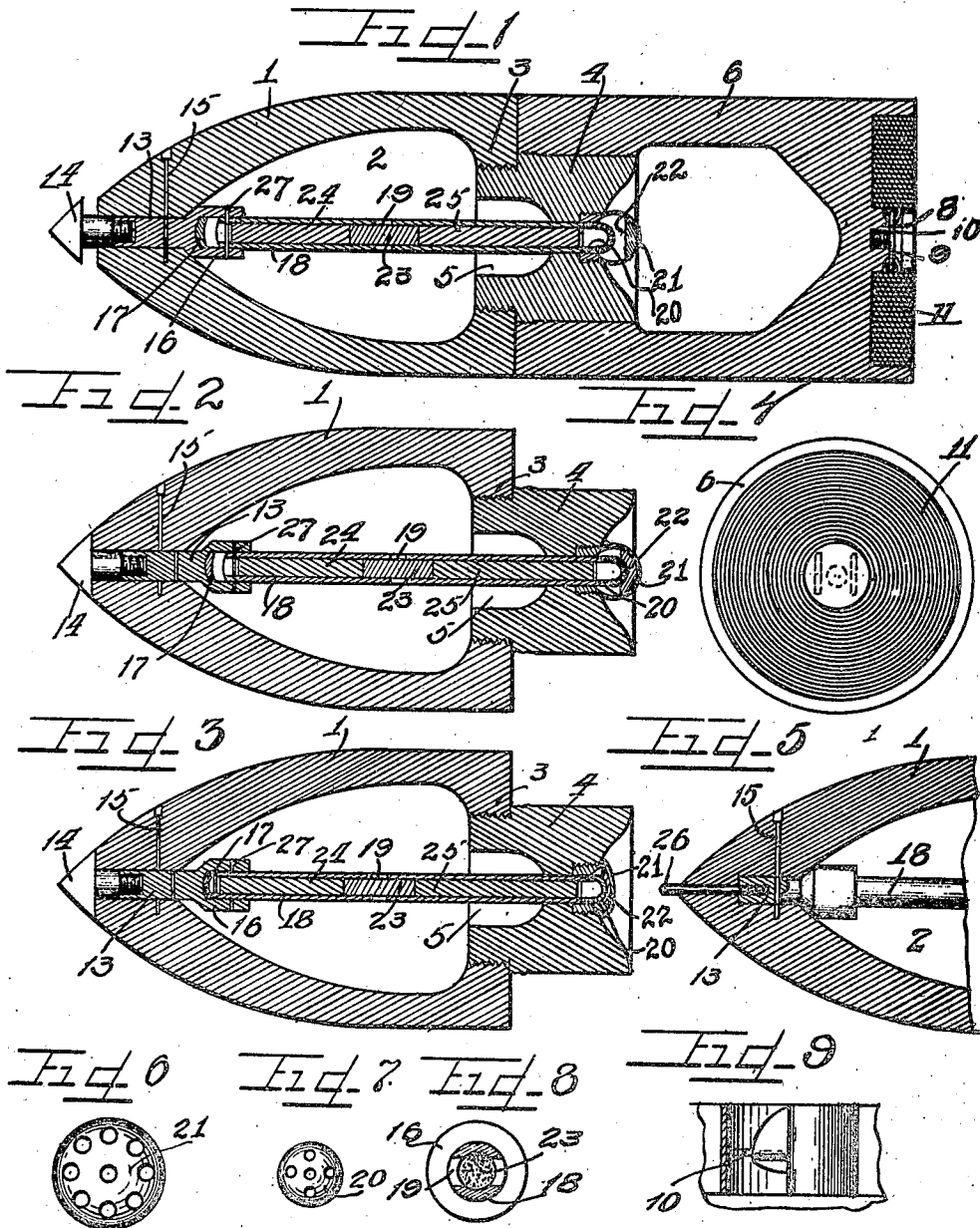


1,335,406.

Patented Mar. 30, 1920.



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UNITED STATES PATENT OFFICE.

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PROJECTILE.

1,335,406.

