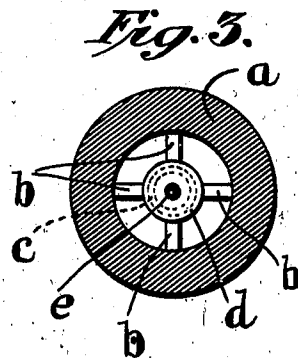
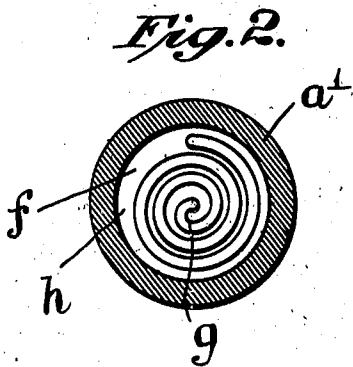
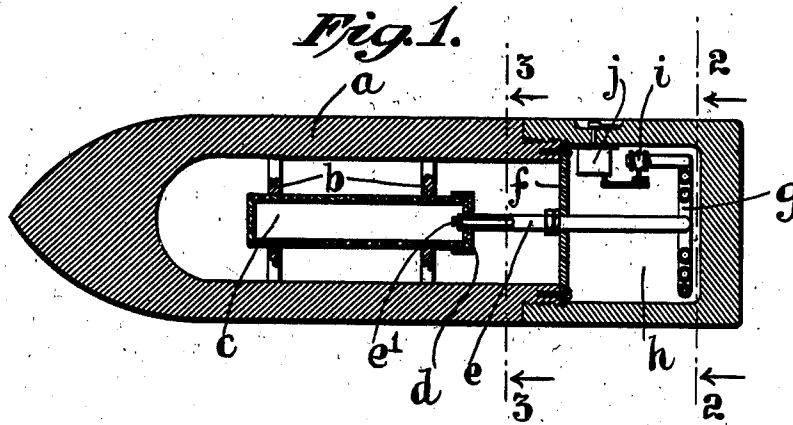


C. STIRIZ.
EXPLOSIVE SHELL AND THE ART OF MAKING SAME.
APPLICATION FILED JULY 20, 1909.

950,032.

Patented Feb. 22, 1910.



Attest:
Edw. M. Miller

Charles Stiriz Inventor:
by *Frank J. Wentworth*

UNITED STATES PATENT OFFICE.

CHARLES STIRIZ, OF NEW YORK, N. Y.

EXPLOSIVE SHELL AND THE ART OF MAKING SAME.

950,032.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed July 20, 1909. Serial No. 508,660.

To all whom it may concern:

Be it known that I, CHARLES STIRIZ, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Explosive Shells and the Art of Making Same, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to explosive shells and the art of making same, and more particularly to a type of shell in which the explosive charge remains inert until the moment of explosion; and to the manner of compounding the explosive compound whereby it will be formed immediately prior to the moment of discharge.

The main object of the invention is to provide an explosive shell, carrying a fixed charge composed of chemicals which in combination form an explosive mixture, which chemicals prior to the moment of discharge will be prevented from combining, automatic means being provided for mixing these chemicals so as to form an explosive mixture at or just prior to the moment of the desired explosion of the charge, thus permitting the storing and handling of the explosives without danger of premature explosions.

A further object is to provide an explosive shell, the fixed charge of which consists of chemicals which on combination form an explosive, wherein said chemicals will be thoroughly commingled at a predetermined moment in the presence of a gas supporting combustion.

A still further object is to provide an explosive shell having therein normally non-communicating chambers, one of said chambers being adapted to be placed in communication with the other and means whereby at a predetermined instant, said chambers will be placed in communication with each other in a manner to cause an admixture of the chemicals therein contained.

A still further object is to provide an explosive shell, the fixed charge of which will consist of glycerin and nitric acid contained in chambers which normally are non-communicative, wherein means will be provided for placing said chambers in communication with each other to mix said chemicals in the

presence of both oxygen and water at a certain predetermined instant.

A still further object is to provide an art or method of forming an explosive mixture composed of nitric acid and glycerin, which consists of storing said chemicals in separate compartments and mixing them in the presence of a supporter of combustion in an inclosed chamber at the point of the explosion.

A still further object is to provide an art or method of forming an explosive mixture which consists of storing nitric acid and glycerin in separate non-communicating chambers, and mixing said chemicals by means of compressed air in the explosion chamber.

A still further object is to provide an art or method of forming an explosive mixture of nitric acid and glycerin which consists of injecting one of said chemicals into a body of the other within said chamber by means of compressed air. And a still further object is to provide an art or method of forming an explosive compound of nitric acid and glycerin which consists of injecting one of said chemicals into a body of the other within an explosive chamber with a jet of water and compressed air.

