L. A. BERRY.

EXPLOSIVE SHELL.

APPLICATION FILED APR. 8, 1918.

1,300,333.

Patented Apr. 15, 1919.

2 SHEETS—SHEET 1.

Fig. 1

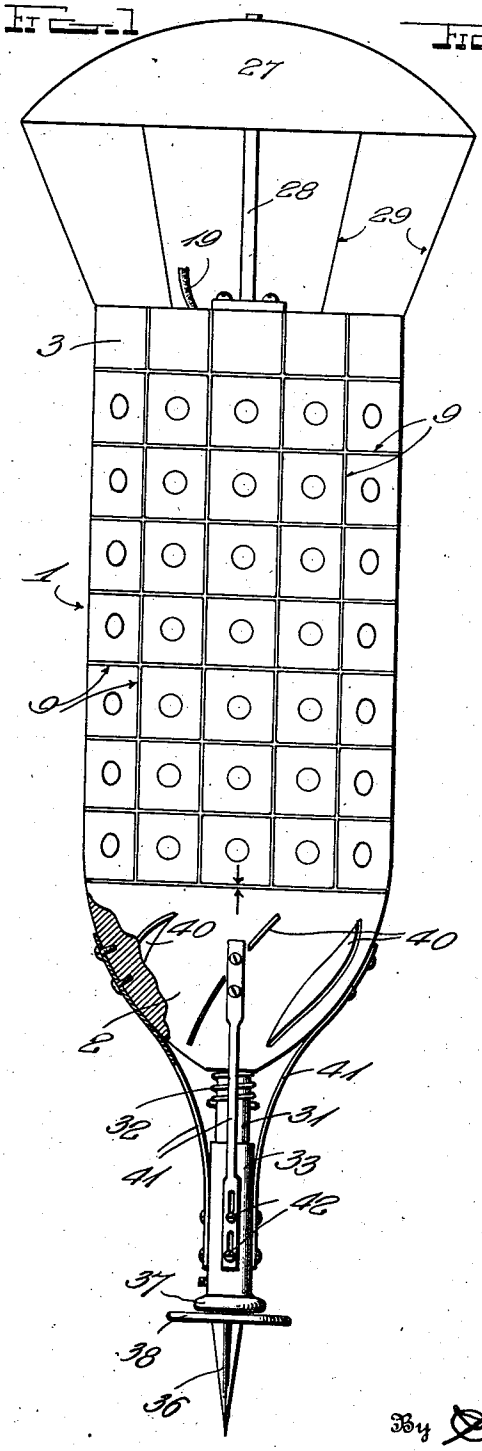
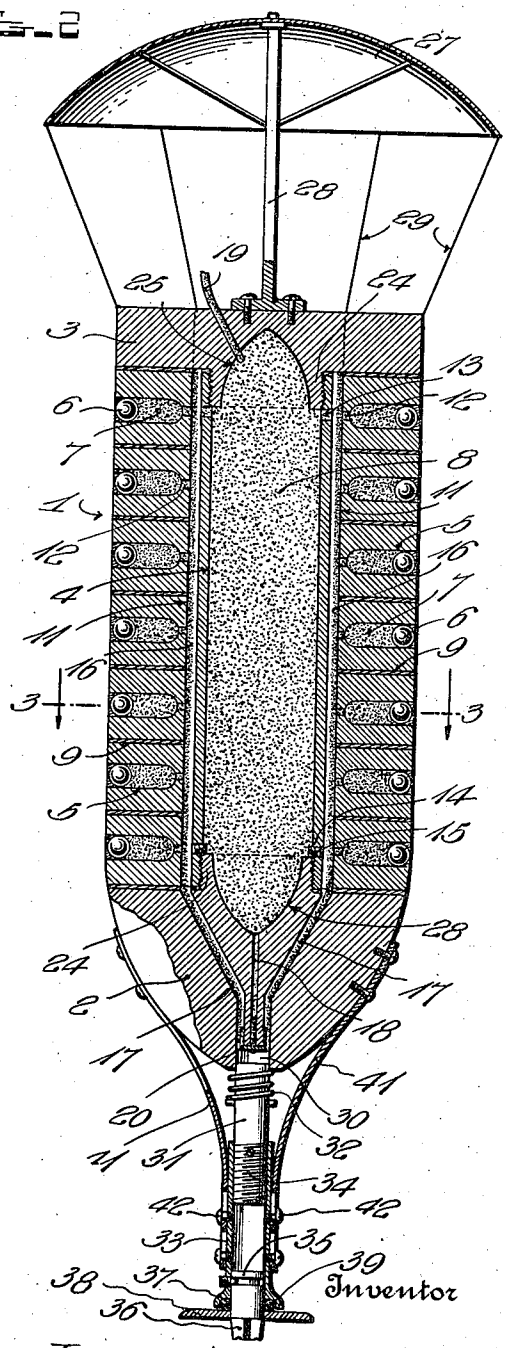


