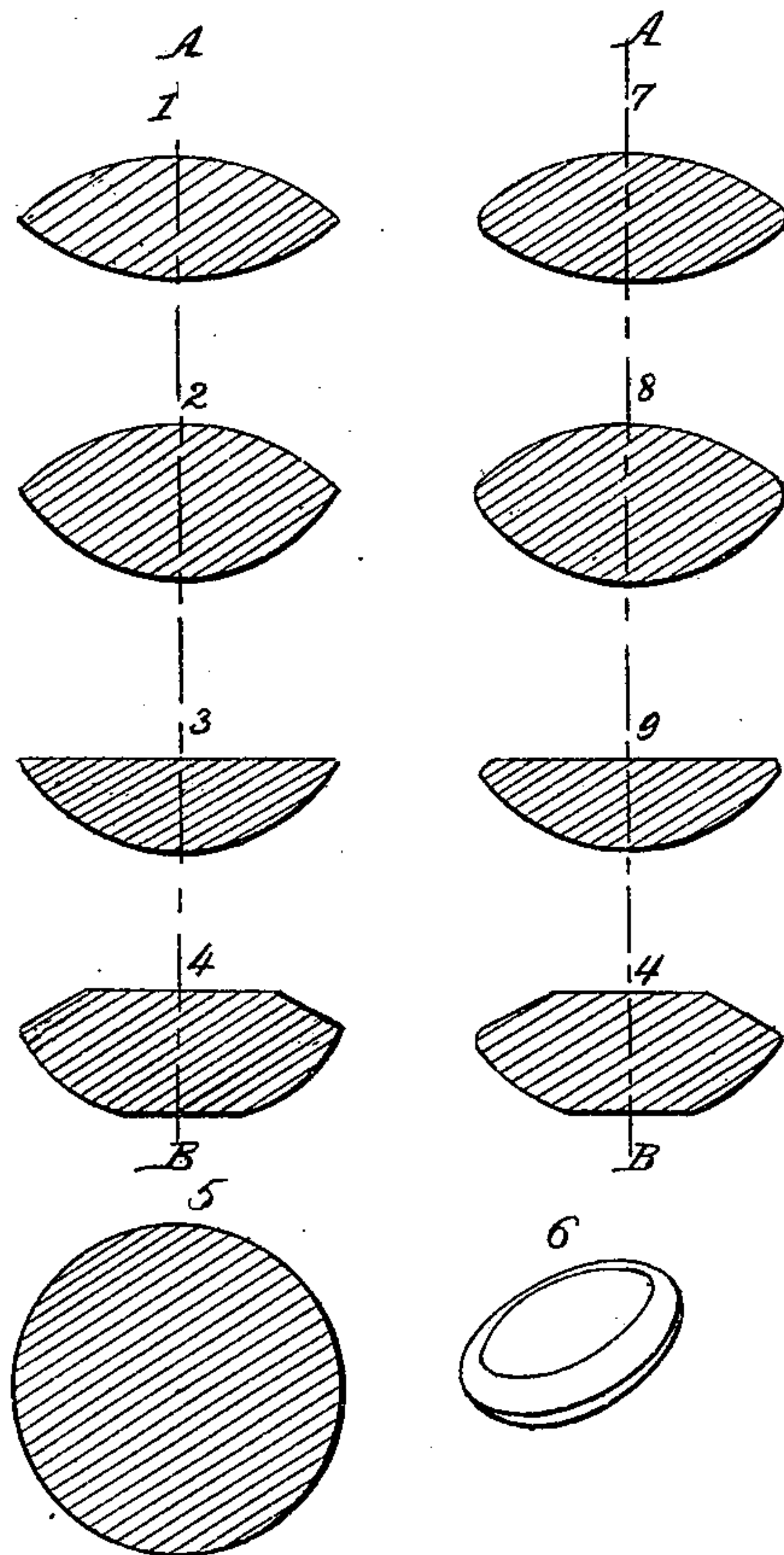


W. J. VON KAMMERHUEBER.

Projectile.

No. 12,801.

Patented May 1, 1855.



Witnesses.

*J. C. Donnan*  
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# UNITED STATES PATENT OFFICE.

W. J. VON KAMMERHUEBER, OF WASHINGTON, DISTRICT OF COLUMBIA.

## IMPROVEMENT IN PROJECTILES.

Specification forming part of Letters Patent No. 12,801, dated May 1, 1885.

*To all whom it may concern:*

Be it known that I, WILDERICH JOS. VON KAMMERHUEBER, of Washington, in the District of Columbia, have invented a new, useful, and important Improvement in Projectiles of Fire-Arms; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being given to the accompanying drawings, forming part of this specification.

Figures 1, 2, 3, and 4 are several transverse sections through the axis of my improved projectile. Fig. 5 is a horizontal section through the circular edge of said projectile. Fig. 6 represents a perspective view of that projectile, of which Fig. 4 is a vertical section. Figs. 7, 8, and 9 show different manners in which the edge of the projectile may be flattened or rounded.

Similar letters of reference in each of the several drawings indicate corresponding parts.

This invention relates to certain new and important improvements in the shape of the projectile, which shape enables it to be thrown through a greater distance and with greater precision, by the same amount of moving power, than a ball or conoidal projectile of the same weight and material.