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To all whom it may concern:

Be it known that I, BAYARD E. TAYLOR, a citizen of the United States, and a resident of the town of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Projectiles; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to improvements in a projectile or shell for high power rifles or mortars.

In modern warfare routing of the enemy when once fully entrenched, is almost impossible and can now only be accomplished by the use of rifled cannon of the largest and highest power, firing shells at high trajectory from a great distance in order to secure a nearly perpendicular flight to the earth. It follows that the penetration of a projectile so fired is almost wholly due to gravitational momentum, the energy imparted to it by the explosion of the firing charge, having been nearly exhausted. Yet even so, greater penetration and damage is effected than in the case when fired at close range with little or no elevation causing the shell to strike at a low angle.

Furthermore, effectiveness can only be secured by the utmost precision in gun and shell making, as well as absolute uniformity in the power of the explosive used, which means a vast expenditure of money and time as the official reports disclose.

By the law of falling bodies we know that from a height of four thousand feet a velocity of approximately five hundred feet per second is attained. If, therefore, the body weighs six hundred pounds its kinetic force may be said to be three hundred thousand foot pounds. To this energy I purpose to add in the line of projection and penetration, the force of a booster charge of explosive, fired to increase the momentum of the projectile at the moment the earth is reached, thereby increasing the velocity of the projectile and adding greatly to the depth into the earth to which the shell is projected before the explosive charge contained therein is ignited.

It is an object of this invention to provide a projectile or shell in which two damaging explosives are effected one as the projectile strikes the earth and the other after the other part of the projectile has been forced into the earth by the force of the first explosion.

It is an object of this invention to provide a projectile or shell containing a plurality of explosives, one to explode as the projectile strikes the earth which is adapted to shatter the surrounding surface and which also gives force to the projectile to deeply embed the same after which a timed mechanism explodes the high explosives in the forward end of the projectile.

It is further an object of this invention to construct a projectile or shell provided with a cushioning device seated in the end thereof to take the force of the firing charge thereagainst which is also adapted to unfurl and stream from the end of the projectile during its flight to insure its striking on its conical end.

It is further an object of this invention to provide a projectile or shell of the class described in which the booster charge is ignited by the projectile striking the earth which in turn ignites a slow burning substance which explodes the high explosives in the projectile after the projectile has penetrated deeply into the earth.

It is further an object of this invention to construct a projectile or shell in which a plurality of means are provided for exploding the secondary high explosive so that if one fails the other one is caused to ignite the slow burning mixture.

It is further an object of this invention to provide a detachable striker or nose for the projectile or shell which in shipment is detached therefrom thereby obviating the possibility of accidental discharge and which is adapted to be quickly threaded into the plunger before inserting into the mortar.

The invention (in a preferred form) is hereinafter more fully described and pointed out in the drawing, specification and appended claims.

On the drawings:

Figure 1 is a vertical longitudinal section of a shell embodying my invention.

Fig. 2 is a view thereof after the primary

explosion showing the part containing the primary charge torn off the forward end of the shell.

Fig. 3 is a similar view showing the stem projected forwardly to explode the forward cap.

Fig. 4 is a rear end elevation of the shell showing the tape or webbing wound therein.

Fig. 5 illustrates a modified form of nose.

Fig. 6 is an end view of the inner cap.

Fig. 7 is an end view of the striker for the cap.

Fig. 8 is a section taken through the stem and detonating charge for the high explosive chamber.

Fig. 9 is a detail of the method of attaching the concussion and stabilizing webbing.

As shown in the drawings:

All parts of the projectile or shell are constructed of suitable material and 1 indicates the forward casing or section which is uniformly tapered toward the point and shown in Fig. 1, as cut square off to form a square end and in Fig. 5, as tapered to a point.

This casing or section 1, has a chamber 2, therein, into which is placed a very high explosive as, for instance, lyddite, and at its rear end is provided with an internally threaded flange 3, having a bore there-through.

Threaded into said flange 3, is a plug or core 4, having an enlarged forward chamber 5, and an axial passage extending therefrom through the plug. Said plug is shown as rounded in outline on its rear face to permit the greatest amount of explosive being inserted in the rear chamber.

