E. RIMAILHO.

ARTILLERY PROJECTILE.

APPLICATION FILED APR. 8, 1915.

1,201,763.

Patented Oct. 17, 1916.

5 SHEETS—SHEET 1.

Fig. 1

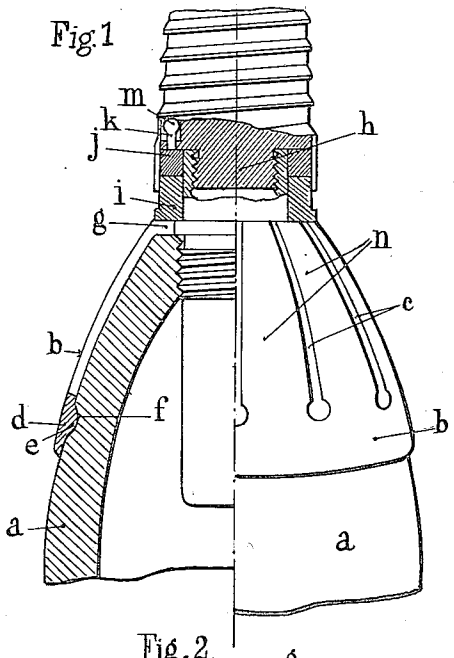


Fig. 2.

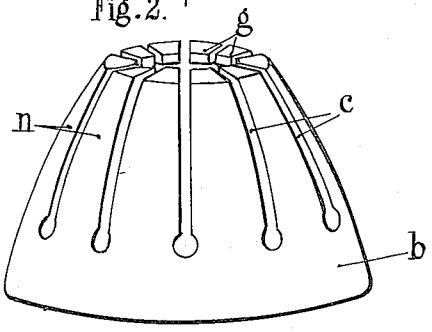
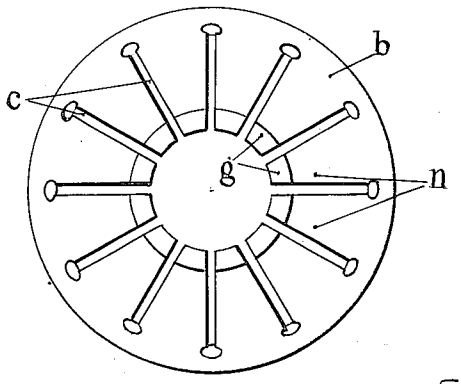


Fig. 3.



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5 SHEETS—SHEET 2.

Fig. 4.

