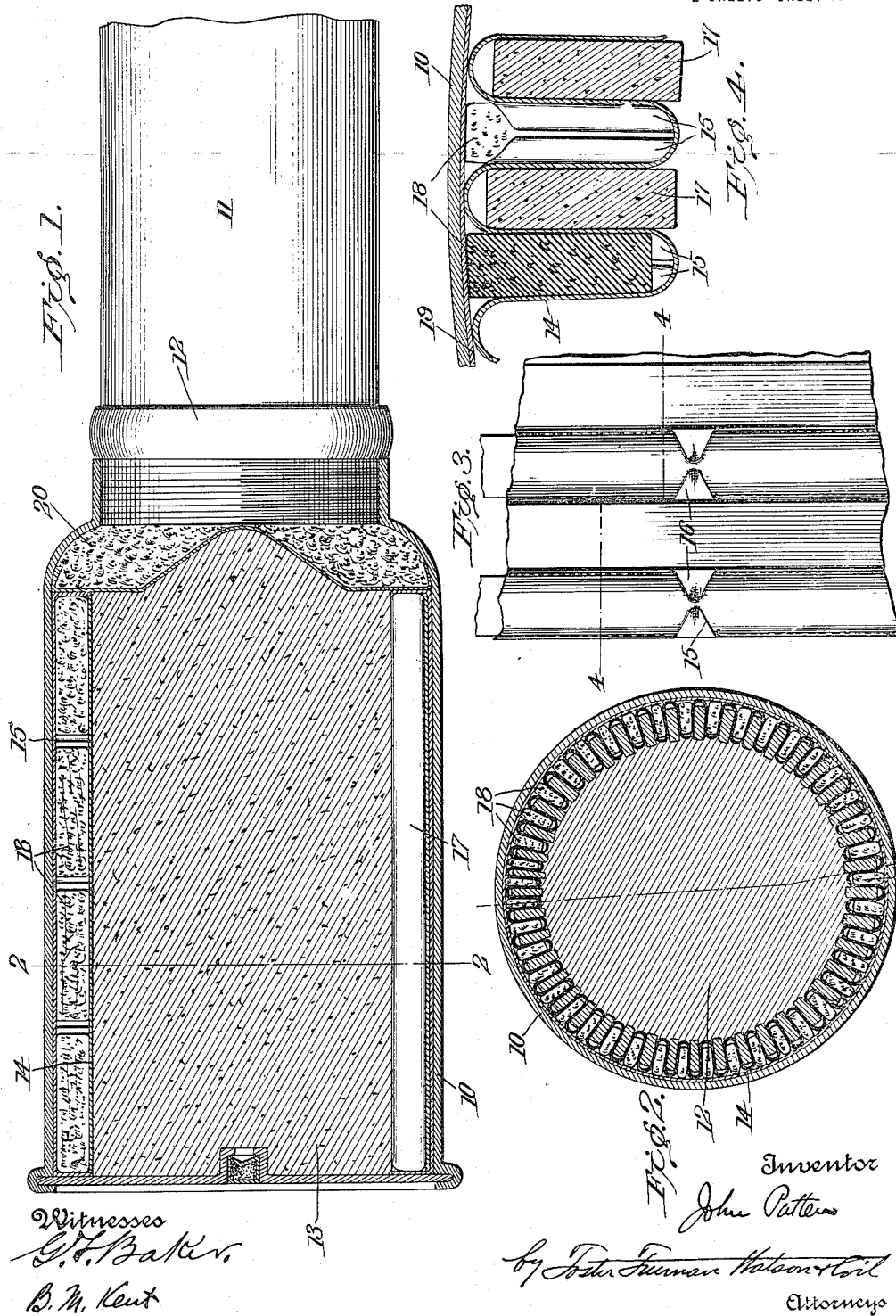


1,187,779.

Patented June 20, 1916.

