

W. W. HUBBELL.

Shell.

No. 14,503.

Patented Mar. 25, 1856.

Figure-1.

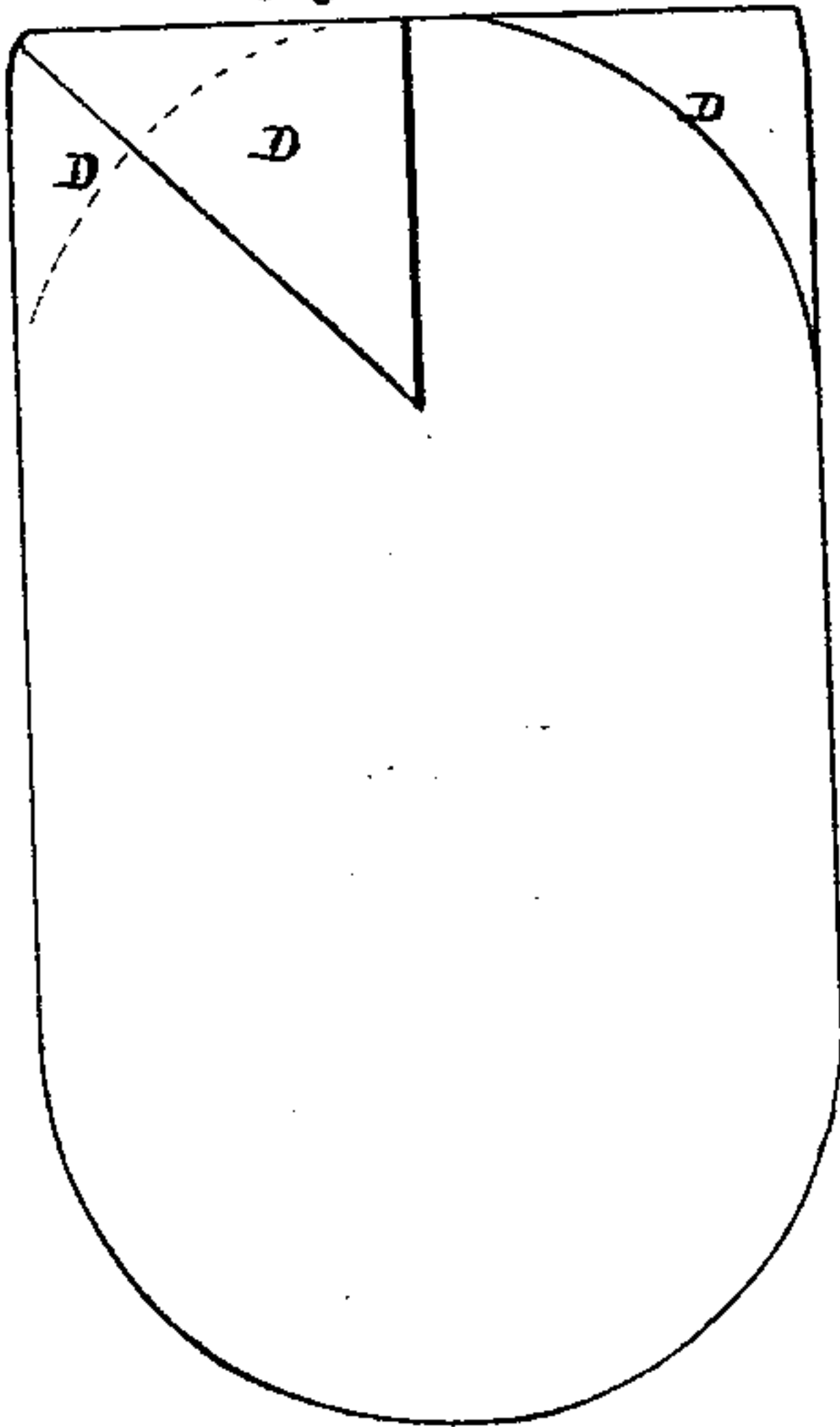


Figure-3.