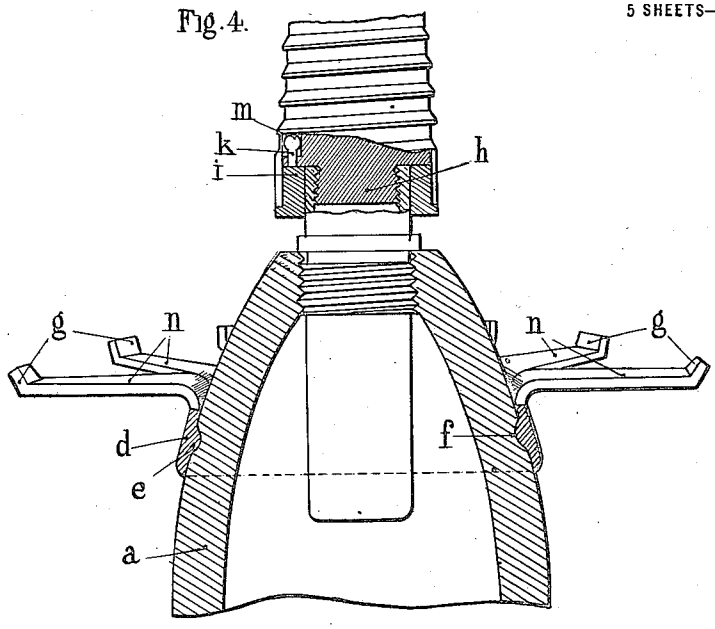
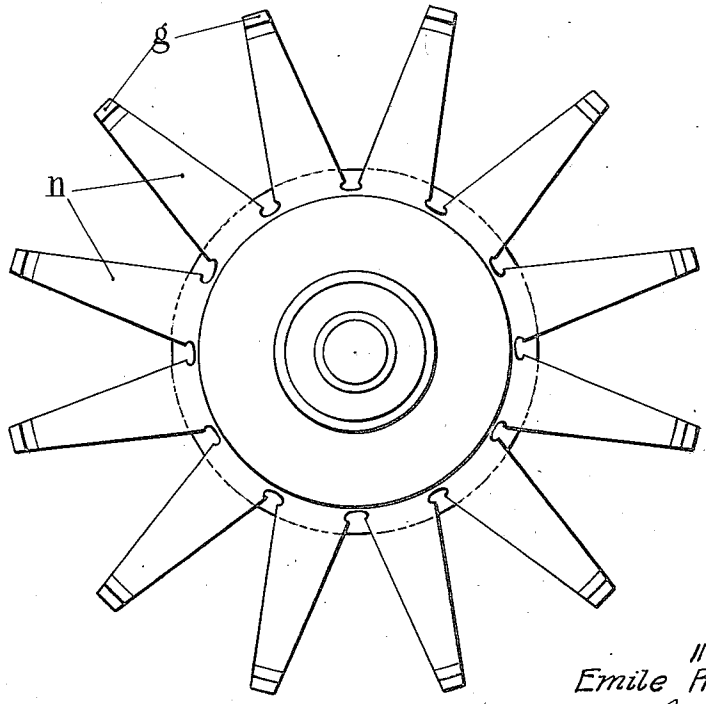


Fig. 5.



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5 SHEETS—SHEET 3.

Fig. 6.

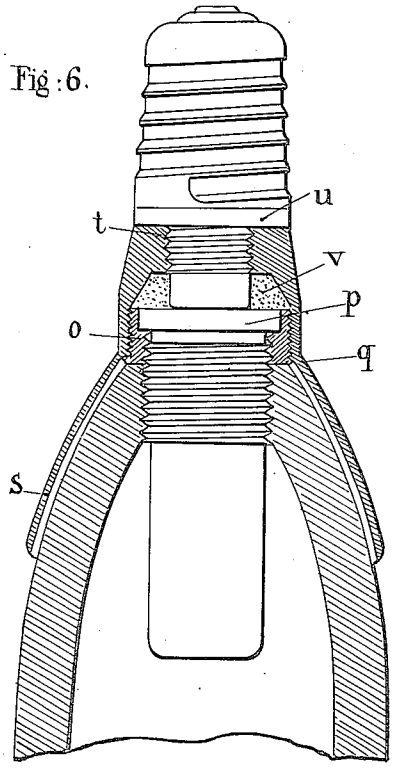
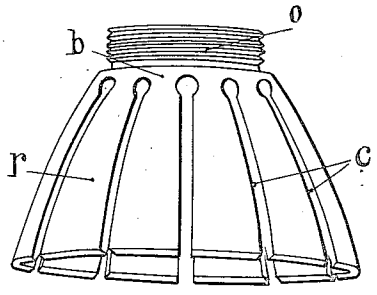


Fig. 7.



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5 SHEETS—SHEET 4.

Fig. 8.