2 SHEETS—SHEET 1.



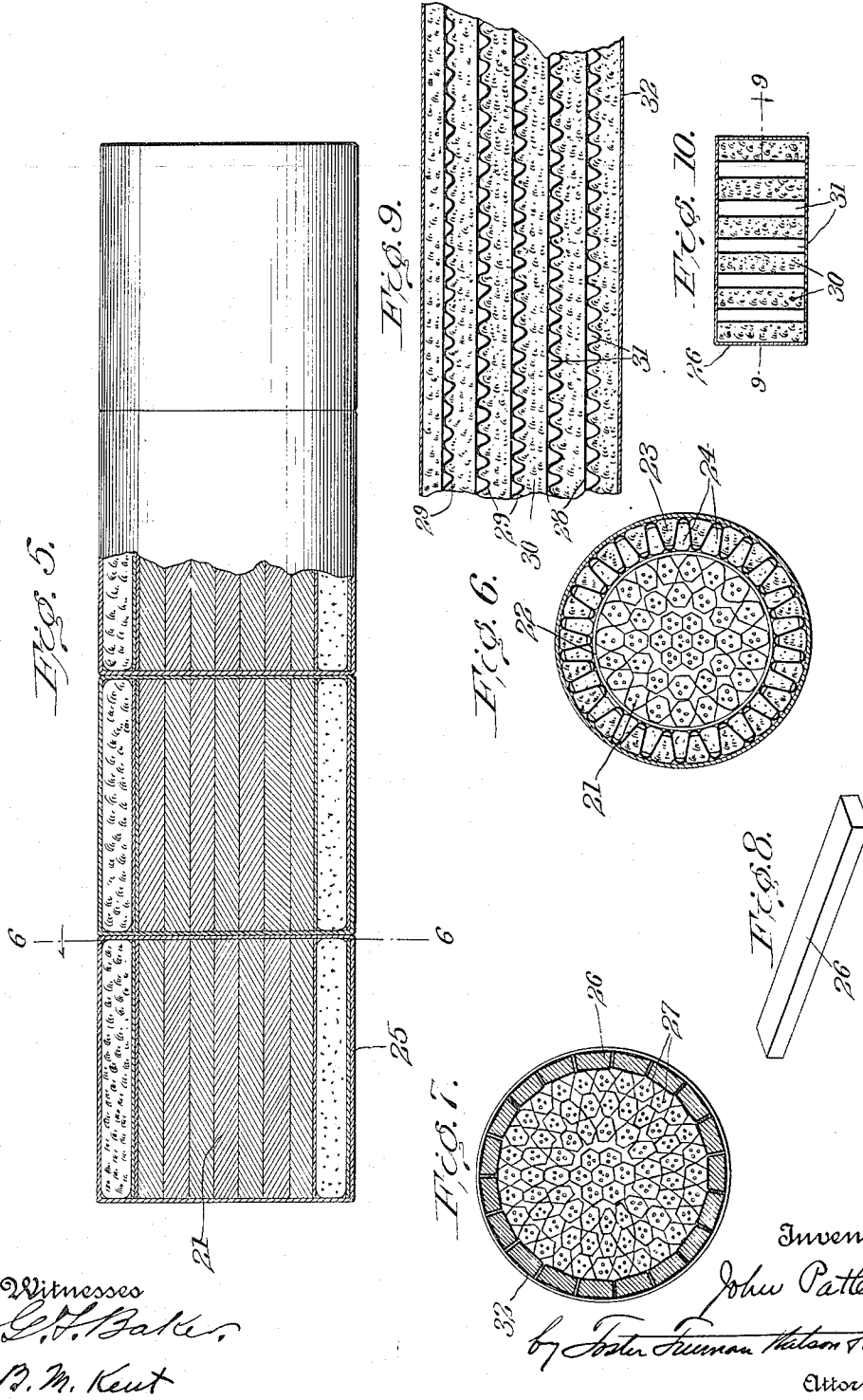
J. PATTEN.
AMMUNITION.

APPLICATION FILED OCT. 2, 1914.

1,187,779.

Patented June 20, 1916.

2 SHEETS—SHEET 2.



Witnesses
C. H. Baker
P. M. Keut

Inventor
John Patten
by Foster Furman Watson & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JOHN PATTEN, OF BALTIMORE, MARYLAND, ASSIGNOR OF SEVENTY-FIVE ONE-HUNDREDTHS TO C. WILBUR MILLER AND ERNEST B. MILLER.

