

A. O. H. HARDENSTEIN.

Explosive Projectile.

No. 82,714.

Patented Oct. 6, 1868.

FIG. 1.

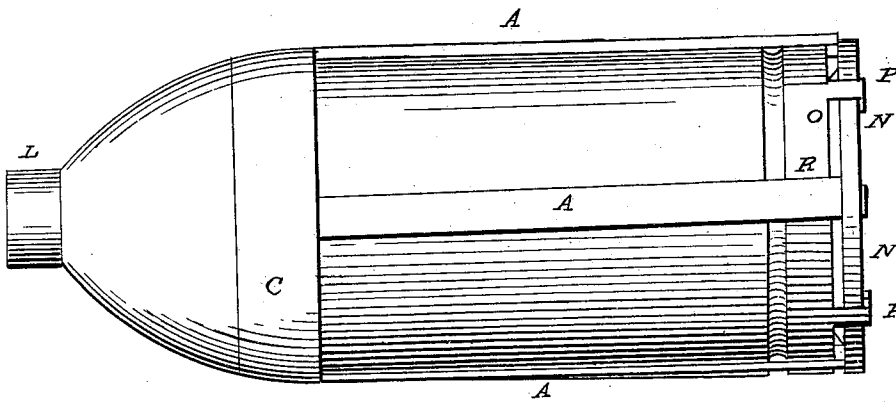


FIG. 2.

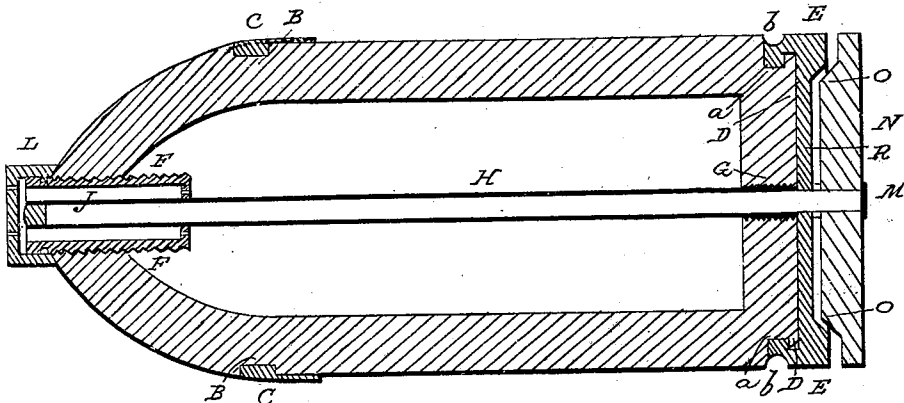
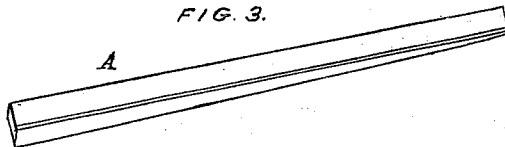


FIG. 3.



WITNESSES:

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A. O. H. HARDENSTEIN, OF CLINTON, MISSISSIPPI, ASSIGNOR TO HIMSELF
AND MARCELLUS A. FOUTE, OF NEW ORLEANS, LOUISIANA.

Letters Patent No. 82,714, dated October 6, 1868.

IMPROVEMENT IN EXPLOSIVE PROJECTILES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, A. O. H. HARDENSTEIN, of Clinton, in the county of Hinds, in the State of Mississippi, have invented a certain new and useful Improvement in Projectiles for Cannon; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the said projectile as when ready for use.

Figure 2, a longitudinal section of the same; and

Figure 3 a detached view of one of the parts of the projectile.

My improved projectile is designed exclusively for rifle-guns, and, by virtue of its peculiarities of construction, I secure, among other minor advantages, the important object of a spiral motion in its flight, the certain ignition of its fuse before it leaves the gun, and consequently its explosion, when it reaches the object at which it is aimed, with absolute certainty.

My invention will be at once and clearly understood by referring to the drawings, on which, at all the figures, the same letters denote the same parts.

In the fabrication of my projectile, as many grooves are cast around its circumference as there are rifles or grooves in the gun, the line of the direction of such grooves corresponding precisely with the line of the grooves in the bore of the gun, to receive the wedge-shaped iron bars A, which, faced with sheet lead on their upper surfaces, are designed to follow the grooves in the bore of the gun, and thus to force the projectile into the rotary motion that is necessary to secure accuracy in its flight. The manner in which the bars A accomplish this purpose will be better understood after certain other parts of my improvement have been described.

Around the projectile, at or near the point at which it begins to assume a conical termination, an encircling groove, B, may also be cast in it to receive a leaden band, C, the object of which is to secure an exact coincidence between the axes of the projectile and the axis of the gun whilst the former is in the latter, and thus to prevent tumbling or deflection on the part of the former in its flight through the air.

In some kinds of guns, however, no such provision as the band C is requisite, and in manufacturing the projectile for such guns, the groove to receive it may be dispensed with.