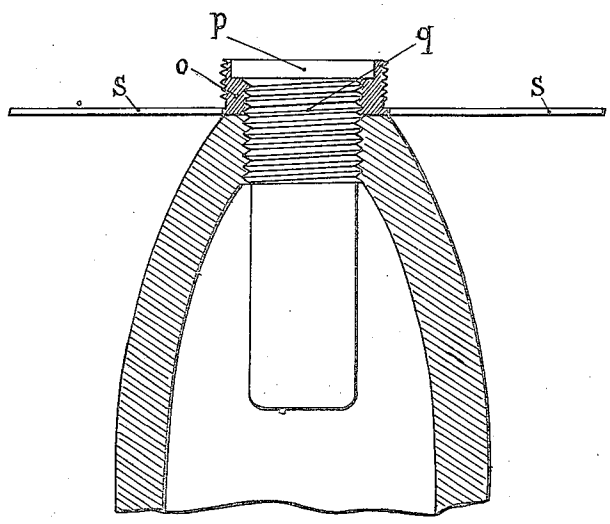
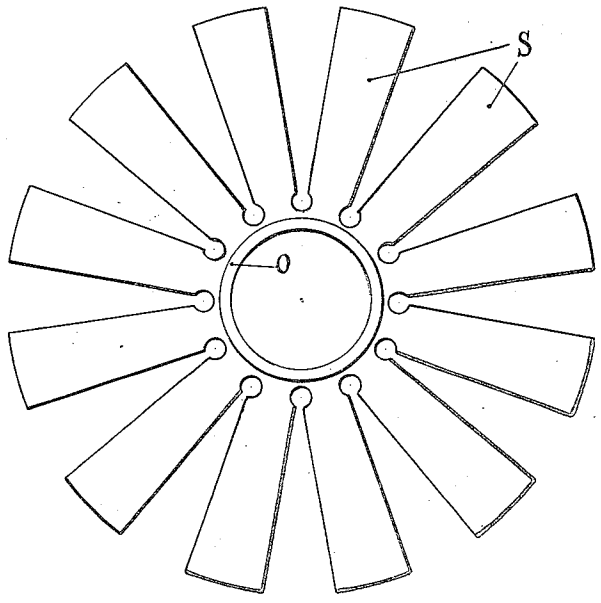


Fig. 9.



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5 SHEETS—SHEET 5.

Fig. 10.

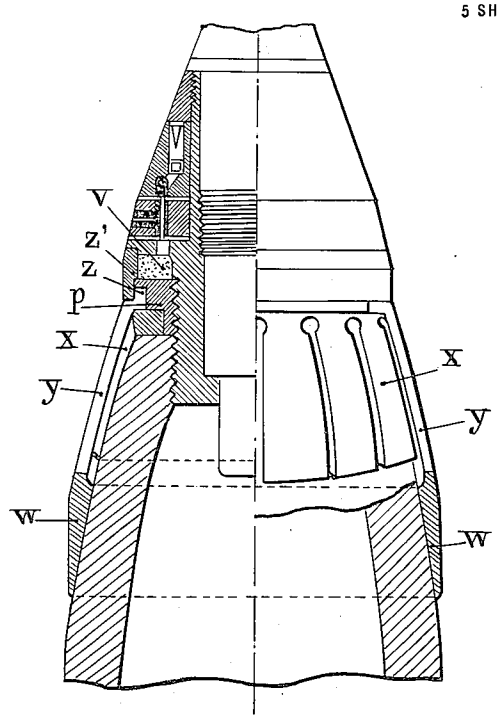
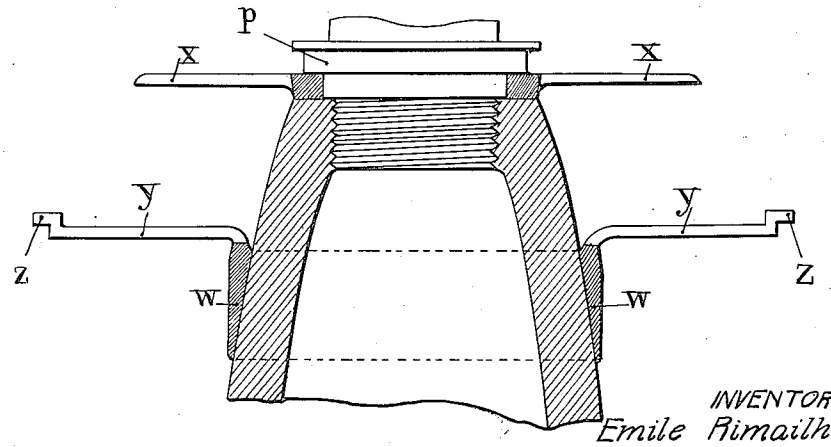


Fig. 11.



