L. D. JACKSON.

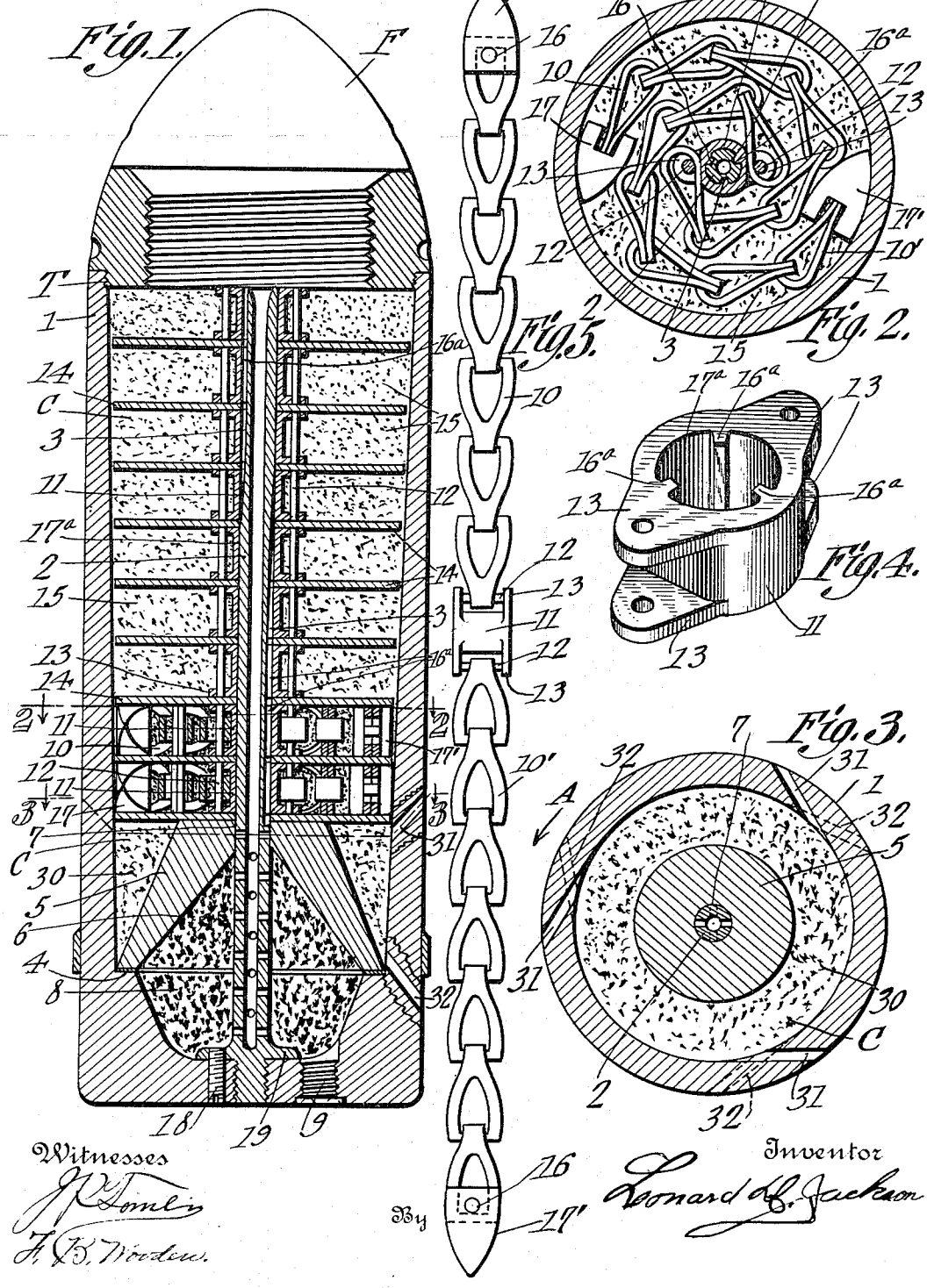
ANTI-AIRCRAFT PROJECTILE.