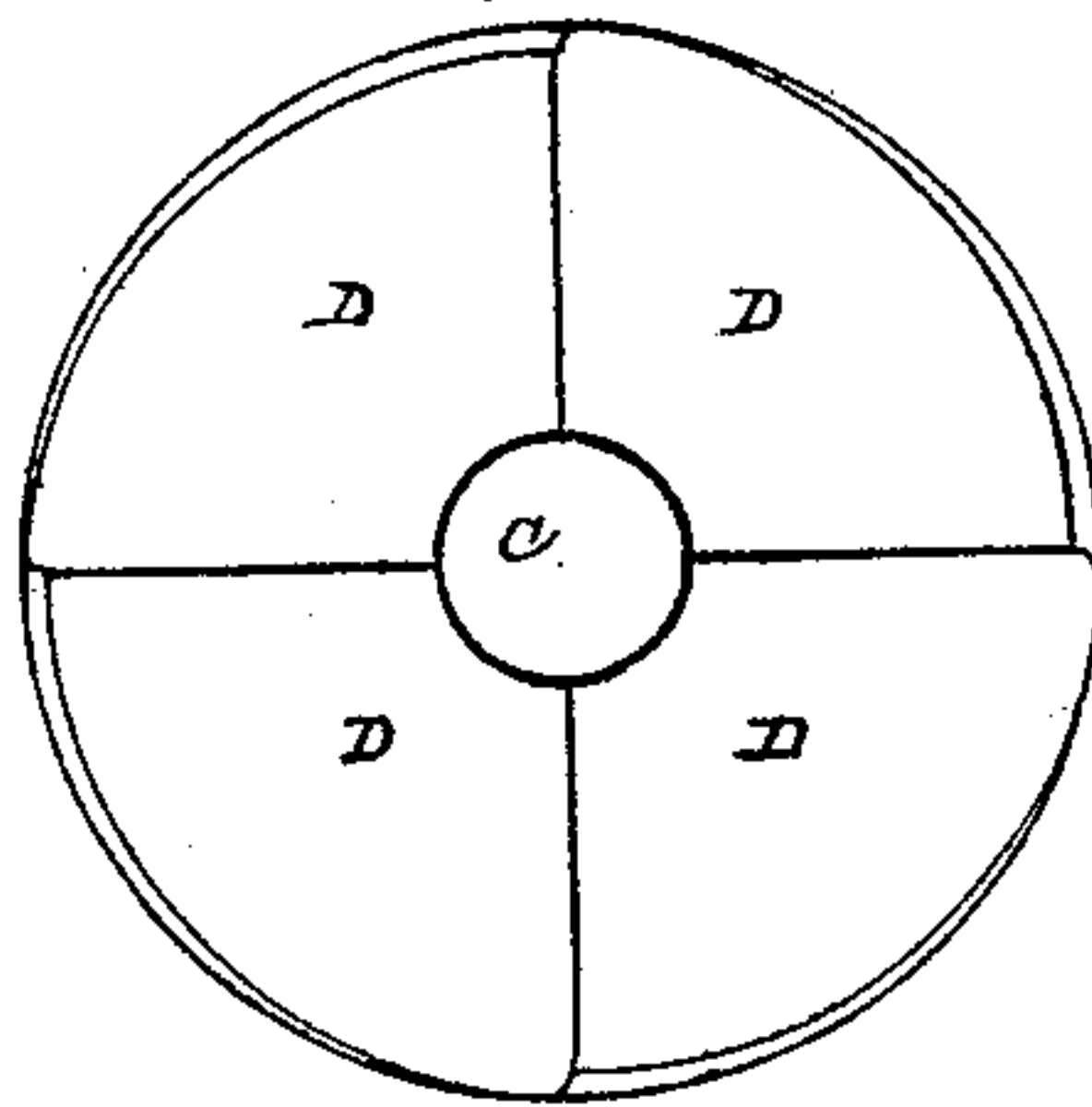