The invention consists in the novel manner of combining chemicals forming an explosive mixture hereinafter described and such novel features of construction and combination of parts of an explosive shell as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a longitudinal vertical section of an explosive shell embodying my invention; Fig. 2 is a section on the line 2—2 of Fig. 1, and Fig. 3 is a section on the line 3—3 of Fig. 1.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention illustrated in the accompanying drawings, I have shown at *a* an ordinary hollow projectile of any desired material. Supported within the chamber in the forward part of the projectile by means of the spiders *b* is a small casing *c* of glass or other acid resisting material, which casing is provided with a flanged cover *d* of the same material, the flange of which has a sliding fit over the

open mouth of the casing *c*. This cover has a central opening therein having a sliding fit over the tube *e* which is of the same material as the casing *c* and the cover *d*. The tube *e* has a closure plug *e'* for the discharge end thereof within the chamber *c*. The foregoing construction permits the casing *c* to be so closed as to have no communication with the chamber in the forward part of the shell *a* under normal conditions. Stored in the chamber of the shell *a* is a suitable quantity of glycerin; and within the casing *c* is stored a quantity of nitric acid in that proportion, relative to the quantity of glycerin, to produce a highly explosive compound when the said glycerin and nitric acid are mixed. The casing *c* is made of glass to prevent its being eaten away by the nitric acid with a resultant accidental formation of the explosive mixture.

That portion of the bore of the shell containing the glycerin, is separated from the rear portion thereof by a partition *f* through which the tube or pipe *e* passes, the joint about said pipe being sealed in any desired manner to make it air tight. The chamber thus formed toward the rear of the shell, being thus air tight, is charged with air under fairly heavy pressure, the assembled shell thus providing the forward chambers for the chemical elements entering into the explosive mixture, and the rear chamber forming a compressed air chamber, communication being established between these chambers in a manner to cause the compressed air to release the nitric acid and mix it with the glycerin. The compressed air thus not only releases the nitric acid, but causes the mixture to occur in the presence of a gas supporting combustion thus lending efficiency to the explosive charge.

Under some conditions it may be desirable to mix water with the air and to meet this condition, I provide the coil *g*, in which may be stored the quantity of water which it is desired to inject into the explosive composition. Said coil *g* may be placed in communication with the compressed air chamber *h* through the valve *i* which valve is controlled by an ordinary time controlled releasing mechanism *j* indicated conventionally in the accompanying drawings. No claim of invention is made to this time controlled mechanism, and a detailed description thereof will not, therefore, be entered into.

By means of the foregoing construction it will be observed that the glycerin and the nitric acid, in themselves non-explosives, are stored in separate receptacles or compartments and that the nitric acid is injected into or mixed with the glycerin at substantially the moment of the explosion, the mixture taking place in the explosion chamber itself. The agency employed in securing

this mixture is the compressed air, or the compressed air and water, by means of which the nitric acid is introduced into the body of glycerin, with said air or with said air and water combined.

While as a matter of convenience, I prefer to force the nitric acid into the body of glycerin it is apparent that this process may be simultaneously discharged into a chamber common to both without departing from the spirit and scope of the invention.

My novel art consists of forming this explosive mixture by mixing the separate chemical agents together in the chamber in which the explosion is to occur and at substantially the moment of explosion by means of an air current, thus not only securing the perfect mixture of these agents, but securing such a mixture in the presence of a gas containing oxygen, thus increasing the effectiveness of the explosive charge thus formed. Water may also be introduced under some conditions to reduce the temperature within an explosion chamber, to prevent the premature explosion of the mixture.

The art or method of forming the explosive mixture is apparent from the foregoing description. It is merely necessary to combine nitric acid with glycerin to form the explosive compound, which will immediately explode without concussion or any other exploding agent or force, the moment of explosion being determined by the moment of the formation of the compound by the mixture of the agents forming same. By my invention these agents are held apart or separated until the moment of explosion arrives, thus permitting the storing and the handling of the shell, or of the explosive mixture necessary to make the shell, with perfect impunity.

The shells ordinarily will be charged by placing the proper quantity of glycerin into the forward chamber of the shell *a* and the proper quantity of nitric acid into the casing *c*. The cover *d* is then forced upon the casing *c* with a tight sliding fit, the stopper *e'* having been first used to close the end of the tube *e*. Water is then introduced into the coil *g* and the valve *i* closed, so as to relieve said water from any pressures from within the compressed air chamber *h*. Air under pressure is then stored in the said chamber *h*. When it is desired to use the shell the time controlling mechanism *j* is set in the usual and well known manner and the shell discharged from the gun. When the shell is timed to explode, the mechanism *j* will open the valve *i* causing the compressed air within the chamber *h* to force the water contained in the tube or coil *g* into the chamber in the casing *c*, the pressure forcing the stopper *e'* from the mouth of the tube *e*. The pressure within the casing *c* will force the cover *d* along the tube *e* and subse-

quently force the nitric acid contained within said casing into the body of glycerin contained within the forward chamber of the shell *a*. The compressed air and water will enter the body of glycerin at the same time and will serve to thoroughly commingle the nitric acid and the glycerin, supplying that quantity of oxygen necessary to form a highly explosive compound. As the nitric acid and glycerin become thoroughly mixed, the shell will explode with great force, the force being proportioned to the quantity of the nitric acid and glycerin therein contained. The water injected into the mixture will serve to hold down the temperatures to an extent to permit thorough mixture of the entire quantity of chemicals.

