its flight. Upon this conical end $E^2$ is the cup-shaped wad F, of paper, felt, or other stiff, firm, and preferably fibrous material. This wad is cupped over the conical projectile-end and is of such diameter as to fit the cartridge-shell closely. It is desirable to have its front side as presented around the projectile end abrupt or at considerable angles to the cartridge-shell sides, as shown, for a reason to be hereinafter explained. The space between the walls of the shell and the body of the projectile in front of the gas-ring E′ is filled with lubricant $e'$, and the end of the shell is then preferably crimped down onto the projectile, confining the lubricant in place and firmly clasping the projectile sides.

The cartridge can be loaded with any desired form or kind of explosive; but I prefer to use black powder for filling the main and forward portion of the shell and some clean non-fouling powder—as, for instance, that known as "Bracket powder"—for the portion of the explosive charge at the rear end of the cartridge. Between the two kinds of powder I place a wad G, which can be provided with a perforation $g$ or not, as desired.

As a non-metallic band or gas-ring is often desirable and better than a metallic one, especially in rapid-machine-gun firing, where the contact of metal with the hot barrel is to be avoided, I contemplate making the gas-ring for my projectile of non-metallic material, as indicated in Fig. 4. For such ring or band leather, papier-maché, vulcanized fiber, or other fibrous or non-fibrous compressible material may be employed. Where such a gas-ring is used on a projectile in the guns as heretofore made it is impossible to secure sufficient compression of the ring on the projectile to prevent windage and insure the proper taking of the grooves unless the ring is compressed before seating the bullet in the cartridge-shell. A ring of leather or other fibrous material when it has been so compressed would by its outward pressure bulge or expand the shell, so that it would not fit the cartridge diameter.

With my cartridge, as described and shown, a ring can be used thick enough to insure fitting the bore tightly and closely taking the grooves when it is compressed, and the proper and desired compression will be caused by the passage of the ring through the tapering part of the bore after said ring has left the cartridge-shell. Such compression of the ring can easily be secured in this way as it would not be possible to obtain in other ways or by other means.

The rear ends of the projectiles illustrated in Figs. 4 and 5 are shown as flat, and behind them are strong thick flat wads instead of the dished or cupped wads shown and described hereinbefore. In front of the gas-rings and inclosed by the crimped shell lubricant is shown, as in the other forms of cartridges.

The gas-ring E′ (shown in Fig. 5) is made tapering rearward, the idea of this form being to allow the outer portion of the ring to be pressed or caused to flow back as the projectile starts from the cartridge and the ring is compressed by the walls of the tapering part of the bore before reaching the bore proper. The band of metal or other material forming the ring is so proportioned as to exactly fill the bore and the grooves therein. The part of the ring above the line *a b* is just sufficient when displaced and forced back to fill the grooves of the gun at the rear portion of the ring. The annular groove *e* or recess in the projectile into which the ring E′ fits can be made tapering toward the front, as shown, in order to insure wedging the band or ring to a tight fit in the bore of the gun.

The gas-rings on the various forms of projectile can be made large enough in diameter to fit the cartridge-shells, and so aid in centering the projectiles, or, as shown in Fig. 6, the shell can be larger than the ring or rings and the projectile can be centered in the cartridge by the cupped wad F engaging its taper base and the crimped forward end of the shell engaging the projectile in front of the ring or rings. The whole space around the projectile and between the wad F and the inturned shell edge can then be filled with lubricant of any desired kind.

In Fig. 7 I show a modified form of projectile having the projecting gas-ring, and around the end of its tapering base a rounded projecting rib $e^2$, adapted, as described in my United States patent, No. 179,054, to act as a feather to cause the axis of the projectile to keep in line with the direction of the projectile's travel.

In Fig. 8 I show one of the annular ribs or gas-rings on the projectile made greater in diameter than the others, so as to fit the cartridge closely and center the projectile. The base of the latter is shown as rounded or spherical instead of conical. The centering-ring is made quite thin, so as to be displaced or compressed easily by the taper part of the bore of the gun.