APPLICATION FILED JUNE 30, 1915.

1,274,419.

Patented Aug. 6, 1918.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 6.

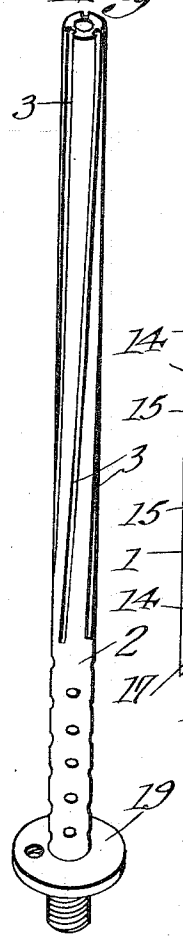


Fig. 7.

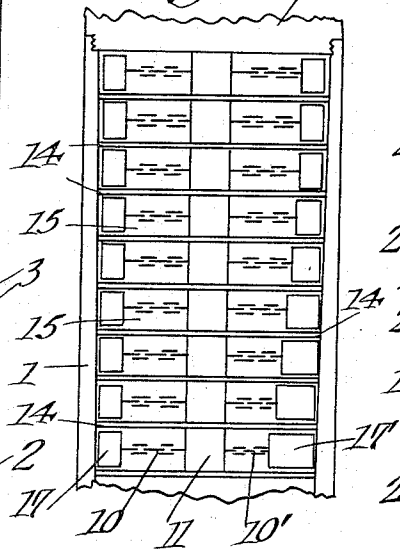


Fig. 8.

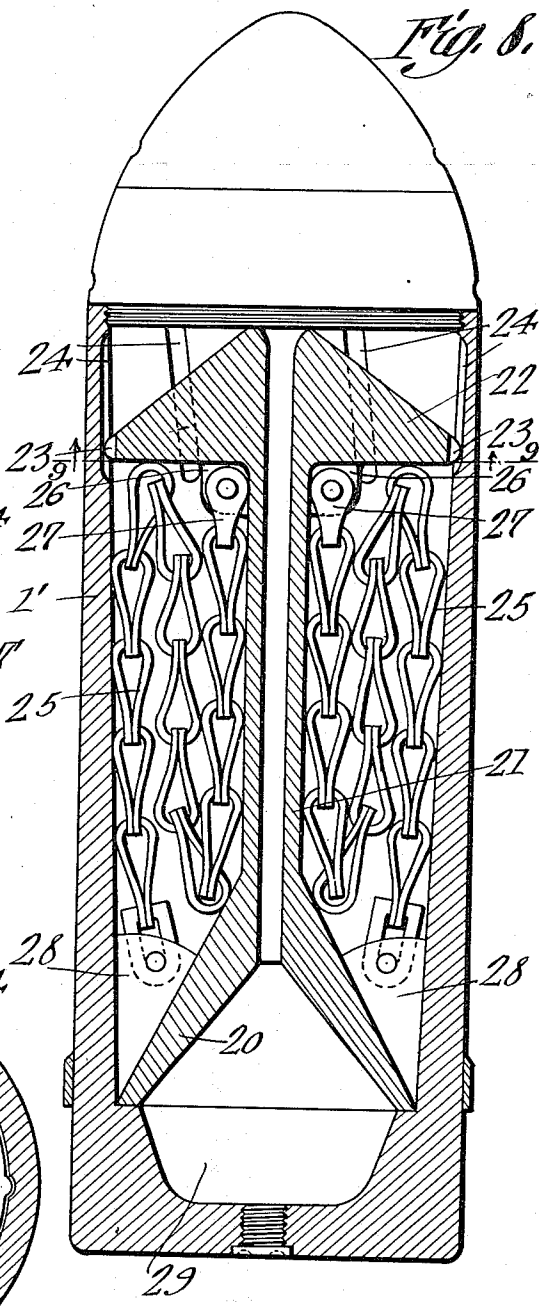
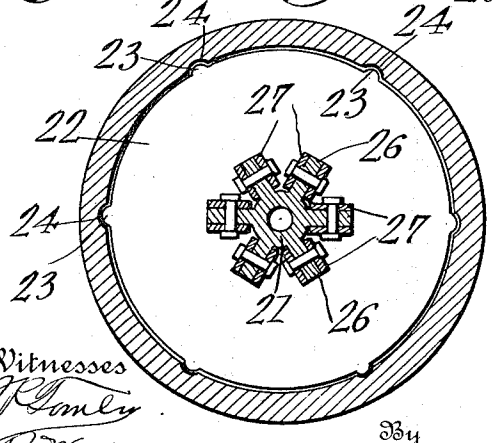