AMMUNITION.

1,187,779.

Specification of Letters Patent. Patented June 20, 1916.

Application filed October 2, 1914. Serial No. 864,650.

To all whom it may concern:

Be it known that I, JOHN PATTEN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Ammunition, of which the following is a specification.

The object of the present invention is to provide an improved powder charge which will greatly lessen the erosion of the gun and thereby prolong the life of the gun, and permit the use of explosives producing a longer range of the projectile. I accomplish these objects by means of a powder charge having a central core of high explosive and a surrounding belt of material which, when the core is exploded, produces gases of a much lower temperature than the products of combustion of the core, these gases surrounding the products of combustion and protecting the walls of the gun from the excessive heat of such products.

The invention may be embodied in various forms and some of the same are illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal section through the shell of a piece of fixed ammunition; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is an enlarged view of a fragment of the belt which surrounds the core of explosive material; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a partial side elevation and partial section of another form of powder charge; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a transverse section, similar to Fig. 6, of another form of powder charge; Fig. 8 is a perspective view of one of the pieces which constitutes the outer belt of the form of charge shown in Fig. 7; Fig. 9 is an enlarged longitudinal section of the piece shown in Fig. 8, the section being taken on the line 9—9 of Fig. 10; and Fig. 10 is a transverse section of the piece shown in Fig. 8.

Referring to Figs. 1 to 4, it will be seen that I have illustrated a shell 10, to which is attached in any suitable manner a projectile 11, having the usual copper rotating ring 12. The powder charge within the shell 10, comprises a core 13, of any preferred form of explosive and a surrounding belt which is made up of sheet material 14, of a highly inflammable nature and preferably of gun cotton, this sheet material

being arranged to provide spaced radial folds as shown in Fig. 2. The sheet material 14, at intervals throughout the length of the charge, is provided with radial indentations 15 to divide the spaces between alternate folds into sections and to further provide the radially extending channels 16 which communicate with the space occupied by the core 13. I arrange in those spaces between the folds of the material 14, which do not have the indentations 15 projecting thereinto, strips of explosive material 17, which may be of the material which constitutes the core 13. Thus there is arranged about the core 13 a series of strips of explosive which extend in an axial direction and are arranged in those spaces between the folds of the material 14, which have their inner sides in open communication with the central space occupied by the core 13, and have their outer sides closed by the material 14. The spaces 16 provide means whereby, when the core is exploded, the fire will be carried outwardly along the sides of the strips 17 and thus cause these strips to be ignited throughout their length.

In the spaces between those in which the strips 17 are placed I place other strips of a mixture of ammonium carbonate and petroleum jelly or other plastic material adapted to protect the ammonium carbonate from the atmosphere. These strips, which are indicated at 18, may be made up of granulated or pulverized ammonium carbonate mixed with petroleum jelly or any other suitable substance which will form a film, which serves to exclude the air from the particles of ammonium carbonate, and thereby prevents the decomposition of the same.

Ammonium carbonate is a material which decomposes at a temperature of about 58° centigrade, the products of decomposition being ammonia and carbon-dioxid. When ammonia is subjected to high temperatures it is decomposed into nitrogen and hydrogen. The ammonium carbonate, in the presence of the high temperature gases produced by the explosion of the core 13, is decomposed into nitrogen, hydrogen and carbon-dioxid, a certain amount of the heat from the products of combustion of the explosive being used to effect the decomposition of the ammonium carbonate. The volume of the gases derived from the ammonium carbonate, however, more than off-sets the loss of

heat by the main explosive and therefore the net result is to increase the pressure over what it would be if the explosive alone were used. On account of the low temperature at which the ammonium carbonate is decomposed the gases derived therefrom will have a much lower temperature than the products of combustion of the core 13, and since the ammonium carbonate is so arranged, in the charge, as to surround the core 13 the products of combustion of the core will be surrounded by an envelop of cooler gases which insulate the wall of the gun from the excessive temperatures produced.