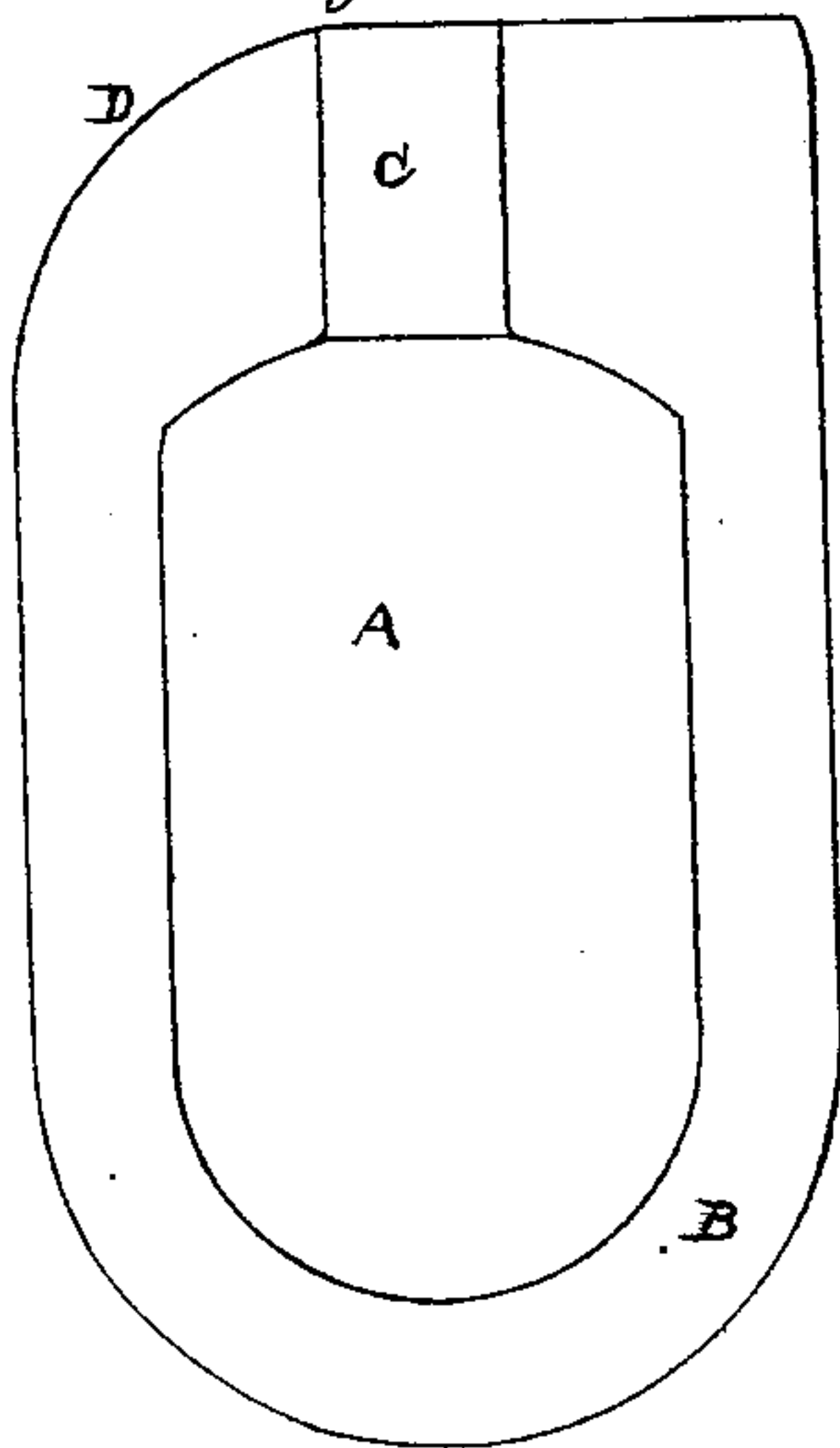