Fig. 9.



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By

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UNITED STATES PATENT OFFICE.

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ANTI-AIRCRAFT PROJECTILE.

1,274,419. Specification of Letters Patent. **Patented Aug. 6, 1918.**

Application filed June 30, 1915. Serial No. 37,251.

To all whom it may concern:

Be it known that I, LEONARD D. JACKSON, a citizen of the United States, residing at Alexandria, in the county of Alexandria and State of Virginia, have invented a new and useful Anti-Aircraft Projectile, of which the following is a specification.

This invention relates to an anti-air craft explosive projectile or shell of the cylindro-conoidal form, specifically known as shrapnel, and aims to provide a novel and improved device of that character.

It is the object of the present invention to provide a shell of the shrapnel type embodying a unique assemblage of the component parts, thereby creating a shell of relatively greater destructive area, which will obviously enhance its value in employment in destroying aerial craft of the aeroplane or dirigible type and the like.

Another object of the invention, is to provide a shell from which the explosive or detonating charge may expeditiously and conveniently be withdrawn, thereby obviating the necessity of placing the entire shell in a magazine upon completion of target practice or other experiments, and also the provision of a shell in which a circulation of air is established during its projection to uniformly distribute a heavy smoke or tracer to visualize the trajectory of the shell.

It is also within the scope of the invention to provide a shell of the shrapnel type which will be simple, substantial, durable and relatively inexpensive in construction as well as convenient, practical and efficient in its use.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in its preferred embodiments in the accompanying drawings, wherein:—

Figure 1 is a longitudinal section taken through the improved shell, omitting some of the rotary chains.

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the spacing sleeves.

Fig. 5 is an elevation of the spacing sleeve and a complete rotary chain.

Fig. 6 is a perspective view of the rifled ignition tube.

Fig. 7 is a diagrammatic view depicting the novel arrangement of the rotary chains within the shell.

Fig. 8 is a longitudinal section through another form of the invention.

Fig. 9 is a transverse section taken on the line 9—9 of Fig. 8.

Referring more specifically to the drawings in which corresponding parts are indicated by like reference characters, there is provided a shell or casing 1 of usual construction having secured at its base and extending axially therethrough, an ignition tube 2 which has its convex surface rifled as indicated at 3.

Mounted upon a shoulder 4 of the shell or casing is a tapered frusto-conical member 5, having its conical bore 6 intersected by a short cylindrical bore 7, which embraces the rifled ignition tube 2, thus insuring the axial alinement of the rifled ignition tube 2 with the usual time fuse F. The conical bore or concave surface 6 of the frusto-conical member 5, forms the outer wall of the explosive containing chamber 8 to which access may be readily had by removing a threaded base plug 9, by means of an ordinary spanner wrench.