Fig. 2



Inventor

Leroy A. Berry

By H. B. Williamson & Co

Attorneys

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2 SHEETS—SHEET 2.

Fig. 3

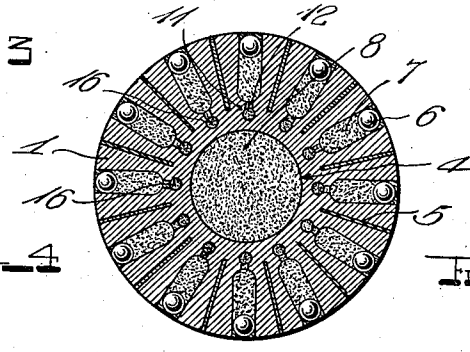
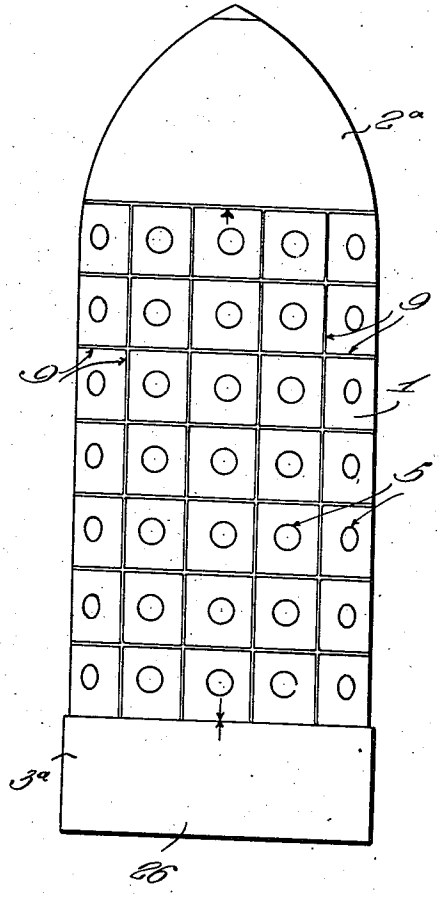
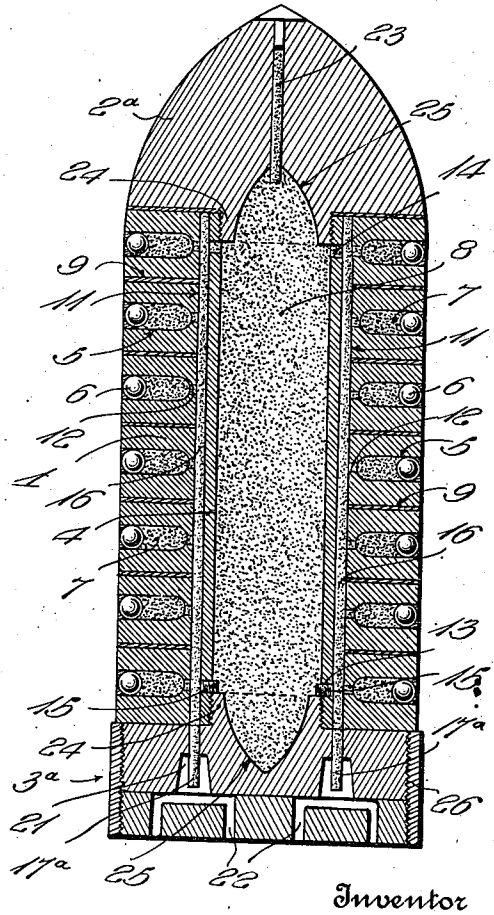


Fig. 4

Fig. 5





Inventor

Leroy A. Berry

By H. B. Williamson & Co

Attorneys

UNITED STATES PATENT OFFICE.

