J. T. THOMPSON.

CARTRIDGE.

APPLICATION FILED JAN. 6, 1920.

1,353,118.

Patented Sept. 14, 1920.

Fig. 3.

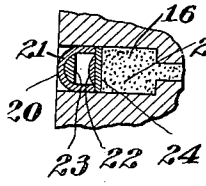


Fig. 1.

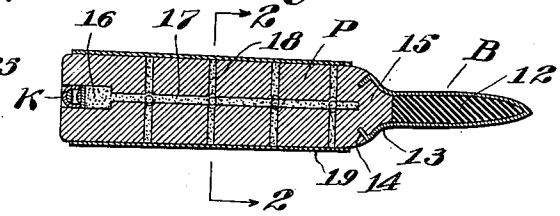


Fig. 2.

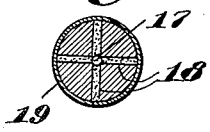


Fig. 4.

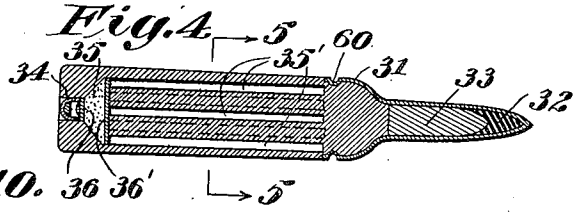


Fig. 5.

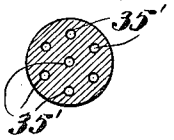


Fig. 10.

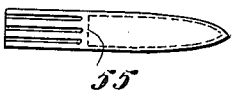


Fig. 6.

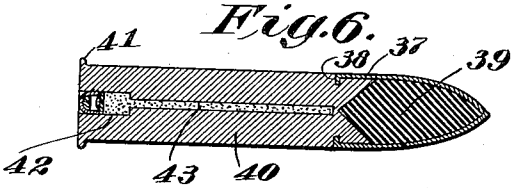


Fig. 7.

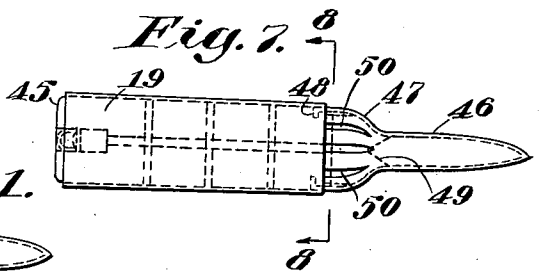


Fig. 8.

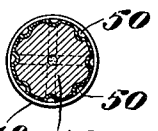


Fig. 11.

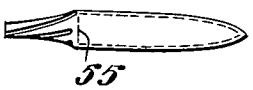


Fig. 9.

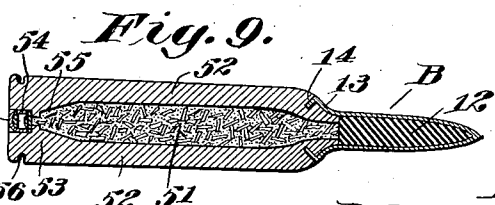
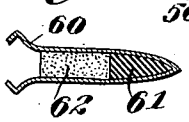


Fig. 12.



Inventor

John T. Thompson

by Roberts Roberts & Cushman

his Attorneys

UNITED STATES PATENT OFFICE.

JOHN T. THOMPSON, OF NEWPORT, KENTUCKY, ASSIGNOR OF ONE-HALF TO THOMAS F. RYAN, OF NEW YORK, N. Y.

CARTRIDGE.

1,353,118. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed January 6, 1920. Serial No. 349,732.

To all whom it may concern:

Be it known that I, JOHN T. THOMPSON, a citizen of the United States, and resident of Newport, in the county of Campbell and State of Kentucky, have invented new and useful Improvements in Cartridges, of which the following is a specification.

This invention relates to an improved caseless cartridge and more particularly to new and improved methods of forming and attaching the bullet, of forming the propellent member, and of seating and attaching the primer.

In the use of cartridges provided with metallic cases and metallic primers there is always the danger of a jam, particularly in machine guns and other rapid fire guns. This may be caused in a variety of ways, all dependent, however, on some portion of the cartridge case. For example, instead of being properly ejected, the empty cartridge case may fall into the path of the bolt and cause a jam in the closing movement of the bolt. If the metallic primer is not firmly held on its seat it may be blown backward and get into the gun mechanism as the breech is opened. If there are any slight irregularities on the surface of the powder chamber the pressure exerted by the explosion of the propelling charge upon the soft metal case may be sufficient to force portions of the case into the irregularities and it will extract only with difficulty.