In order to provide a large uninterrupted destructive area for this shell, or to insure the tearing of a relatively large opening in the target, or object to be penetrated, in lieu of a number of small openings, I have provided a plurality of rotary chains, each of which comprises two sections, 10 and 10′, which are secured at their inner ends to a spacing sleeve 11 by passing a pin or rivet 12 through the innermost link of each chain and opposed ears 13 of the spacing sleeve 11, thus permanently holding these members assembled. The several chains are separated by a series of spacing washers or partitions 14 which are in turn spaced apart by the said spacing sleeves 11, thereby dividing the outer portion of the shell chamber into a plurality of uniform compartments 15, each of which forms a housing

for a complete chain, which arrangement prevents the interference of the chains, one with the other. Secured to the outer end of the chain section 10 and 10′ by means of pins or rivets 16, are relatively heavy centrifugal slugs 17 and 17′. The weight of these centrifugal slugs is to be graduated to best suit the conditions to be met. The following arrangement it is thought would prove advantageous:—The first three compartments 15 adjacent the outer end of the shell, contain chains having the centrifugal slugs 17 and 17′ on their opposite ends, of equal weight, thus rendering these complete chains isotropic in their action, which will be explained hereinafter. Each successive chain away from the three mentioned, toward the base of the shell has its centrifugal slug 17′ gradually increased in weight, as shown in Fig. 7, while all of the chains in the entire shell have their centrifugal slugs 17 of equal weight. By this arrangement, each successive chain away from the first three adjacent the outer end of the chamber, has a gradually increasing differentiation between the weight of the centrifugal slugs 17 and 17′ on the opposed ends of each chain.

The cylindrical body of the flanged spacing sleeve 11 is provided with a plurality of radial splines or lugs 16ª, which extend into a bore 17ª of the spacing sleeve 11, to engage the grooves 3 of the rifled or polygroove ignition tube 2. To prevent the ignition tube 2 from rotating with respect to the shell 1, a set screw 18 is screwed through the inner end of the shell 1 into engagement with a flange 19, which is formed on the ignition tube 2.

In order to visualize the trajectory of the shell 1, thereby enabling the gunner to accurately observe or trace its flight, a smoke producing composition and means for its employment is provided. The smoke producing composition C is placed within the compartments 15 about the chain and also in an annular compartment 30 which is formed around the frusto-conical member 5. The smoke producing composition is of sufficient consistency to aid in holding the chains in their assembled position. An annular series of inwardly and rearwardly extending tangential apertures 31 are formed in the shell or casing 1, and communicate with the annular compartment 30. Also communicating with the compartment 30, is a series of oppositely disposed outwardly and rearwardly extending tangential apertures 32. The series of apertures 31 extend tangentially from the compartment 30 in the direction of rotation of the shell 1, as indicated by the arrow A, while the series of apertures 32 extend tangentially from the compartments 30 in a direction opposite from the direction of rotation of the shell 1. By this arrangement, a positive circulation of air is established in the compartment 30 during the projection of the shell, and since, the smoke producing composition is ignited by the discharge of the shell 1 from its cannon, the smoke produced thereby will be distributed along the trajectory of the shell, thus accurately revealing to the gunner the course along which the shell is projected.

In further operation, upon the ignition of the explosive material in the chamber 8, through the instrumentality of the time fuse F, and ignition tube 2, the frusto-conical member 5, rotary chain members 10 and 10′, flange spacing sleeves 11 and spacing members 14, will all be violently projected through the open end of the shell 1, which action is permitted by the stripping of the small threads T by the force of the expanding gases in the shell. The chains 10 and 10′ will immediately after liberation from the shell 1, unwind or straighten out to their full length, as illustrated in Fig. 5, due to the action of centrifugal force upon the relatively heavy centrifugal slugs 17 and 17′, which is caused by the rapid rotary motion imparted to the chains by the lugs or splines 16 in traversing the spiral or helical grooves 3 in the rifled ignition tube 2. Therefore, since the first three chains adjacent the open end of the shell are isotropic in their action they will after liberation, straighten out to their full length and rotate about the mean trajectory of the shell, and upon contact with the target, or object to be penetrated, will tear an opening, at least, as large in diameter as the combined lengths of the chain sections 10 and 10′. While the remaining chains have a gradual increasing difference in weight between the centrifugal slugs 17 and 17′ on the opposite end of each chain as they are positioned away from the open end of the shell, so they will not only rotate about their own axes or the axis of the flanged spacing sleeve 11, but will gyrate about their heavier slug 17′, causing the chains to drift or deflect from the trajectory commensurate with the differentiation in weight of the centrifugal slugs 17 and 17′.