My invention consists, first, in giving to the projectile the shape of a lens—that is to say, of a body, *a*, bounded on both sides by spherical or otherwise curved surfaces on each side of the same nature; or *b*, bounded on both sides by spherical or otherwise curved surfaces, on one side of a different nature than on the other; or *c*, bounded by the surface of two frustums of cones of the same base; or *d*, bounded on one side by a plain and on the other side by a spherical curved surface; or *e*, bounded by a combination of curved and plain surfaces, either on both sides of the same nature or not, provided the thickness of the lens—viz., the greatest distance between the bounding surfaces—be smaller than the diameter of the circular edge. The circular edge may be made sharp or more or less flattened or rounded.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

If a body moves through a fluid or an elastic fluid—as, for instance, the air—with a certain velocity, it will move till the living power, or

the velocity of it, is worked up, provided it does not strike against another solid body, and we say the living power of the moving body is worked up by the resistance of the fluid or air in which it is moving. This resistance is the product of the square of the velocity of motion and the largest section of the moving body perpendicular to the direction of the motion. From that it will be seen that a moving body with the same amount of living power, but with a smaller area of section in the direction perpendicular to its motion, causes a smaller amount of resistance, and will therefore move through a greater distance. A ball has the smallest surface by the greatest contents, but as the resistance, as said above, depends not on the entire surface, it will easily be understood that the shape of a ball is not the most favorable of a moving body. It must be therefore very important, in respect to the distance through which a body is to be carried by a certain amount of moving power, which shape should be given to such body. The first improvement of this kind was the invention of conoidal projectiles. They offer indeed a smaller area of section perpendicular to the direction of motion than a ball of the same contents, but their area of section in the direction of the axis is larger, and therefore any sideward current of the fluid or air will alter the direction of motion easier. Another disadvantage of the conoidal projectile is that, as the greatest part of their contents is in the rear part of their longitudinal axis, a greater amount of living power is concentrated in the rear part of the conoidal projectile than in the front part, which amount of living power presses forward more intensively than that in the front part and causes the projectile to turn over, and really it has often been observed that conoidal projectiles arrived at their striking-point with the thick end in the front and the pointed end in the rear. But a body of such shape as described above—viz., a lens projectile moving in the direction of its circular edge—will offer in any direction of the plane of this edge the same area of section and a smaller one than a ball or conoidal projectile of the same contents. This is the very reason for using a lens on the pendulum of chronometers. The greatest part of the currents of the air is going in a horizontal direction, or nearly so, and therefore a lens



projectile with a sharp or little flattened edge of circular shape, moving in such a manner that one diameter of the circular edge is in the direction of the motion and another diameter of the edge perpendicular to the first is horizontal, will offer the smallest area of resistance in the direction of the motion and to sideward currents. This theory is confirmed by experience, as the ancient Greeks used a flattened or lens-shaped body as a weapon to be thrown by hand; and as for a sling, in every case a flat stone will be used, and no ball. But in no case that I know of a lens-shaped projectile has been used for fire-arms or their equivalents, because it is too difficult to make a perfectly straight and polished hole different from the circular shape. If the lens projectile is bounded on both sides by surfaces of the same nature, it will, thrown horizontally, as soon as the moving-power ceases to act, commence to descend toward the surface of the earth, forming a parabola, and reach it long before the living power of it is worked up by the resistance of the air. But by giving to the lower surface a shape in a proper proportion different from the upper one, the evil above mentioned can be avoided entirely, or nearly so, so that the moving body thrown horizontally will, as soon as it leaves the barrel, ascend, more or less according to the difference of the shapes of both surfaces, till about half the way of the entire distance through which it will be carried, and from that point commence to descend till it arrives again in the level of the beginning of its course, where most of its living power is worked up by the resistance of the air, and then it will fall down in a direction not very different from the perpendicular. As my lens projectile is intended only to rotate in the direction of its edge, I am enabled to give to the two bounding surfaces any desired shape, equal or different.

The advantages of a lens-shaped projectile are therefore: first, it will by the same amount of moving-power be carried farther, as its area of resistance in the direction of the motion is smaller by the same contents; second, its di-

rection of the motion will be less affected by any sideward current of air, as the resistance area in any horizontal direction is the same, and smaller by the same contents; third, it will by the same amount of moving-power be carried farther, as it does not descend so soon, and will not reach the surface of the earth before the living power is mostly worked up by the resistance of the air, provided it does not strike against a solid body; fourth, it can be made of more uniformity in respect to its material, because it is not as thick as long and wide; fifth, it will strike where a ball or conoidal projectile of the same contents will pass by, because its horizontal diameter is about twice as large; sixth, if a lens-shaped projectile is thrown against a wall it will effect more than a ball of the same weight, because it works like a chisel or wedge.

My projectile is of such shape as will be generated by turning the figures 1 4 and 7 9, or similar ones, around the axis A B.

As the lens projectile is to be thrown in the direction of its circular edge, it is necessary to construct the cartridge in such a manner that one-half of the circular edge of the projectile is exposed to the exploding or expanding substance, which acts as moving-power, and for that reason the cartridge will assume another shape than the common ones for balls or conoidal projectiles.

This projectile may be made of any material or composition or combination of materials, hollow or massive.

Having thus fully described the construction and operation of my invention, I will now state that what I claim as new, and desire to secure by Letters Patent, is—

The lens shape of the projectile, made of any desirable material or combination of materials, solid or hollow, as above described, and which projectile is to be thrown by any exploding or expanding substance.

WILDERICH JOS. VON KAMMERHUEBER.

Witnesses:

T. C. DONN,  
JOHN DE LA CAMP.