LEROY A. BERRY, OF ALLSTON, MASSACHUSETTS.

EXPLOSIVE SHELL.

1,300,333. Specification of Letters Patent. Patented Apr. 15, 1919.

Application filed April 8, 1918. Serial No. 227,329.

To all whom it may concern:

Be it known that I, LEROY A. BERRY, a citizen of the United States, residing at Allston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Explosive Shells; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its principal object to provide an explosive shell which is easily convertible for use as a projectile to be fired from a gun, or as an aerial bomb to be dropped from aeroplanes and the like.

The shell body is so constructed as to permit either a projectile head and base or an aerial bomb head and base to be attached thereto, the arrangement of fuses in said shell body being such as to permit firing either by the projectile base or the aerial bomb head.

A still further object is to provide means for anchoring the shell and rotating it in a vertical position when dropped from an airship, and projecting a plurality of missiles from the device while so rotating, whereby to establish a danger zone of considerable area.

With the foregoing general objects in view, the invention resides in the novel features of construction and unique combinations of parts to be hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawings which form a part of this specification and in which:

Figure 1 is a side elevation of the invention used as an aerial bomb;

Fig. 2 is a longitudinal section of the device shown in Fig. 1;

Fig. 3 is a transverse section on the plane indicated by the line 3—3 of Fig. 2;

Fig. 4 is a side elevation of the invention used as a projectile; and

Fig. 5 is a longitudinal section of the device shown in Fig. 4.

In the drawing above briefly described, the numeral 1 designates the shell body, 2 and 3 refer respectively to the head and base to be attached to said body 1 in forming the aerial bomb disclosed in Figs. 1 and 2, and the numerals 2^a and 3^a designate respectively a projectile head and base which are applicable to the ends of the body 1 to form a projectile to be shot from a gun.

The body 1 is of cylindrical formation and is provided with a main central chamber 4 formed by a longitudinal bore of uniform diameter throughout its length and opening through the ends of said body. Spaced around the bore 4, are a number of preferably though not necessarily radial pockets or supplemental chambers 5 in which missiles 6 and explosive charges 7 for projecting them are located. The charges 7 are fired in advance of a main charge 8 in the bore 4 and in order that the shell body 1 may be broken into a number of pieces when said master charge is exploded, said body is weakened by a plurality of longitudinal and circumferential splits 9 which pass between the several pockets 5 as shown clearly in Figs. 1 and 4. These splits are filled with lead or any other suitable material when the shell is manufactured and some similar filler is provided to retain the missiles 6 in the supplemental chambers or pockets 5. It may here be stated that the missiles in question may be of incendiary type, of shrapnel, or of any other preferred formation.

Formed longitudinally of the body 1 and opening through both ends thereof, are a plurality of longitudinal fuse ports 11 from which branch ports 12 lead to the several pockets 5. Other branch ports 13 and 14 lead from the ends of the ports 11 into the central chamber 4, the former (13) extending from the rear ends of the ports 11 while the latter (14) extend from the front ends thereof. A plurality of threaded plugs 15 are provided for closing the front ports 14 when the aerial bomb head 2 is employed and for closing the rear ports 13 when the projectile head 2^a is used. All of the ports with the exception of those which are filled by the plugs 15, are provided with fuses 16 of any preferred construction. The fuses of the longitudinal bores 11 are fired by fuses 17 of the aerial bomb head 2 or by fuses 17^a with which the projectile base 3^a is equipped, and it will thus be seen that the several charges 7 will be fired before the ignition fuse of the charge 8 is ignited. If desired, the head 2 may be provided with a time fuse 18 serving as further ignition means for the charge 8 and base 3 may be provided with an additional time fuse 19 to be ignited when the shell is dropped, to insure explosion of the device as a whole in case the percussion cap 20 which ignites the fuses 17 and 18, should fail to operate. The fuses 17^a terminate at their rear ends in ignition cham-