Obviously, the first three chains, or any number of chains that may prove advantageous, will approximately follow and rotate about the mean trajectory, while each successive chain away from the first mentioned, will drift or deflect farther from the mean trajectory, thus causing the entire group of chains when striking with the target, or object to be penetrated, to tear a very large opening therein.

The concave surface 6 of the frusto-conical member 5 forms the outer wall of the powder chamber 8, thereby presenting an increased area to be acted upon by the expanding gases, which causes the frusto-conical

member 5 and chains, to be projected with greater velocity along the trajectory.

In the form of the invention depicted in Figs. 6 and 7, there is provided a frusto-conical member 20 having formed at its apical extremity, an ignition tube 21, which terminates with a flaring frusto-conical head 22. Formed at predetermined intervals on the periphery of the frusto-conical head 22, is a series of guiding lugs 23, which engage the spiral or helical grooves 24, formed in the concave surface of the rifled shell 1.

A plurality of rotary chains 25 are pivotally secured to a series of radial attaching ears 26 depending from the frusto-conical head 22, through the instrumentality of terminal links or clevises 27. Secured to the free end of each chain 25, is a centrifugal slug 28, which rests between the inner surface of the shell 1′ and the outer surface of the frusto-conical member 20.

The slugs in this form of the invention, are of uniform weight, so that when the frusto-conical member 20, ignition tube 21 and flaring head 22, together with the chains 25 and slugs 28 are all projected through the open end of the shell 1′ upon the ignition of the explosive material in the chamber 29, the slugs 28 will spread out equidistantly from the mean trajectory due to the centrifugence set up in the member 20, by the lugs 23 in traversing the spiral or helical groove 24 in passing out of the shell 1′. By having the chains 25 and centrifugal slugs 28 of uniform respective lengths and weights, the auxiliary projectile 20, 21 and 22 including chains and slugs will be rendered isotropic in its action, thus causing it to revolve rapidly about the mean trajectory in its flight. Obviously, this construction in striking with the target or object to be penetrated will tear a very large opening in the same.

While the invention above described may be advantageously employed against other than aerial crafts, it is specifically designed for that purpose.

Having thus described the invention, what is claimed as new is:

1. A device of the character described, including a casing having an explosive chamber; a composite auxiliary projectile carried by the said casing; flexible members secured to the auxiliary projectile; and means for imparting an independent rotary motion to the auxiliary projectile.

2. In a device of the character described, including a casing having an explosive chamber; a composite auxiliary projectile carried by said casing; opposed centrifugal slugs flexibly connected to said auxiliary projectile; and means for imparting an independent rotary motion to the said auxiliary projectile.

3. In a device of the character described, including a casing having an explosive containing chamber; a composite auxiliary projectile carried by said casing; opposed centrifugal slugs of unequal weight flexibly connected to the said auxiliary projectile; and means for imparting an independent rotary motion to the said auxiliary projectile.

4. In a device of the character described, including a casing having an explosive containing chamber; a composite auxiliary projectile supported within the said casing; opposed centrifugal slugs flexibly connected to the said auxiliary projectile; and radial lugs extending from the said auxiliary projectile to operably engage rotary motion imparting means embodied in said casing.

5. In a device of the character described, including a casing having an explosive containing chamber; a composite auxiliary projectile supported within the said casing; opposed centrifugal slugs connected to the said auxiliary projectile through the instrumentality of a flexible medium; lugs extending from the said auxiliary projectile to operably engage rotary motion imparting means contained in the said casing; and a frusto-conical projecting member which forms a part of the said auxiliary projectile and one wall of the said explosive containing chamber.