In Fig. 9 is shown a projectile preferably composed of an alloy of tin and lead sufficiently hard to resist upsetting by the force of the explosive used. Such projectile is cast with one or more gas-rings on it greater in diameter than the projectile-body and the bore of the gun with which the projectile is to be used. Lubricant is shown as filling not only the space within the crimped end of the cartridge-shell forward of the gas ring or rings, but also the spaces in the grooves between the several annular ribs or rings around the body of the projectile.

In Fig. 10 is shown a modified form of projectile in which the body of material forming the gas-ring is attached to the projectile by being screwed on the threaded rear end thereof. Such end is made tapering and is provided with screw-threads $e^3$ $e^3$, preferably of quick pitch and running in the same direction as the grooves of the rifling in a gun. The block of material forming the gas-ring is provided with corresponding internal threads adapted to engage properly the threads on the projectile end. The gas-ring thus attached can be externally of any desired form, but is preferably grooved or cannelured. I prefer to make the threaded portion of the projectile-body conical, as shown, for with this shape and the attaching-threads of quick pitch and running in the direction described the twist given the block forming the gas-ring in the grooves of the rifling will tend to force said block farther onto the projectile end, and so expand it to cause it to fit the gun-bore and take the rifling more closely.

For sharp-shooting and target-shooting a plane metallic band or gas-ring of tin or tin and lead covered with paper, or patched, as indicated in Fig. 11, can be used to advantage. The paper patch $e^4$ will then, as usual, be cut away by the grooves of the gun as the projectile passes along the barrel and will shed or strip from the projectile as the latter leaves the muzzle of the gun.

If the material used for the band on any of the different forms of projectiles is compressible, it should be of such size or thickness when uncompressed as to fit the shell closely and snugly and should be so shaped and of such volume as to entirely and closely fit the bore and fill the grooves of the rifling when it has been compressed by passage through the tapering part of the bore.

If the difference between the calibers of the bore and shell be too great to permit of sufficiently reducing the band or ring to the size of the bore by direct compression alone, enough of the material of the ring can be removed by grooving to reduce the volume of material to the necessary extent to allow of proper reduction of the diameter of the ring before entering the straight part of the bore of the gun. With a band or ring of compressible material so formed obviously a shell of much larger caliber than the gun-bore can be safely used.

As indicated, broadly, hereinbefore, if the material of the gas ring or band be uncompressible, as metal, the volume of the material to be swaged by passage through the taper part of the bore can by proper grooving be diminished, as desired, without lessening the diameter of the ring. The grooves can be made of such depth and width that the remaining material of the ring will be just enough after passing through the taper or swaging part of the bore to just fill the bore and the grooves of the rifling. The grooves on the band or ring would then be obliterated.

If desired, the grooves in the gas-ring can, as shown in Fig. 6, be made of such depths

that their bottoms are below the plane of the periphery of the body of the projectile. This will make more room for the flow of metal as the ring is swaged and reduced in size.

Where the gas-ring is of such diameter as to fit the shell closely, the best results will be obtained if, as shown in Fig. 2, the grooves in the ring are made of such depth that their bottoms are as far within the plane of the bottoms of the rifling-grooves as the outer periphery of the ring between the grooves is outside of such plane. However the band or gas-ring is formed its volume should be slightly in excess of what is necessary to exactly fill the bore and the grooves of the rifling.

The band or ring can be fixed to or fastened on the projectile-body in any desired way or by any suitable means. Instead of seating it in a groove or annular depression, as shown in some of the figures of the drawings, I contemplate, where the projectile is of steel or other hard metal, coating the body of the projectile with an even coat of tin, as indicated at $e^5$ in Fig. 6, and then casting the ring on the tinned surface. The ring is then preferably made of tin or an alloy of tin and lead, which when cast on the tin coating of the projectile will be most firmly secured in place. After the casting the ring can be rolled or otherwise compressed, if desired. The grooved form of projectiles shown can also be coated with tin and provided with the ring cast into the groove in the projectile-body. The tin coating $e^5$ not only does not interfere with the penetration of steel bullets, but it rather assists such penetration, especially where metal is being pierced, by acting as a lubricant between the sides of the bullet and the metal being penetrated.