It is not my intention to claim any rights of invention in an explosive consisting of nitric acid and glycerin, the explosive compound produced being old and well known in the art. By my manner of forming this compound, however, while I do not secure any higher efficiency, in the explosive itself, I do form the explosive at the point at which it is to be used, thus permitting the conveyance or handling of the explosive without likelihood of damage through the accidental or premature discharge thereof.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described my invention, what I claim as new, and desire to have protected by Letters Patent, is:—

1. In an explosive shell, the combination with a shell having a plurality of normally non-communicating chambers therein, of means whereby said chambers may be placed in communication with each other, non-explosive agents stored in said chambers respectively, means forming a compressed air chamber within said shell and means establishing communication between said compressed air chamber and one of said first mentioned chambers whereby the pressure within said chamber will actuate said means establishing communication between said chambers, and said agents will be compounded in the presence of air at the point of discharge to form an explosive mixture.

2. In an explosive shell, the combination with a shell having a chamber therein, of a casing seated within said chamber, a removable closure for said casing whereby said chamber and said casing are normally non-communicating, nonexplosive agents stored in said chamber and said casing respectively, means forming a compressed air chamber within said shell, and means establishing communication between said compressed air chamber and said casing whereby the pres-

sure within said casing will remove said closure and force the agent within said casing into said chamber and mix or compound it with the agent in said chamber in the presence of air at the point of discharge to form an explosive mixture.

3. In an explosive shell, the combination with a shell having a chamber therein, of a casing seated within said chamber, a removable closure for said casing whereby said chamber and said casing are normally non-communicating, glycerin stored in said chamber, nitric acid stored in said casing, said casing and its closure being of acid resisting material, means forming a compressed air chamber within said shell and means establishing communication between said compressed air chamber and said casing whereby the pressure within said casing will remove said closure and force the agent within said casing into said chamber and mix or compound it with the agent in said chamber in the presence of air at the point of discharge to form an explosive mixture.

4. In an explosive shell, the combination with a shell having a plurality of normally non-communicating chambers therein, of means whereby said chambers may be placed in communication with each other, non-explosive agents stored in said chambers respectively, means forming a compressed air chamber within said shell, means storing water within said shell and means establishing communication between said compressed air chamber and one of said first mentioned chambers and said water storage means whereby the pressure within said chamber will actuate said means establishing communication between said chambers and said agents will be mixed or compounded in the presence of air and water at the point of discharge to form an explosive mixture.

5. In an explosive shell, the combination with a shell, having a chamber therein, of a casing seated within said chamber, a removable closure for said casing whereby said chamber and said casing are normally non-communicating, glycerin stored in said chamber, nitric acid stored in said casing, said casing and its closure being of acid resisting material, means forming a compressed air chamber within said shell, a coil of pipe within said compressed air chamber, the opposite ends of which open into said compressed air chamber and said casing respectively, means normally closing the opposite ends of said coil, and means whereby the end within said compressed air chamber will be open at a predetermined interval whereby water and air under pressure will be forced within said casing, and the contents of said casing in the presence of water and air will be forced into said chamber and mixed or compounded with the contents thereof to form an explosive mixture.

6. In an explosive shell, the combination with a shell, having a chamber therein, of a casing seated within said chamber, a removable closure for said casing whereby said chamber and said casing are normally non-communicating, glycerin stored in said chamber, nitric acid stored in said casing, said casing and its closure being of acid resisting material, means forming a compressed air chamber within said shell, a coil of pipe within said compressed air chamber, the opposite ends of which open into said compressed air chamber, the opposite ends of which open into said compressed air chamber and said casing respectively, means normally closing the opposite ends of said coil, and adjustable, time controlled means whereby water and air under pressure will be forced within said casing, and the contents of said casing in the presence of water and air will be forced into said chamber and mixed or compounded with the contents thereof to form an explosive mixture.

7. The combination in an explosive chamber, of means storing glycerin and nitric acid separately, means forming a compressed air chamber, and suitable connections whereby said glycerin and said nitric acid will be mixed by, and in the presence of

compressed air within said explosion chamber and at substantially the moment of discharge.

8. The herein described method or art of forming an explosive mixture, consisting of mixing or compounding glycerin and nitric acid in an explosion chamber, by means of and in the presence of a jet of compressed air, and at substantially the moment of discharge of the explosive mixture.

9. The herein described process of forming an explosive mixture, which consists of mixing glycerin and nitric acid in an explosive chamber at substantially the moment of discharge by means of water and compressed air.

10. The herein described process of forming an explosive mixture, which consists of forcing nitric acid into a body of glycerin by means of a moving volume of compressed air and water.

In witness whereof, I have hereunto affixed my signature, this 10th day of July, in the presence of two witnesses.

CHARLES STIRIZ.

Witnesses:

P. FRANK SONNEK,
P. V. NENING.