Figure-2.



Wm W Hubbell

Witnesses.

John Hanan
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UNITED STATES PATENT OFFICE.

WM. W. HUBBELL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN EXPLOSIVE SHELLS.

Specification forming part of Letters Patent No. 14,503, dated March 25, 1856.

To all whom it may concern:

Be it known that I, WILLIAM W. HUBBELL, of the city of Philadelphia and State of Pennsylvania, now attorney at law, have invented a new and useful Improvement in Elongated Explosive Shells, to fire from cannon, howitzers, and guns of large caliber; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part hereof.

The nature of my invention consists in the formation and arrangement of metal of the elongated explosive shell, to be hereinafter described, consisting of the following combined essential conditions: First, the back part of the shell must be a smooth semi-spherical surface, and the thickness of its metal uniform, as near as may be, to give the greatest strength and powder-space with the least proportional weight, and for other reasons that will be presently described in their relation to the other parts; second, the body of the shell in front of this semi-spherical hinder part must be cylindrical, and the thickness of its metal (excepting the head to be presently described) the same or a little greater than the thickness of metal of the hinder part, to give the greatest possible proportional powder-space, and for other reasons also to be presently stated, in the combination or relation to the other parts; third, the head or front part of this cylindrical surface or body is through the fuse-hole at least twice as thick in metal as the thickness of the semi-spherical hinder part, for the same reasons set forth in the specification of my patent for an improvement in eccentric explosive shells, dated 22d of January, 1856; and on the front face of the head of this shell the metal composing the head is formed in a series of oblique or propeller surfaces radiating from the fuse-hole, which passes through the center of the head parallel with the cylindrical surface of the body, to properly give the shell a rotary motion. It should be particularly observed, and I specify, that the smooth semi-spherical hinder part has no ears, tails, or wings thereon, but is smooth, because (as I have discovered by experiment) the air, being less dense behind than in front of the shell in its flight, is least liable to act on the wings when behind, and also, particu-

larly, because the weight of metal of such wings or tails, when behind, by its momentum tends to counteract both the action of the air on their surfaces and the necessary predominance of the weight of the head or front part, and thus, and also from the action of cross-winds on their surfaces, disturb the true flight of the shell, the same being also explained in my aforesaid patent of 22d January. The back of the shell, therefore, must be a smooth semi-spherical surface. Also, to prevent error, I particularly specify that the body of this elongated shell must not consist of or have on the windage surface, or part nearest the metal of the gun, any spirally-formed wings extending both before and behind the center of gravity longitudinally, because the momentum of the metal of the portion of the wings behind the center of gravity of the mass tends to counteract the momentum of the metal of the portion of the wings before the center of gravity, as well as the action of the atmosphere on such hinder surfaces of the wings, and thus destroy the necessary predominance of momentum of the metal in front, and, also, because the open space between the spiral longitudinal wings, when the shell is in the gun, allows the power of the exploding cartridge to escape from behind the shell too much through the openings between the wings, while it is most needed to give projectile force to the shell out of the gun, and because such spiral longitudinal wings diminish the powder-space in the shell.

The body or barrel of the shell, between the head and the hinder part, must be a smooth cylindrical surface of, as near as may be, uniform thickness, and have only the usual windage in the gun.

The head or front part of this shell is peculiar, in combination with the cylindrical barrel or body and semi-spherical back or hinder part, in order harmoniously to give the shell a proper rotary motion, such as is given to a rifle-ball by the grooves in the barrel of the rifle, to attain a truer flight.

It is a great object in this invention to have the metal that forms the oblique or propeller surfaces, and also the head, both in one mass, and as far forward of the center of gravity of the body or shell as possible, in order to have the same metal that forms the propeller-sur-

faces and gives the rotation also give the assistance of its weight, to cause the greatest predominance of momentum possible, to keep the head, propellers, and fuse in front.