By using gun cotton or other explosive for the sheet material 14, and by arranging between the layers of the ammonium carbonate mixture, layers of explosive material, the ammonium carbonate mixture is so intimately associated with the explosive that it will be almost instantly decomposed.

The charge is preferably surrounded by a suitable casing 19, which serves to hold the components together and also forms a protection for the components.

In making up fixed ammunition a wad of the ammonium carbonate mixture, above described, may be placed between the charge and the projectile as indicated at 20, and when the charge is exploded this wad of the mixture will be forced ahead of the products of combustion, and some of the mixture will be forced between the projectile and the wall of the gun, in the rear of the rotating ring 12. This mixture tends to lubricate the wall of the gun so as to lessen the friction of the gases which follow the projectile. The mixture also serves to form a body of relatively cool gases preceding the hot gases of combustion and these relatively cool gases have a tendency to cool the wall of the gun after the temperature thereof has been raised to a very high degree on account of the friction caused by the rotating ring 12. The products of combustion from the core 13 may reach a temperature as high as 4000° Fahrenheit, and the gases produced in the belt surrounding the core will have a temperature not exceeding 2000° F., and this temperature is below the melting point of the steel from which the gun is made, so that the gun will be protected or insulated from the extremely hot products of combustion of the core. It is a well established fact that the erosion of the gun is due largely to the heat generated by the rotating ring 12, followed by powder gases having a temperature as high as 4000° F. which causes a thin film of the metal to be melted and swept away by the gases.

Referring to Figs. 5 and 6, it will be seen that I have therein illustrated a sectional charge such as is employed in very large guns. In this form of the invention there is a central core 21 of gun cotton or other

high explosive, which may be inclosed in a band 22 of gun cotton or other suitable material. Arranged exteriorly of the band 22 and inclosing the core 21 is a belt made up, as in the former case, of a folded strip of suitable sheet material between alternate folds of which are arranged layers of explosive and the mixture of ammonium carbonate and petroleum jelly. In the present case, however, the strips 23 of the mixture are preferably wedge shaped and oppositely arranged with respect to the wedge shaped strips 24 of explosives. In this way a large inner surface of the strips of explosives is subjected to the fire of the core 21, thereby more effectively igniting the strips.

As is customary in the charges for very large guns they are made up in sections and in Fig. 5, I have illustrated four of such sections, each of which is inclosed in a suitable casing 25, which serves to protect the components of the charge and also to facilitate handling.

Referring to Figs. 7 to 10, it will be seen that I have therein illustrated a charge similar to that shown in Figs. 5 and 6 with the exception that the outer belt, containing the ammonium carbonate is made up of independent pieces 26 which may be assembled along with the pieces 27 of explosive which constitute the central core. The piece 26 is preferably made up in the form of a box or casing of gun cotton or other similar material, the box being hermetically sealed after being filled. Within the walls of the box there are arranged longitudinally extending strips 28 of gun cotton or other suitable material, these strips having arranged on one side thereof corrugated strips 29 of similar material. The strips 28 and 29 are thus arranged in pairs and between the pairs is placed the ammonium carbonate 30. The strips 28 and 29 cooperate to form spaces 31 extending radially of the charge so as to carry the flash from the central core of the charge to all parts of the strips 28 and 29, and thus ignite these strips throughout their length and cause the ammonium carbonate to be quickly decomposed. In the drawings, the proportions are greatly exaggerated, but in practice the various layers of ammonium carbonate between the pairs of strips of gun cotton will be very thin, preferably about one-sixteenth of an inch thick, and the strips of gun cotton may be about five one-thousandths of an inch thick, and the corrugations in the strips 29 about one-sixteenth of an inch deep. The casing inclosing the strips and ammonium carbonate will also have thin walls, preferably, about five one-thousandths of an inch thick and being of gun cotton will be quickly burned to admit the flash to the spaces 31. The thin layers of ammonium carbonate, being inclosed on both sides by the burning gun cotton, will

be subjected to such a high temperature that it will be very rapidly decomposed, the gases mingling with the products of combustion of the strips 28 and 29 and producing a gaseous mixture of relatively low temperature which will insulate the wall of the gun from the excessive heat of the products of combustion of the central core. Each section of the charge will be inclosed in a casing 32 similar to the casing 25 and in this way the components of the charge are held together so as to facilitate handling.