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UNITED STATES PATENT OFFICE.

EMILE RIMAILHO, OF PARIS, FRANCE, ASSIGNOR TO COMPAGNIE DES FORGES ET ACIERIES DE LA MARINE ET D'HOMECOURT, OF PARIS, FRANCE.

ARTILLERY-PROJECTILE.

1,201,763. Specification of Letters Patent. Patented Oct. 17, 1916.

Application filed April 8, 1915. Serial No. 20,100.

To all whom it may concern:

Be it known that I, EMILE RIMAILHO, a citizen of the French Republic, and residing at 98 Rue de la Victoire, Paris, France, consulting engineer, have invented certain new and useful Improvements in and Relating to Artillery-Projectiles, of which the following is a complete specification.

It has already been proposed to modify the trajectory of a shell by providing the same, at the front of the ogive, with a small plate or screen at right angles to the axis, so that the increase in the resistance of air increases the curvature of the trajectory, this result being obtained as soon as the projectile leaves the muzzle. It is advantageous, however, to obtain this result not only at the moment the projectile leaves the muzzle but also at any predetermined desired point of the trajectory. The present invention permits of obtaining the said effect, even with existing projectiles by transforming, if necessary, an ordinary shell into a projectile having a trajectory deformable as desired, independently of the laying or pointing members of the gun so that the projectile which has left the muzzle of the gun after the manner of a shell, drops vertically at the desired point like a bomb.

The projectile forming the subject matter of the invention, is characterized by the fact that a portion of its casing, whether connected thereto or not, is formed with a certain number of wings preferably obtained by slitting the casing, for instance, along its meridian planes, the said wings being locked by means of a suitable member during a portion of the trajectory of the projectile and then, at a predetermined and desired point of this trajectory, they are suddenly released and open out under the effect of centrifugal force. For this double purpose, the wings are locked by a member integral with a time fuse mounted on the projectile in such a manner that the said fuse at the moment it operates on the trajectory, determines the release or the elimination of the wing locking member while still enabling the same to open out freely under the action of centrifugal force. The effect of the opening out or spreading of the wings, is to create suddenly a considerable resistance to the advancement of the projectile and cause the same to head to the ground by increasing the dropping angle. According to whether the spreading of the wings has been produced at a later or earlier moment, the sudden curvature of the trajectory will take place at a point more or less distant from the muzzle; this point may be selected as desired from the exit at the muzzle to the extreme limit of the range.

Several constructional forms embodying the invention are illustrated in the accompanying drawings, in which:—

Figure 1 is an external view with a partial section of one constructional form of the projectile before the spreading of the wings. Figs. 2 and 3 are a perspective view and a plan, respectively, of the head piece. Fig. 4 illustrates the projectile after the spreading of the wings. Fig. 5 is a plan of the head piece after the spreading of the wings. Fig. 6 is a section through a second constructional form of the projectile before the spreading of the wings. Fig. 7 is a perspective view of the head piece of Fig. 6. Fig. 8 illustrates the projectile after the spreading of the wings. Fig. 9 is a plan of the head piece after the spreading of the wings. Figs. 10 and 11 are sections through a further constructional form of the projectile.

In the constructional form illustrated in Fig. 1, the projectile *a* is provided with an ogival head piece *b* formed with wings *n* obtained by slitting the said piece along its meridian planes *c*, these wings being connected integrally with one another at their base by means of a ring *d* formed with a bead *e* (Fig. 1) which engages with a tight fit in the groove *f* formed in the head of the projectile. The bent ends *g* of the wings are turned down onto the upper edge of the shell (Fig. 1) but leave uncovered a screw-threaded portion intended to receive the time fuse *h*. The latter is screwed into the projectile in the usual manner and bears on the bent ends *g* of the wings through the medium of a washer or the like locking means *i* maintained in the locking position illustrated in Fig. 1, by a washer of compressed powder *j* in direct communication with the end *k* of the fire conducting conduit *m* of the fuse. As long as the powder washer *j* is in the position illustrated in Fig. 1, the ends *g* of the wings remain locked underneath the washer *i* and the projectile preserves the cylindro-ogival shape illustrated in semi-elevation in the right