With the cartridge and the bore of the gun constructed and arranged in accordance with my invention, as hereinbefore described, and shown in the drawings, the operation upon firing is as follows: When the cartridge is fired, the body of Bracket or other non-fouling powder takes fire first and transmits fire to the body of powder in front of wad G. The gases from such latter powder then force wad F and the projectile forward. As the projectile passes along the bore the body of lubricant $e'$, which is carried forward by the ring E′ and cannot, therefore, escape to the rear, is contracted and squeezed forward around the shot by the action of the contracting walls of the conical part B′ of the gun-bore. The lubricant is thus by its compression spirted ahead into the grooves in front of as well as around the projectile. As soon as the gas-ring E′ reaches the conical part of the bore it is compressed or swaged down in size, so as to fit the bore and take the grooves of the rifling most closely. The wad F is at its sides forced forward around the base of the projectile by the force of the gases of explosion behind it and when it reaches the conical or contracting part of the gun-bore is itself compressed like the gas-ring before it, so as to fit the rifled portion of the bore and take the grooves. This compression of the wad when the latter is cupped around a tapering or rounded base of the projectile will, besides forcing the fibers of the wad more closely together, turn the edges of the wad and its fibers forward, so as to get a good scraping action on the bore of the gun. Any residuum, dirt, or fouling scraped from the bore by the wad as it passes along can collect in the space between the wad edges and the gas-ring on the projectile. Where the wad is cupped around a portion of the projectile-base and compressed, as described, so as to take the rifling-grooves, it can assist materially in imparting twist to the projectile. The amount of Bracket or non-fouling powder used is such that as the projectile and wad F reach the muzzle of the gun and the bore is filled with powder-gases and partially-consumed and still-burning powder-grains the wad G will be at or near the front end of the cartridge-shell. The sudden relieving of pressure in front of wad G caused by the projectile and wad F leaving the bore B will allow a sudden expansion of the gases from the Bracket powder, which will force the wad G throughout the bore quickly, carrying out and away any smoke or residuum from the burning of the black powder. The smoke of the black powder is thus forced out of the barrel before any access of atmosphere can take place and before any fouling can be caused by the settling of the smoke on the surface of the bore. I have found that the mere placing of a body of non-fouling powder at the rear end of a shell without any wad between it and the body of black powder is not enough to insure the best and most thorough cleaning of the bore, but that a separating-wad is necessary to secure such desired result. This wad prevents the mingling of the gases of the Bracket powder with those of the other powder which takes place where no separating-wad is used and which much lessens the cleaning effect of the Bracket powder. With the separating-wad F all the gases of the Bracket powder, which is smokeless, are utilized to clean the barrel. As is known, much fouling results from crushing of grains of powder against the surface of the bore on the lands and in the grooves, adherence of the crushed grains to such surface and their imperfect burning leaving a residuum which sticks and hardens. With my cartridge and bore such fouling is prevented. The lubricant being forced, as described, in front of and around the projectile as the latter travels along leaves a film of grease along the surface of the bore, which requires a certain amount of time to burn off. This film prevents contact of the crushed or partially-burned grains of powder with the metal of the barrel, so that they cannot adhere to or

deposit any residuum on the metal surface before the wad G, driven forward by the Bracket-powder gases, brushes them away and they are blown out of the muzzle. The rush of the clean smokeless gases of such powder then completes the cleansing and clearing of the bore, leaving it after firing clear of smoke and perfectly clean.

The conical shoulder or tapering part of the bore, while acting to swage or compress the gas-ring on the projectile and to compress and project the lubricant forcibly forward, serves, also, to hold the projectile an instant in check, so as to give the powder time to become thoroughly ignited. Such checking, short as it is, obviously enables more powder to be burned and greater pressure of gases to be obtained within the barrel before the shot leaves the muzzle of the gun. I do not claim as my invention, broadly, a projectile provided with a gas-ring or band of leather.

I do not intend to claim herein the gun-barrel with its cartridge-chamber and the incline or taper at the forward end of such chamber or the projectile by itself made as shown and described; nor do I claim or intend to cover by my claims, broadly, a cartridge in which powder varying in degree of quickness of burning or in power is used, with a wad between the portions of the charge of different grades.