From the foregoing it will be seen that I have provided such improvements in ammunition as will protect the wall of the gun from the high temperature gases and thus prevent erosion. This will prolong the life of the gun and also permit higher temperatures and pressures to be employed so as to give the projectile a higher initial velocity and a consequent longer range.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A powder charge comprising a central core of explosive and a surrounding belt of gas forming material intermingled with explosive, which belt produces a lower temperature than the core, when the charge is fired.

2. A powder charge comprising a central core of explosive and a surrounding belt of intermingled explosive and material which is decomposed, by the temperature produced by the core, into gases having a lower temperature than the products of combustion of the core.

3. A powder charge having a central core of explosive which is surrounded by intermingled explosive and material adapted to produce an envelop of relatively low temperature gases for the products of combustion of the core, when the latter is exploded.

4. A powder charge comprising a central core of explosive and a surrounding belt of alternate layers of explosive and non-explosive material which is decomposed into gases by the temperature of the products of combustion of the explosives.

5. A powder charge comprising a central core of explosive and a surrounding belt of sheet material arranged with radial folds between which is material adapted to produce an envelop of relatively low temperature gases for the products of combustion of the core when the latter is exploded.

6. A powder charge comprising a central core of explosive and a surrounding belt of sheet material arranged with radial folds between which are alternately arranged layers of explosive and material adapted to produce gases of relatively low temperature around the products of combustion of the core when the latter is exploded.

7. A powder charge comprising a central

core of explosive and a surrounding belt of sheet material arranged with radial folds between which are alternately arranged layers of explosive and a mixture of ammonium carbonate and a material for excluding air therefrom.

8. A powder charge having a central core of explosive and a surrounding belt comprising sheet explosive and hermetically sealed containers having ammonium carbonate therein.

9. A powder charge having a central core of explosive, a surrounding belt of hermetically sealed containers formed of explosive material and containing ammonium carbonate, and means for holding said containers in position.

10. A powder charge comprising a central core of explosive inclosed in a casing of sheet material, and a surrounding belt of explosive and a volatile granular material adapted to produce an envelop of relatively cool gases when the charge is exploded.

11. A powder charge comprising a central core of explosive inclosed in sheet explosive, and an outer belt of explosive and a volatile granular material adapted to produce an envelop of relatively cool gases when the charge is exploded.

12. A powder charge comprising a central core of explosive, a surrounding belt containing a mixture of ammonium carbonate and petroleum jelly, and a wad of said mixture between said core and belt and the projectile.

13. A powder charge comprising a main body of explosive and a wad of a mixture of a petroleum jelly and a volatile granular material in front of the main body of explosive.

14. A powder charge comprising a central core of explosive and a surrounding belt of hermetically sealed containers having therein ammonium carbonate and explosive.

15. A powder charge comprising a central core of explosive and a surrounding belt of hermetically sealed containers having therein alternate layers of ammonium carbonate and explosive material.

16. A powder charge comprising a central core and a surrounding belt of hermetically sealed containers having therein alternate layers of ammonium carbonate and explosive arranged radially of the charge whereby the edges of the layers are presented to the central core.

17. A powder charge comprising a central core and a surrounding belt of hermetically sealed containers of explosive material having therein alternate layers of ammonium carbonate and explosive material, and the explosive material having passages through arranged radially of the charge.

18. A hermetically sealed container formed of explosive material and containing alter-

ately arranged layers of ammonium carbonate and explosive material.

19. A hermetically sealed container formed of explosive material and containing granular ammonium carbonate or an equivalent material adapted to be volatilized by the heat generated by the explosion of the container.

20. A hermetically sealed container formed of explosive material and having therein spaced pairs of strips of explosive material, one strip of each pair being substantially plain and the other strip being corrugated,

and layers of ammonium carbonate in the spaces between the pairs of strips.

21. A container formed of explosive material and having therein spaced strips of explosive material and ammonium carbonate in the spaces between said strips.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN PATTEN.

Witnesses:

B. M. KENT,

ERNEST B. MILLER.