A rear section or casing 6, is secured to the plug 4, by means of very light threads which are so constructed as to permit the force of the explosion tearing the rear section 6, from the forward section or casing 1. As shown, this cylinder or casing 6, is provided with a large chamber to contain a less active explosive and the outer or rear end is provided with a large recess into which projects a boss 8, taped and threaded to receive an attaching device for the concussion and stabilizing webbing or tape. As shown, for this purpose a stem 9, is threaded into the boss provided with a circular head or disk 10, which is slotted, as shown in Fig. 9, to have the end of the webbing or tape passed there-through and attached. In the present construction two webbings or tapes 11, are used which are tightly wound around and around the boss so that the entire wad snugly fits into the recess.

The retracted or forward end of the shell casing 1, has an axial bore opening through the nose and fitted therein is a plunger 13, having an internally threaded recess in its forward end adapted to have the nose or striking point 14, detachably threaded therein. Said plunger is normally held in place

by a pin 15, of metal and the rear end of the plunger is provided with a cup 16, in the forward end of which is seated a percussion cap 17.

Secured to the cup 16, by means of a pin 27, is a tube or stem 18, provided with apertures 19, opening into the chamber 2, and said stem projects rearwardly through the axial passage in the plug 4, and has threaded thereon an apertured cup or cap 20. Fitted around the cap 20, is an aperture cup 21, which is threaded into the plug 4, and a percussion cap 22, is secured in the cup 21.

Secured centrally in the tube 18, at the apertures 19, is a detonating charge 23, of any suitable material and extending therefrom toward and nearly to the ends of the tube are slow burning mixtures 24 and 25, which may be in the plastic form or any suitable fuse.

In Fig. 5, a striking pin 26, is threaded into the plunger 13, which permits the forward end of the shell to be brought to a point.

The operation is as follows:

The striking pin or nose 26—14, is screwed into the plunger and the shell loaded into the breach of the mortar by means of a hoist as is usual.

When the gun is fired the shock of the firing charge is directed largely against the concussion member or webbing which prevents the possibility of the firing force exploding the contents of the sections and such firing also loosens the webbing to trail behind the shell.

In this class of guns the angle is such that the shell takes a certain flight into the air and then turns point downwardly. The tails or streamers 11, act to stabilize the shell when turned, to fall truly with the shell pointed directly downwardly and also can be observed so as to inform the gunners the exact position at which they drop enabling them to find the proper range.

As the shell strikes the earth or other obstacle the force of the impact forces the striker or nose inwardly carrying the plunger 13, therewith, and shearing off pin 15.

The plunger carries the stem 18, therewith, until the cap 20, strikes the percussion cap 22, which explodes the charge in the chamber in section or casing 6. The explosion occurring at the time the shell strikes the earth gives added force to the forward end of the shell projecting the same with increased velocity to penetrate deeply into the earth. Owing to the light threads on the plug 4, the rear section has been stripped from the forward section and as before stated has exploded at the surface of the earth. The flames from the explosion in the rear section enter the apertures in the cup 21 which ignites the slow burning material 25, which is so timed as to fire the detonating

charge 23, as the projectile reaches its extreme point of penetration into the earth.

Should for any reason the explosion in the rear section 6, flatten out the cups 20—21, and fail to ignite the fuse 25, the stem 18, is forced ahead which shears the pin 27, permitting the front end of the stem to strike cap 17, which ignites the slow burning material or fuse 24, which in turn accomplishes the firing of the detonating charge 23.

In any event it is quite certain that the high explosives will be ignited and a plurality of explosions will occur, one to act as a booster charge to drive the projectile into the earth at the time its velocity is ordinarily diminished by contact with the earth.

In effect the improved projectile may be said to be a cannon within a cannon in which one cannon is fired at the time that ordinary shells would be stopped so that added penetrating velocity is given to the projectile to penetrate deep trenches and then explode after such deep penetration to the great confusion and disaster of the enemy.