6. In a device of the character described, a casing having an explosive containing chamber; an auxiliary projectile supported within the said casing; attaching ears extending from the said auxiliary projectile; opposed chains secured to the said attaching ears; centrifugal slugs attached to the said chains; radial lugs extending from the said auxiliary projectile and adapted to operably engage means contained in the said casing for imparting rotary motion to the said auxiliary projectile; and a frusto-conical projecting member which forms a part of the said auxiliary projectile and one wall of the said explosive containing chamber.

7. In a device of the character described, a casing having an explosive containing chamber and a threaded aperture extending through the base of the said casing and communicating with the explosive containing chamber; an ignition tube communicating with the said chamber; an auxiliary projectile supported within the said casing; diametrically opposed radial attaching ears extending from the said auxiliary projectile; diametrically opposed chains pivotally secured to the said attaching ears; opposed centrifugal slugs attached to the said chains; radial lugs extending from the said auxiliary projectile and adapted to operably engage means embodied in the said casing for imparting rotary motion to the said auxiliary projectile; a frusto-conical member which forms a part of the said auxiliary projectile and one wall of the said explosive containing chamber; and a threaded plug received by

the said threaded aperture to provide a closure for the explosive containing chamber.

8. In a device of the character, including a casing having an explosive containing chamber; an axial ignition tube communicating with the said chamber, means for preventing the said tube from rotating with respect to the said casing; a frusto-conical projecting member which forms one wall of the explosive containing chamber; sleeves detachably supported by the said ignition tube; opposed flexible elements secured to the said sleeves; and opposed centrifugal slugs attached to the said flexible elements.

9. In a device of the character described, including a casing having an explosive containing chamber; an axial ignition tube communicating with the explosive containing chamber, said tube having helical grooves formed in the periphery thereof; a frusto-conical projecting member which forms one wall of the explosive containing chamber and detachably supports the said ignition tube; spaced sleeves slidably supported on the said tube; lugs extending from the spaced sleeves into the helical grooves formed in the ignition tube; opposed ears extending from the spaced sleeves; opposed flexible elements pivotally secured to the said ears; opposed centrifugal slugs secured to the outer terminals of the said flexible elements; and means for holding the said ignition tube against rotation with respect to the said casing.

10. In a device of the character described, including a casing having an explosive containing chamber formed adjacent its inner end; an axial ignition tube communicating with the said chamber and threadedly secured to the said casing; a radial flange extending from the said tube; a set screw extending through the casing and into engagement with the said flange to prevent the said tube from rotating with respect to the casing; a frusto-conical projecting member forming the outer wall of the explosive containing chamber; spaced partitions detachably supported by the said ignition tube; spacing sleeves detachably supported by the said ignition tube and interposed between the said partitions; opposed flexible elements pivotally secured to the said sleeves; and opposed centrifugal slugs secured to the said flexible elements.

11. In a device of the character described, including a casing having an explosive containing chamber formed in the base thereof, and a threaded aperture through the said base and communicating with the said explosive containing chamber and adapted to facilitate the withdrawal of the contents of the said chamber; a threaded plug screwed into the aperture to provide a closure therefor; an axial ignition tube secured to the said casing and communicating with the explosive containing chamber, said tube having a plurality of helical grooves formed in the periphery thereof; a frusto-conical projecting member which detachably engages the said ignition tube and forms the outer wall of the explosive containing chamber; a gasket interposed between the said frusto-conical member and the casing; spaced annular partitions detachably supported on the said ignition tube; spacing sleeves detachably supported on the said ignition tube and interposed between the said partitions; opposed flexible elements secured at their inner ends to the said sleeves; opposed centrifugal slugs secured to the free ends of the said flexible elements; radial lugs extending from the said spacing sleeves and into the helical grooves in order to impart an independent rotary motion to the said sleeves, flexible elements and centrifugal slugs after they have been violently projected along the said ignition tube, upon the explosion of the explosive material in the said chamber.