Having thus described my invention, what I claim is—

1. In a cartridge, in combination with the shell of larger caliber than the bore of the gun with which the cartridge is to be used, the projectile having a body adapted to fit the bore of the gun and provided with a gas-ring or band of greater diameter than said bore, substantially as and for the purpose described.

2. In a cartridge, in combination with the shell of larger caliber than the bore of the gun with which the cartridge is to be used, the projectile having a body adapted to fit the bore of the gun and provided with a gas-ring or band of greater diameter than said bore and fitting the cartridge-shell, substantially as and for the purpose shown.

3. In a cartridge, in combination with the shell of larger caliber than the bore of the gun with which it is to be used, the projectile of hard metal having its body adapted to fit the gun-bore and provided with a gas-ring of softer material and of larger diameter than the projectile-body, substantially as and for the purpose specified.

4. In a cartridge, in combination with the shell of larger caliber than the bore of the gun with which the cartridge is to be used, a projectile adapted to fit said bore and provided with a projecting gas-ring, and lubricant surrounding the projectile-body in front of the ring, substantially as and for the purpose shown.

5. In a cartridge, in combination with the projectile having a body adapted to fit the bore of the gun, the gas-ring on the projectile, the cartridge-shell of larger diameter than the projectile-body and crimped at its forward end down upon such body, and lubricant within the shell in front of the gas-ring or band, substantially as and for the purpose set forth.

6. In a cartridge, in combination with the cartridge-shell of greater caliber than the bore of the gun for which it is intended and the projectile provided with a conical or rounded base, a cup-shaped wad on such base fitting the cartridge-shell, substantially as and for the purpose specified.

7. In a cartridge, in combination with the shell having its forward portion of greater caliber than the bore of the gun, the projectile and the wad at the base thereof, both fitting the shell and larger in diameter than the bore of the gun, substantially as and for the purpose shown.

8. In a cartridge, in combination with the projectile having a conical base, the shell having a caliber greater than the body of the projectile and its forward edge crimped in on such body, and the cup-shaped wad on the projectile-base and fitting the shell, substantially as and for the purpose set forth.

9. In a cartridge, a body of non-fouling clearing-powder situated in the rear portion of the cartridge and separated from the main charge of explosive by a wad, substantially as and for the purpose described.

10. In a cartridge, in combination with the body of explosive filling the forward and main portion of the shell, the body of non-fouling explosive at the rear end of the cartridge-shell, and a wad dividing the two explosives, substantially as and for the purpose specified.

11. In a cartridge, in combination with the body of black powder and the body of Bracket powder at the rear end of the cartridge-shell, a wad dividing the two powders, substantially as and for the purpose shown.

12. In combination with a gun having a cartridge-chamber adapted to receive a cartridge-shell of greater caliber than the bore and a conical forwardly-tapering passage leading from such chamber to the bore proper, a cartridge fitting the chamber and having a projectile provided with a gas-ring or bearing-surface of greater diameter than the bore of the gun, substantially as and for the purpose set forth.

13. In combination with the gun having at the rear end of its bore a forwardly-tapering passage, a projectile having a bearing portion of greater diameter than the forward end of such passage, and a body of lubricant surrounding the projectile in front of such bearing portion, substantially as and for the purpose described.

14. In combination with a gun having its cartridge-chamber adapted to receive a cartridge-shell of larger caliber than its bore and a forwardly-contracting passage from

such chamber to the bore proper, a projectile having a bearing-surface of greater diameter than the bore, and a wad at the base of the projectile also larger than the bore of the gun, substantially as and for the purpose shown.

15. In combination with a gun having a forwardly-contracting passage leading to the bore proper, a projectile having a gas-ring or bearing portion of greater diameter than the bore and a tapering or conical base, and a cup-shaped wad on such base also greater in diameter than the bore of the gun, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of January, A. D. 1889.

JAMES M. POLLARD.

Witnesses:
HENRY C. HAZARD,
SCHUYLER DURYEE.