In high powered rifles, it is necessary to provide a powder chamber of greater diameter than the bore of the rifle and this necessitates a more or less abrupt shoulder where the two meet. There is, therefore, a component of the explosive pressure which acts against this shoulder and hence in a direction opposite to the movement of the cartridge case in extraction. At times this pressure causes the cartridge case to rupture adjacent the rear end of this shoulder and the portion broken off remains in the gun when the other portion is extracted. This causes a jam when the next cartridge is inserted.

Almost without exception all jams are caused by the metallic cartridge case or some other metallic part thereof such as the primer and hence its elimination will greatly increase certainty of fire.

A caseless cartridge also requires no extractor or ejector and consequently there will be a saving in the number of parts, the weight, and the cost of manufacture of guns adapted for use with such cartridges.

Another very important feature is the saving in time by the use of my improved cartridge. The loading mechanisms of guns may be speeded up since it is unnecessary to have them retarded until the empty case has been both extracted and ejected.

In the manufacture of cartridges, the case is one of the most expensive elements, especially when the cartridges are to be used in automatic or machine guns since it is necessary that such cases be very carefully sized and shaped to prevent jams. They are made of expensive material, usually a copper alloy, and require a number of operations in their manufacture. All of this expense is obviated in my new and improved caseless cartridge.

It is an object of my invention to provide a caseless cartridge, with a metalless primer, of such nature that after firing no part of the cartridge remains in the rifle.

It is a further object to provide a bullet of a new and improved form such that it is firmly attached to the propelling explosive before firing and is detached upon the burning of the explosive.

It is also an object to provide a bullet carrying means to provide improved stability in flight. It is another object to provide a caseless cartridge with a primer formed entirely of combustible material and an additional object is to provide a cartridge entirely non-metallic save for the bullet.

In a specific embodiment it is an object of my invention to provide an improved caseless cartridge in which the propelling charge comprises a solid element having the primer

seated in a cavity in this element, and the bullet attached to the element by extending its metallic jacket at least part way along the propelling element.

I have illustrated several specific embodiments of my invention in the accompanying drawings, in which,—

Figure 1 is a longitudinal section showing one form of my improved cartridge.

Fig. 2 is a cross section of Fig. 1 on the line 2—2;

Fig. 3 is a longitudinal section showing a primer on its seat;

Fig. 4 is a longitudinal section of another embodiment;

Fig. 5 is a cross section of Fig. 4 on the line 5—5;

Fig. 6 is a longitudinal section of a different embodiment;

Fig. 7 is a side view of another form of my invention;

Fig. 8 is a cross section of Fig. 7 on the line 8—8;

Fig. 9 is a longitudinal section of still another form of my invention;

Fig. 10 is a view of the bullet used with my cartridge as it is when in the bore of the gun after firing;

Fig. 11 is a view of the bullet as it appears shortly after leaving the gun; and

Fig. 12 is a view of another type of bullet adapted to be used with my caseless cartridge.

In Fig. 1 I have shown my improved cartridge as comprising a bullet B, a powder element P, and a primer K. The bullet as shown is composed of a core 12 of the usual lead alloy, and with a jacket 13 which may be made of the cupro-nickel now in general use for such purposes. This jacket extends to the rear beyond the end of the core and is fastened to the powder element by an inturned flange 14. This flange may be crimped into the powder or the powder may be cast onto the bullet. In this form I have shown the jacket as extending but a short distance onto the powder element, but obviously this distance may be varied at will in various types of cartridges. If the shoulder on the forward end of the powder element is very abrupt, it may be found desirable to limit the jacket as shown in this figure.

The powder element is cylindrical in general outline with a reduced portion 15 adjacent the bullet and a tubular primer and igniter seat 16 on the rear end. The powder element also has a smaller tubular opening 17 running longitudinally thereof with spaced radial openings 18 intersecting it as shown in Fig. 2. There is a thin wrapper 19 around the powder element. This wrapper may be made of paper or of any suitable, readily combustible or explosive material, and may be waterproofed to protect the powder element.

In the primer seat 16 is the primer 20 comprising the cup 21, anvil 22, and fulminate or similar priming compound 23 as shown in detail in Fig. 3. Next the primer is the thin combustible membrane 24 and beyond this the remainder of the primer cup is filled with a rapid burning explosive, such as black powder in granular form, to form the igniter 25. As shown in Fig. 1 the openings 17 and 18 are also filled with igniting means to facilitate the rapid and even combustion of the propelling charge. The granules of the igniter are retained in the openings by the wrapper 19.