bers 21 and a plurality of ports 22 lead to said chambers from the rear end of the base 3^a. It thus follows that when the impelling charge is fired in rear of the projectile, flame will pass through the ports 22 into the chamber 21 and ignite the fuses 17^a. The projectile head 2^a is by preference provided with a time fuse 23 and suitable detonation point for exploding the master charge 8 a suitable time after the shell has struck an objective, whereby to permit penetration of the object before explosion takes place.

Both of the heads 2, 2^a and the two bases 3 and 3^a are provided with central bosses 24 which are threaded into the ends of the bore or chamber 4, said bosses being provided with cavities 25 extending a considerable distance into the heads and bases in question and serving to increase the holding capacity of the aforesaid bore or chamber. The construction of the projectile head 2^a and the projectile base 3^a does not vary greatly from similar parts now known, said base being provided with a packing ring 26 for gas tight engagement with the rifling of the gun barrel. This ring 26 connects the two sections of which the base 3^a is constructed. The head and base 2 and 3 however possess wide departures from the constructions now followed. As above suggested, when these parts are used, the shell is adapted to be dropped from an aerial carrier and in order that it may remain in a vertical position during its descent, a parachute 27 is attached to the base 3 by means of a central standard 28 and tie wires or the like 29.

The front end of head 2 is provided with a central socket 30 in which the percussion cap 20 is located, said socket receiving slidably therein the rear end of a bearing pin 31 which is normally held spaced from the cap 20 by a coiled spring 32. The pin 31 is preferably formed of two sections, a solid rear section and a tubular front section 33 having a threaded connection at 34, said section receiving rotatably the rear cylindrical end 35 of a longitudinal spike or anchor 36 which is adapted to hold the shell in a vertical position when it strikes an object below. The lower end of the tubular section 33 is shown provided with an annular ball race 37 and the spike 36 is equipped with an outstanding annular flange 38, ball bearings 39 being positioned between the two. By this arrangement, the entire shell body 1 is permitted to rotate freely upon the anchor 26 when the latter strikes and penetrates an object. While thus rotating, the explosive charges 7 of the body 1 are fired from the fuses 17, the latter having been ignited by a percussion cap 20 which is exploded the moment the anchor 36 strikes. Firing of the charges 7 projects all of the missiles 6 over an area of considerable size and thus forms a comparatively large danger zone around the point at which the projectile strikes. After firing of all the charges 7, the master charge 8 is fired through the rear ports 13. If from any cause however this should not take place, the time fuses 18 and 19 will become effective for this purpose. When this master charge is exploded, the entire shell is broken into fragments which will further wreak damage upon the surrounding territory.

Various ways could be adapted for rotating the shell body 1 when used with the head 2 and base 3, but for illustrative purposes I have illustrated a plurality of vanes 40 carried by said head and arranged helically for engagement with the air as the shell descends. By this means, the shell body will be rotating at a high rate of speed when the anchor 36 strikes and becomes effective, and while the device is thus rotating, the charges are fired in the manner above set forth.

Any preferred means could well be employed for bracing the firing pin 31 and guiding the same, and as illustrating one of the many ways in which this can be done, I have shown a plurality of arms 41 secured to the head 2 and extended forwardly therefrom, said arms having pin and slot connections or the like 42 with the tubular section 33 of the firing pin.

When the head 2^a and base 3^a are used in connection with the body 1, the firing of the charges 7 is delayed a suitable length of time by means of the slow burning fuses 17^a and if all of said charges are fired before the projectile strikes, the master charge 8 will be fired through the ports 14. If the projectile strikes before all of said charges 7 are fired, however said charge is exploded by the time fuse 23.