The object in keeping the propellers in front is to have their surfaces exposed to the most dense air in the flight of the shell, (it being of course most dense in front,) to obtain the best effect, to cause the rotation of the shell on an axis coincident with its true line of flight; also, to have the metal forming them add their momentum most effectively to that of the head by forming a part thereof, instead of detracting from it, and thereby give the shell, though of elongated form, a most true flight, and the fuse, being in front, acts most effectively, for reasons given in said patent of 22d January, the object of this invention, as differing from that described in that patent, being to obtain a much larger shell for any given size of gun, capable of carrying more powder and of exhibiting more explosive force and destructive effect, and yet have it of such form and arrangement of metal as to correct the difficulties that have existed in the flight and form of elongated shells before my invention. Therefore the head of this shell, to attain these results, must be at least twice as thick through the fuse-hole as at the back part; must have the propeller-surfaces formed by the metal of the head itself on the front face of the cylindrical body as far forward of the center of gravity of the entire mass as possible, and uniformly around the fuse-hole, with the back part a smooth semi-spherical surface.

Reference being had to the accompanying drawings, Figure 1 is a side view of the external surface or form. Fig. 2 is a sectional view through the center of the head, fuse-hole, and body of the shell; and Fig. 3 is an outside view of the front or head of the shell, showing its oblique faces and fuse-hole, in all of which figures like letters refer to like parts.

A is the hollow of the shell, to contain the explosive powder, having the cylindrical barrel or body.

B is the thickness of the metal of the hinder portion of the shell, being uniform in thickness, excepting the slight variation often caused by the rising of the core in casting, and being semi-spherical in form.

C is the fuse-hole, with the metal of the head at least twice as thick through it as the thickness of the metal of the hinder part of the shell, and this head has the four front oblique surfaces D D D D uniformly combined around the fuse-hole on the extreme front face of the cylindrical body, making the head much greater

in mass or weight than the hinder part of the shell, and giving the shell in its flight a rotary motion on an axis coincident with the line of flight. The tendencies, therefore, to keep the fuse foremost and make the shell fly true are the rotary motion of the shell on its axis and the predominant momentum arising from the form and amount of this head with the fuse-hole through its middle.

The faces of the oblique surfaces may be made straight instead of curved, and of various angles of obliquity, without materially changing the principle; but the curved faces and angle given in the drawings embody a large predominance of mass in the head, and also give sufficient angle and surface to cause the necessary rotation of the shell.

The shell is loaded in the gun with the semi-spherical hind part next to the cartridge, and its length may be varied; but about two and a half diameters of the bore of the gun for the length is recommended as giving great effect for short ranges; and if a very long range is desired, two diameters may be used for the length.

Any of the fuses and the ordinary windage may be used, and to facilitate the firing of the fuse in this shell of large diameter and long cylindrical windage, a small groove should be made extending each way on opposite sides from the fuse along the bases of opposite oblique faces to the windage, filled with gunpowder and covered with a lead plate or rib set in a dovetail groove on top of the train, the ends near the windage and fuse being perforated, and covered with tinsel to break and fire, and thus form a train to ignite the fuse from the cartridge, and yet before use be protected by the lead rib and tinsel from the weather and accidental fire.

I do not claim spirally-winged elongated shells, nor elongated shells with cylindrical body and spherical hinder part, either with or without tails or wings behind, nor with enlarged head, for I am aware that they have been long known, and I have many years ago experimented with them.

What I claim is—

Combining or forming a series of oblique or propeller surfaces uniformly around the fuse-hole, on the extreme front face of the metal of an enlarged or thickened head of an elongated shell, with cylindrical body and smooth semi-spherical hinder part, substantially as described.

WM. W. HUBBELL.

Witnesses:

JOHN HANAN,
JNO. S. HANAN.