In Fig. 4 I have shown a slightly different form of cartridge. Here the forward end of the powder member is on a less abrupt slope and the jacket 31 extends onto the cylindrical portion of the powder element and has a circumferential crimp 60 to hold it to the powder element. The bullet shown here is an armor piercing one comprising a multiple core, the part 32 being formed of lead alloy and the part 33 of steel. The powder element contains a primer seat 34 and a conical igniter cavity 35, with an inflammable membrane 36 therebetween and a similar membrane 36′ is located at the base of the igniter chamber. The body of the powder element has a plurality of longitudinal passages 35′ extending therein from the igniter chamber, the location of the passages being shown in Fig. 5. This form of powder element is similar to the form now in general use when powder in large cylindrical grains is used in our ordnance, and passages so spaced have been found to greatly facilitate rapidity and evenness of burning.

In Fig. 6 I have shown my cartridge in a form adapted for use in guns taking a cartridge substantially cylindrical and of the same diameter as the bullet. The bullet is here shown with a jacket 37 turned into the powder member at 38. The core 39 is shown as approximately stream line in contour or "boat-tailed" as such projectiles are commonly called. The powder member 40 is cylindrical with an integral flange 41 at its base so as to fit the usual form of powder chamber. It has the primer seat 42 and a longitudinal passage 43 connected therewith. As shown the igniter charge extends through the whole passage 43. In a cylindrical cartridge the flange 41 is desirable to insure seating at the proper point in the powder chamber.

When the bullet is in flight the air pressure due to the speed of travel and the partial vacuum created thereby, together with the rotation of the bullet, will cause the relatively thin and flexible jacket to be

folded in about the boat-tail of the core and give the bullet in general a stream line contour. This will very considerably increase the velocity and range. A boat-tailed projectile for small arms used without the jacket as described loses much of its efficiency due to the fact that the boat tail has a tendency to direct the pressure of the propelling charge between the bullet and the bore of the gun and there is consequently loss of pressure, with consequent loss of velocity and range. With small arms the velocity is most important since on it depends the flatness of the trajectory and consequently the depth of danger space.

With the jacketed bullet of the present invention with its jacket extending into contact with the walls of the bore back beside the boat-tail, the jacket causes substantially perfect obturation and no pressure or velocity is lost.

This particular form of bullet is, of course, susceptible to use with any of the other forms of cartridge shown.

In Fig. 7 I have shown a caseless cartridge comprising the powder member 45, wrapper 19, and the jacketed bullet 46, the jacket of which extends over the shoulder 47 and is crimped into the powder member at 48. The boat tailed core extends to the dotted line 49 and I have indicated in dotted lines the primer seat and igniter cavity shown in Fig. 1. As best shown in cross section in Fig. 8, the rear part of the bullet jacket has the longitudinal grooves 50 formed therein. In cartridges which have an abrupt shoulder such as 47 in order to fit the powder chamber of existing firearms, it may be desirable to have these grooves in order to permit pressure of the propelling charge to be exerted on both sides of the jacket skirt. If this were not done, there would be a tendency for internal pressure exerted inside the skirt to hold it against the shoulder so that it would be ruptured approximately at the base of the shoulder.

In Fig. 9 I have shown a cartridge having the form of bullet B shown in Fig. 1 with the jacket 13 over a core 12, the jacket being inturned into the powder member at 14. The powder member is very approximately of the form of the usual metallic cartridge case having the interior cavity 51 surrounded by the walls 52 and the base 53 having a primer seat 54 with a vent 55 into the cavity 51. The base may have a groove 56 therein so as to be fitted into the usual form of clip. As shown, a primer K is fitted into the primer seat 54. The interior cavity is shown filled with the usual form of rifle powder.

Since many types of colloidal powder are so slow burning that a solid piece the size of a powder chamber will not burn with sufficient rapidity to give the requisite velocity for rifle fire, it may be found desirable in some instances to use this type of cartridge. It is to be understood, however, that the hollow member is not only highly combustible so that no residue is left in the chamber, but preferably is explosive and forms a substantial part of the powder charge.

In Fig. 10 I have shown a bullet such as is shown in Figs. 1, 4, 9 and 12 as it will appear while in the bore of the gun. The core extends to the dotted line 55, and the tail of the jacket is crimped down until it is cylindrical in form. In Fig. 11 the same bullet is shown shortly after leaving the muzzle. The tail of the jacket has become pressed together by the rush of the air and the partial vacuum formed in the rear of the bullet and has become twisted by the rotation of the bullet due to the rifling of the piece. It will be seen that the bullet approaches a stream line form.