From the foregoing, taken in connection with the accompanying drawings, it will be obvious that although my invention is of comparatively simple construction, it will be highly efficient for the purposes intended. It is a simple matter to convert the device into either an aerial bomb or a projectile, it being simply necessary to substitute one head and base for the other and to place the plugs 15 in the proper ports 13—14. Since probably the best results are obtained from the several features shown and described, these features are preferably employed, but I wish it understood that the present disclosure is for illustrative purposes only, and that within the scope of the invention as claimed, considerable latitude is allowed for the adaptation of the invention to the numerous requirements.

I claim:

1. An explosive shell comprising a front and a rear section, said rear section being

movable toward and rotatable on said front section when the latter strikes an object, said front section having anchoring means effective when said section strikes, missiles carried by said rear section, explosive means for projecting said missiles, and means operable by the movement of said rear sections toward said front sections for firing said explosive means.

2. A structure as specified in claim 1, said firing means comprising a percussion cap, a fuse leading therefrom to said explosive means, and a firing pin carried by said front section for exploding said cap when said rear section moves toward the other.

3. An explosive shell comprising a shell body carrying a plurality of missiles and explosive means for discharging them, means including a forwardly projecting firing pin for firing said explosive means, guiding means for said pin permitting forward movement of said shell body when movement of said pin is arrested, whereby to fire said cap, and an anchor rotatably connected to the front end of said firing pin and serving to rotatably support the shell body when said anchor strikes.

4. A structure as specified in claim 3, said firing pin guiding means comprising forwardly extending arms on said shell body having sliding connections with said pin.

5. A structure as specified in claim 3, said firing pin having a socket in its front end and said anchor having a portion on its rear end received in said socket to form said rotatable connection.

6. A structure as specified in claim 3, said firing pin having a socket in its front end and said anchor consisting of a spike whose rear end is received in said socket to form said rotatable connection.

7. A structure as specified in claim 3, the front end of said shell body having a socket in which the rear end of said firing pin is slidable, said firing means including a percussion cap in said socket in rear of said pin.

8. An explosive shell comprising a shell body carrying a plurality of missiles and explosive means for discharging them, means including a forwardly projecting firing pin for firing said explosive means, and a spike alined with and rotatably connected to the front end of said firing pin, said shell body being rotatable on said spike when the latter strikes.

9. An explosive shell comprising a shell body carrying a plurality of missiles and explosive means for discharging them, means including a forwardly projecting firing pin for firing said explosive means, said pin having a socket in its front end and a ball race around said socket, a spike whose rear end is rotatably received in said socket, said spike having a laterally extending annular flange underlying said ball race, and ball bearings between said flange and race, whereby said shell body may rotate when said spike strikes and penetrates an object.

10. A convertible shell comprising a cylindrical shell body to the ends of which a projectile base and head or an aerial bomb base and head are attachable, said shell body having explosive means therein and a fuse for firing said explosive means, said fuse leading to both ends of the body for coaction with the aerial bomb head or the projectile base.

11. In an explosive shell, a cylindrical shell body to which either a projectile base and head or an aerial bomb base and head are attachable, said body having a main central chamber and a plurality of supplemental chambers around the same, explosive charges in all of said chambers, said body having a longitudinal fuse port opening through its ends, a fuse in said port to be fired either by the projectile base or the aerial bomb head, said body being provided with branch ports leading from said longitudinal port to said supplemental chambers, and with a front and a rear branch port leading from the ends of said longitudinal port into said main chamber, fuses in said ports with the exception of one, and a plug closing the latter, said plug closing said front branch port when the aerial bomb head is used and closing said rear branch port when the projectile base is employed.

12. A structure as specified in claim 11, said main central chamber being formed by a longitudinal bore of uniform diameter throughout its length and opening through the ends of said shell body, the ends of said bore being threaded to receive threaded bosses on the aforesaid bases and heads.

13. An explosive shell comprising a front and a rear section rotatably connected, said rear section being adapted for rotation upon said front section when the latter strikes an object, and said front section having anchoring means effective when said section strikes, missiles carried by and projectible from said rear section, and substantially helical vanes on said rear section acted upon by the air during the travel of the shell to rotate said rear section.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEROY A. BERRY.

Witnesses:
FRANK L. BRIER,
MABEL A. WYMAN.