hand half of Fig. 1, which is suitable for an extended trajectory. But immediately after the combustion of the powder contained in the conduit *m*, the gas jet from the latter reaches the powder washer *j*; this washer is then ignited and disappears leaving the locking washer *i* free to move in a forwardly direction. The wings are constantly acted upon by centrifugal force which tends to separate them from the axis of the projectile during the advance of the latter so that when the powder washer *j* has disappeared, the bent ends *g* of these wings push the locking washer *i* in a forwardly direction and move outwardly as shown in Figs. 4 and 5. Under the combined action of centrifugal force and atmospheric pressure, the wings then assuming a position of equilibrium approximately normal to the axis of the projectile. The wings being thus bent downwardly and extended, constitute a real screen and the resistance of the air is increased by the pressure exerted on the whole extended surface of the wings *n*; the speed of the projectile decreases rapidly and the dropping angle becomes considerable. According to the duration of the combustion of the fuse conduit *m*, that is to say according to the adjustment of the time fuse, the curvature of the trajectory is accentuated to a greater or lesser extent, decreasing or increasing the range of the projectile without modifying the firing angle of the gun. The head piece *b* may be provided on the projectile at the moment of firing by dispensing with the bead *e* so as to permit of varying the trajectory of existing projectiles. The operation of the time fuse does not cause the projectile to burst in its trajectory in the usual manner, but the percussive system of the said fuse serves to cause the shell to burst at the point where it drops.

Figs. 6 to 9 illustrate another constructional form in which the wings open from the rear to the front instead of conversely. In this form, the cuts or slits *c* start from the base of the head piece and leave at the apex a complete circular ring *o* formed with an external screw-thread. The head piece is maintained in place upon the projectile by means of the shoulder *p* of the percussive fuse *q* bearing on the ring *o*. The wings *r* are covered in by a metal casing *s* screwed on the ring *o* and formed, at its forward end, with a screw-threaded boss *t* in which the time fuse *u* is screwed. A chamber *v* provided above the percussive fuse *p* within the boss *t* receives a charge of powder which remains in direct communication with the lower end of the fire conducting conduit. As long as the wings remain imprisoned under the casing *s* in the position illustrated in Fig. 6, the projectile preserves the cylindro-ogival shape suitable for an extended trajectory but as soon as the gas jet from the fire conducting conduit reaches the powder charge contained in the chamber *v* the fuse *u* and its casing *s* are torn off and projected in a forwardly direction. The wings *r* of the head piece being no longer restrained, they extend under the action of the centrifugal force and assume the position illustrated in Figs. 8 and 9 which is approximately normal to the axis of the projectile. The time fuse having disappeared, the percussive fuse *q* remains and causes the shell to burst at the point where it drops.

It is possible to provide on the projectile, two head pieces (Figs. 10 and 11), one *x* placed directly on the head of the ogive and maintained on the projectile by the shoulder *p* of the fuse, while the head piece *y* covers the head piece *x* serving as a casing for the latter and is maintained on the projectile by means of the collar *w*. The wings of the latter head piece are formed with bent tips *z* maintained in position by a metallic ring or collar *z'* which constitutes one of the walls of the chamber *v* of Fig. 6. When the powder charge contained in the chamber *v* is ignited it produces the breaking of the ring *z'* which thereby releases the tips *z* of the wings of the external head piece *y*. These wings release, by spreading out in a rearwardly direction, the wings of the inner head piece *x* and the whole apparatus assumes the position illustrated in Fig. 11, thus affording the combined advantages of the spreading in a forwardly and rearwardly direction without any element separating from the projectile at the moment the trajectory is changed.