In Fig. 12 I have shown an incendiary or tracer bullet adapted for use with my caseless cartridge, the bullet comprising a jacket 60, lead alloy core 61 and inflammable pellet 62. While I have shown my improved cartridge as comprising any one of a number of types of bullets, all of these bullets are characterized by having a portion of the jacket extending back a greater or less distance onto the powder element, and always sufficiently so to insure a firm connection between the two parts. Obviously any type of bullet may be used with any type of powder element shown. I have shown a number of types of powder elements but all are so constructed as to obviate the necessity for a metallic casing and all have a primer attached directly thereto. This primer is also made entirely of combustible or explosive material.

In certain cases in connection with such primers, it may be found desirable to vary the usual type of firing pin and give it a broader point and it may be necessary or desirable to provide improved obturation between the bolt and powder chamber when using my caseless cartridges, but these variations form no part of my present invention and need not be further discussed herein.

While I have shown certain preferred embodiments of my invention, they are to be considered not as limiting but as illustrative only, and I desire to cover my invention broadly within the scope of the appended claims.

I claim:

1. In a caseless cartridge, a unitary propelling charge and a bullet comprising a core and a jacket, a portion of the jacket extending exteriorly over the propelling

charge, and a part thereof extending inwardly behind a shoulder on the propelling charge.

2. A cartridge for firearms comprising a body of solid explosive, said body having a recess therein, and a primer mounted on and supported by said body within said recess.

3. A cartridge for firearms comprising a body of solid explosive, said body having a recess therein, and a metalless combustible primer mounted on said body within said recess.

4. A cartridge comprising a body of solid explosive and a bullet having a portion extending exteriorly over said body, the end of said portion being embedded in said body to retain the parts in fixed relation.

5. A caseless cartridge comprising a body of solid explosive, and a bullet having a core and a jacket, a portion of the jacket extending exteriorly over said body and having its edge embedded therein to retain the two members in fixed relation.

6. A cartridge comprising a body of solid explosive and a projectile secured thereto, said body having a recess adapted to support a primer.

7. A cartridge comprising a body of solid explosive and a projectile secured thereto, said body having a primer seat and a communicating igniter cavity therein.

8. In a caseless cartridge, a unitary propelling charge and a bullet, the propelling charge having an igniter cavity therein, portions of the igniter cavity extending to the circumferential surface of the propelling charge, and being closed by a combustible membrane.

9. In a caseless cartridge, a bullet and a body of solid explosive having an igniter cavity therein, the said cavity containing an explosive more readily ignitible than the said solid explosive.

10. As an article of manufacture, a composite bullet comprising a core substantially stream line in form and a jacket therefor, said jacket being in intimate contact with the forward portion of said core and separated from the rear portions thereof, said jacket being formed of material adapted to be forced against the core by the partial vacuum created by the flight of the bullet.

11. As an article of manufacture, a composite bullet comprising a core substantially stream line in form and a jacket therefor, said jacket being in intimate contact with the forward portion of said core and separated from the rear portions thereof, said jacket adapted to act as an obturator during the passage of the bullet through the bore of a gun, and being formed of material adapted to be forced against the core by the partial vacuum created by the flight of the bullet.

12. As an article of manufacture, a unitary propelling charge having a seat formed therein adapted to receive and support a primer.

13. As an article of manufacture, a unitary propelling charge having a primer seat therein and an igniter cavity connecting with said primer seat.

14. As an article of manufacture, a unitary propellent charge having a primer seat and igniter cavity formed therein, portions of the igniter cavity extending to the circumferential surface of the propellent charge and being closed by a combustible membrane.

15. In a caseless cartridge, a propelling charge and a bullet, a portion of the bullet extending exteriorly of the propelling charge, and being adapted to permit explosive pressure to be applied to both the interior and exterior circumferential surfaces thereof.

16 In a caseless cartridge, a propelling charge and a jacketed bullet, a portion of the jacket extending exteriorly of the propellent charge, said portion having longitudinal grooves therein adapted to permit explosive pressure to be applied both interiorly and exteriorly thereof.

17. A cartridge of the type for use in a firing chamber having a shoulder at its forward end, comprising a propellent element and a projectile secured together, the projectile having a shoulder adapted to seat against the shoulder of said firing chamber.

18. A cartridge of the type for use in a firing chamber having a tapered shoulder at its forward end, comprising a propellent element and a projectile secured together, the projectile having a flaring skirt adapted to seat against the tapered shoulder of said firing chamber.

19. A cartridge of the type for use in a firing chamber having a shoulder at its forward end, comprising a propellent element and a projectile having a flaring skirt adapted to seat against the tapered shoulder of said firing chamber, said skirt being anchored to said element.

20. A cartridge of the type for use in a firing chamber having a shoulder at its forward end, comprising a solid propellent element and a projectile secured together, the projectile having a shoulder adapted to seat against the shoulder of said firing chamber.

Signed by me at New York, N. Y., this 27th day of December, 1919.

JOHN T. THOMPSON.