It is also seen that by removing the striker or top 14—26, that the projectile or shell cannot be fired (unless someone maliciously uses a hammer and drill), as the pins 15 and 27 hold the plunger 13, and stem 18, with its associated parts rigidly in place. However, the force of the impact and of the explosion shears these pins permitting movement of the parts as described for the purpose as set forth.

Any metal may be used that is best adapted for the different parts and any explosive, detonators or percussion elements may be used and many modifications may be made without departing from the principles of this invention. I therefore do not desire to limit this application for patent otherwise than necessitated by the prior art.

I claim as my invention:

1. A projectile or shell of the class described comprising a plurality of explosion chambers, containing explosives, a plurality of pins in said projectile, mechanism for shearing one of said pins for exploding the contents of one of the chambers as the shell strikes the earth to force the projectile deeply into the earth and mechanism operated by the said explosion for shearing the other of said pins for exploding the contents of the other chamber after the projectile has deeply penetrated into the earth.

2. A projectile or shell of the class described comprising a plurality of explosion chambers, containing explosives, mechanism for exploding the contents of one of the chambers by impact of the projectile against an object, mechanism operated by the said explosion for exploding the contents of the other chamber, and a concussion member secured to the shell adapted to receive the charge of firing thereagainst and to stream

after the shell for stabilizing the descent of the same and acting as a signal to indicate the point of descent thereof.

3. A shell comprising a forward casing for containing high explosives, a rear casing, a plug connecting said casings, explosives in said casings adapted when exploded to shear the rear casing from the plug and to force forward casing to penetrate deeply into the earth, and means actuated thereby timed to explode the charge in the forward chamber after the forward casing has penetrated the earth.

4. A shell containing a primary explosive charge and a secondary explosive charge, mechanism for setting said charges off by impact of the shell whereby one charge explodes at the surface of the object contacted and the other charge explodes after the object has been penetrated by the shell, and coiled tapes seated in one end of said shell adapted to first serve as a concussion means and then unfurl to act as a stabilizer for the shell.

5. A shell containing a primary explosive charge and a secondary explosive charge, mechanism for setting said charges off by impact of the shell, and concussion and signal material attached to the shell adapted to absorb shock in firing and to unfurl as the shell is fired to stream or trail behind the shell.

6. A shell comprising a forward casing having an explosive therein, a plug secured thereto, a rear casing having an explosive therein attached to the plug and adapted to be torn therefrom by explosion in the rear casing, a cap in the rear casing, a plunger, a stem carried thereby, a striker carried by the plunger adapted to force the plunger and stem to explode the cap to thereby fire the explosive in the rear casing, slow burning material carried in the stem adapted to be ignited by the firing of the rear chamber, and a detonator fired thereby to fire the charge in the forward casing.

7. A shell comprising a forward casing having an explosive therein, a plug secured thereto, a rear casing having an explosive therein attached to the plug and adapted to be torn therefrom by explosion in the rear casing, a cap in the rear casing, a plunger, a stem carried thereby, a striker carried by the plunger adapted to force the plunger and stem to explode the cap to thereby fire the explosive in the rear casing, slow burning material carried in the stem adapted to be ignited by the firing of the rear chamber, a detonator fired thereby to fire the charge in the forward casing, a cap in the forward casing, said stem adapted to strike and explode the cap, and slow burning material adapted to be fired thereby and to fire the detonator.

8. A shell comprising a forward casing,

a rear casing, a plug connecting the cas-
 ings, all having axial bores therein, a stem
 extending through the bores in the plug and
 into the rear casing and having apertures
 5 therein, a plunger pinned thereto, a pin
 holding the plunger in place until struck,
 a nose secured to the plunger for actuating
 the same to shear the pin, a percussion mem-
 10 ber in the rear chamber adapted to be ex-
 ploded by the stem, a percussion member
 at the forward end of the stem, a plurality

of fuses in the stem, and a detonator be-
 tween said fuses at the apertures in the
 stem.

In testimony whereof I have hereunto 15
 subscribed my name in the presence of two
 subscribing witnesses.

BAYARD E. TAYLOR.

Witnesses:

CHARLES W. HILLS, Jr.,
 EARL M. HARDINE.