What I claim is:—

1. An artillery projectile, having wings overlying the front portion of its ogive, means for locking the said wings in position on said portion of the projectile, during a part of the trajectory, a time fuse, and means controlled by the time fuse for releasing the locking means at a desired point of the trajectory.

2. An artillery projectile having a casing overlying the front portion of its ogive, wings forming parts of the casing of the shell, and obtained by slitting the casing along its meridian planes, means for locking said wings in position on that portion of the projectile, during a part of the trajectory, a time fuse, and means controlled by the time fuse for releasing the locking means at a desired point of the trajectory.

3. An artillery projectile, having a head piece normally overlying the front portion of its ogive, wings forming part of said head piece and obtained by slitting the head piece along its meridian planes, the said head piece having a ring held on the projectile and connecting the wings together

at one end, means for locking the said wings in position on that portion of the projectile during a part of the trajectory, a time fuse, and means controlled by the time fuse for releasing the locking means at a desired point of the trajectory.

4. An artillery projectile having an ogival head piece normally overlying the front portion of the ogive of the projectile, wings forming part of said head piece and obtained by slitting the said piece along its meridian planes, a ring connecting the said wings integrally with one another at their rear base, the said ring fitting in a groove formed in the head of the projectile, and releasable locking means for holding the wings in position on the projectile.

5. An artillery projectile having, in the front portion of its ogive, wings provided with bent ends, a locking device for maintaining the wings in position, and a time fuse for controlling the said locking device.

6. An artillery projectile having, in the front portion of its ogive, wings provided with bent ends, a locking ring resting on the bent ends of the wings, a time fuse, and a washer of compressed powder for holding the locking ring in position, the said washer being in direct communication with the end of the fire conducting conduit of the fuse.

7. An artillery projectile having in the front portion of its ogive, wings having bent front ends, locking means engaging the said bent ends to hold the wings in position on the projectile, a washer of compressed powder for holding the said locking means in position, a time fuse for igniting the washer to release the wings, and a ring connecting the rear ends of the said wings integrally with one another at their base, the said ring fitting in a groove of the shell, said wings being thus able to be bent to the rear of the shell after elimination of the washer under the effect of the centrifugal force so as to constitute a screen.

8. An artillery projectile having, in the front portion of its ogive, wings forming part of a head piece and obtained by slitting the said piece along its meridian planes, the head piece having, at one end, a ring connecting the wings integrally with one another, and means for holding the said wings in position on the shell.

9. An artillery projectile having, in the front portion of its ogive, wings forming part of a head piece and obtained by slitting the said piece along its meridian planes, the head piece having, at one end, a ring connecting the wings integrally with one another, means for holding the wings in position on the shell, an explosive charge controlling said means, and a time fuse having a fire conducting conduit in direct communication with the said explosive charge.

10. An artillery projectile having, in the front portion of its ogive wings connected integrally with one another at their rear end by means of a ring solid with the shell, said wings forming, in their resting position, a casing which covers up another series of wings connected integrally with one another at their forward end by a ring.

11. An artillery projectile having, in the front portion of its ogive wings connected integrally with one another at their rear end by means of a ring solid with the shell, said wings forming, in their resting position, a casing which covers up another series of wings connected integrally with one another at their forward end by a ring the wings connected by their rear ends having their forward ends imprisoned by a displaceable collar on which is screwed a time fuse.

12. An artillery projectile having, in the front portion of its ogive wings connected integrally with one another at their rear end by means of a ring solid with the shell, said wings forming, in their resting position a casing which covers up another series of wings connected integrally with one another at their forward end by a ring the wings connected by their rear ends having their forward ends imprisoned by a breakable ring forming one part of a powder chamber, and a time fuse having a fire conducting conduit connected with the said powder chamber.

In testimony whereof I have hereunto set my hand at St. Etienne, France, this third day of April, 1915.

EMILE RIMAILHO.

In the presence of two witnesses:
P. VEPILLE,
DAVIS B. LEVIS.