12. In a device of the character described, including a casing having an explosive containing chamber; an axial ignition tube secured to the said casing and communicating with the explosive containing chamber, said tube having a plurality of helical grooves formed in the periphery thereof; a frusto-conical projecting member which forms the outer wall of the explosive containing chamber; spaced annular partitions detachably supported on the said ignition tube; spaced sleeves detachably supported on the ignition tube and interposed between the said partitions; opposed flexible elements secured at their inner ends to the said sleeves; opposed centrifugal slugs of uniform weight secured at the outer ends of certain of the said flexible elements; opposed centrifugal slugs of unequal weight secured at each outer end of the remaining flexible elements; radial lugs extending from the said spacing sleeves into sliding engagement with the said helical grooves of the ignition tube and adapted to impart an independent rotary motion to the said sleeves, flexible elements and centrifugal slugs, after they have been violently projected along the said ignition tube and out of the said casing, by the explosion of the explosive material in the said chamber.

13. In a device of the character described, including a casing having an explosive containing chamber formed in the base end thereof; an axial ignition tube secured to said casing and communicating with the said chamber; spaced partitions detachably mounted on the ignition tube and adapted to provide annular compartments around the said tube; spacing sleeves detachably mounted on the said tube tube and interposed between the said partitions; flexible elements

secured to the said sleeves, each flexible element adapted to be compactly housed within one of the said compartments; centrifugal slugs of equal weight secured to the opposed ends of certain of said flexible elements; centrifugal slugs of unequal weight secured to the opposed ends of the remaining flexible elements, the latter arrangement is adapted to present a gradual increased differentiation between the weight of the slugs on the opposed end of each flexible element, as such flexible elements are positioned toward or near the base end of the said casing; radial lugs extending from the said spacing sleeves into sliding engagement with the helical grooves of the said ignition tube and adapted to impart a rotary motion to the said sleeves, flexible elements and centrifugal slugs, thereby causing the flexible element and centrifugal slugs, after their discharge from the said casing by the explosion in the explosive containing chamber, to straighten out to their full lengths and rotate about the said sleeves while the flexible elements, which have the centrifugal slugs of unequal weight on their opposed ends, rotate about their said sleeves, and the lighter slugs are adapted to gyrate about the heavier slugs synchronously with the said rotations.

14. A device of the character described, including a casing having an explosive containing chamber, a compartment for the reception of a smoke producing composition and opposed inlet and outlet apertures communicating with the said compartment for establishing a rotary circulation of air within the said compartment to convey the smoke produced by the ignition of the composition to the exterior of the shell; a composite auxiliary projectile mounted within the said casing; and means for imparting an independent rotary motion to the auxiliary projectile.

15. In a device of the character described, including a casing having an explosive containing chamber; a compartment for the reception of a smoke producing composition; an annular series of inwardly and rearwardly extending air inlet apertures which communicate with the said compartment, and an annular series of rearwardly and outwardly extending air and smoke outlet apertures which also communicate with the said compartment; a composite auxiliary projectile detachably mounted within the said casing; and means for imparting an independent rotary motion to the said auxiliary projectile.

16. In a device of the character described, including a casing having an explosive containing chamber; a compartment for the reception of a smoke producing composition; an annular series of inwardly and rearwardly disposed air inlet apertures which communicate with and extend tangentially from the said compartment; an annular series of outwardly and rearwardly disposed air and smoke apertures which communicate with and extend tangentially from the said compartment; a composite auxiliary projectile detachably mounted within the said casing; and means for imparting an independent rotary motion to the said auxiliary projectile, after its discharge from the said casing.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LEONARD D. JACKSON.

Witnesses:
ROSA JACKSON,
TERESA V. JACKSON.