At the base or rear end of my projectile there is a slight extension, D, of reduced diameter, as shown, relatively to the body of the projectile, around which there is a groove or depression, *a*, to secure the expanding cup E firmly in its place. This cup E is made of lead, is cast upon the shell, and is distinguished by some novel features of construction, which will be more appropriately described when I come to explain the objects intended to be subserved by them.

The point or front end of the projectile and its base are both provided with openings, in which female screws are cut in order that a fuse-plug may be secured in the one, and a tube, H, in the other, at the point G, to serve as a guide for an appliance hereafter to be described, match male screws being cut on said fuse-plug and tube to establish the connection. Though differing in size, as shown by the drawings, the axes of both these openings are precisely coincident with the axis or centre of the projectile.

An annular fuse, J, envelops the front end of the tube H, completely filling the space between said tube and the internal surface of the fuse-plug F, for the entire length of the latter. The filling of the shell may be effected through the opening around tube H, before the fuse-plug and fuse are inserted.

The fuse-plug F projects slightly beyond the point of the shell, and thus affords a means of securing a covering-cap, L, over the same by any sufficient method of fastening. The covering-cap L is perforated on its sides with a sufficient number of small holes for the admission of air to support the combustion of the fuse, and for the escape of the products of the combustion thereof.

A rod, M, which is formed to receive a percussion-cap on its front end, and which is securely attached at its rear end to a circular plate-metal disk, N, is inserted into the tube H, as shown at fig. 2, and constitutes the

means for igniting the fuse. The diameter of the disk N is the same as that of the shell, and its object is to secure the rod M in position until the gun is fired, then to drive it forward and explode the percussion-cap by bringing it into contact with the inner surface of the covering-cap L, and also to expand, mechanically or by positive pressure, the expanding cup E, and drive forward the bars A, and thus to prevent the escape of the gas, and at the same time give a spiral motion to the projectile.

In order to expand the cup E, the front face of the disk N is provided with a very flat truncated conical projection, O, as shown in figs. 1 and 2. The cup E is provided with three or more projecting lugs, P, near the ends of which are notches, looking towards the centre, into which the edge of the disk N fits, and so the said disk is held in position. To get the disk in its place, as shown on the drawing, it is necessary that it shall be notched at as many points on its perimeter as there are lugs P, which, after passing through said notches, securely hold the disk in place on its being turned a little way to the right or to the left upon its axis, to change the relation of the lugs and the notches.

The groove-closing bars A, being thinner at their front ends than at any other point, and of true wedge-form, it is obvious that if they be drawn out beyond the base of the projectile, the diameter of the same will be diminished in precise proportion to the extent of such withdrawal, and that hence it follows that if the diameter of the projectile be ordered so as to have that relation to the bore of the gun as will just admit of the introduction of the former into the latter when the bars A are drawn back, as shown at fig. 1, the grooves or rifles of the bore will be completely filled up by the bars the instant they are driven forward sufficiently to bring their rear extremities up to the base of the projectile by the explosion of the powder, and that they must follow the said grooves to the muzzle of the gun, and therefore necessarily impart a spiral motion to the projectile.

The bars A, and indeed all the other novel parts of my invention, as delineated on the drawings, are merely illustrative, for it is clear that the form of the same may be modified without at all affecting the general principles underlying the construction of the projectile when considered as an entirety.

It is also obvious that the space for holding the powder to explode the projectile may be divided into compartments, and that canister-shot or the like may be introduced, if thought expedient, into one of the same, to increase the destructive effect of the explosion of the shell; and instead of igniting the fuse by means of a percussion-cap on the bar or rod M, a needle-friction device may be employed as a substitute in lieu thereof, the novel characteristic of my improvement, in this particular part or regard, consisting of the ignition of the fuse by the action of the rod M, and not in the means of producing fire to effect such ignition.

The charge of powder to drive the projectile from the gun may be attached to the base of the same by means of a shallow groove around the expanding cup E, or by any other usual method.

The operation of my invention is as follows, to wit: All its parts having been adjusted as shown at fig. 1, which, it will be observed, involves the creation or existence of an open space between the disk N and the base of the projectile, marked R, and the propelling-charge of powder being attached at its base, (the projectiles,) the whole is inserted in the gun. When the gun is fired, the explosion of the propelling-charges of powder drives the disk N against the base of the projectile, and causes it to drive the bars A forward, whilst at the same time, through the agency of the projecting part O, an expansion of the cup E is effected, and all the objects sought are effectually accomplished.

The percussion-cap need not be placed on the rod M until the projectile is to be inserted in the gun, and hence there is no danger of explosion in the transportation or handling of the projectile from accidental causes.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the disk N and rod M with a projectile, substantially as herein described, when these parts are constructed and operate substantially as and for the purpose set forth.
2. The wedge-formed bars A, in combination with a projectile, substantially as herein described, when the same are constructed and operated substantially as herein described, for the purpose set forth.
3. The bars A, in combination with the disk N, when these several parts are constructed and operate as herein described, in connection with a projectile, substantially as herein described, for the purpose set forth.

A. O. H. HARDENSTEIN.

Witnesses:

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