

(No Model.)

W. HOPE & R. S. RIPLEY.

CARTRIDGE FOR ORDNANCE.

No. 314,127.

Patented Mar. 17, 1885.

Fig. 3.

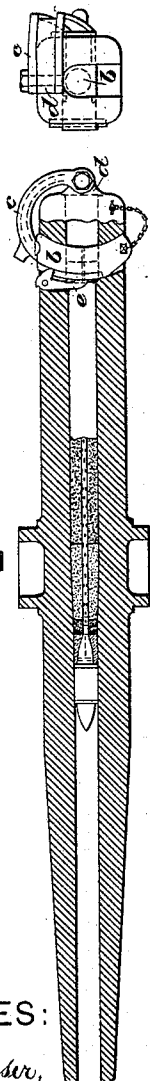


Fig. 4.

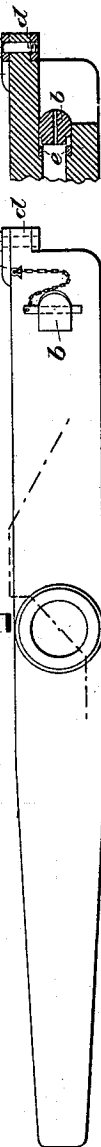


Fig. 5.

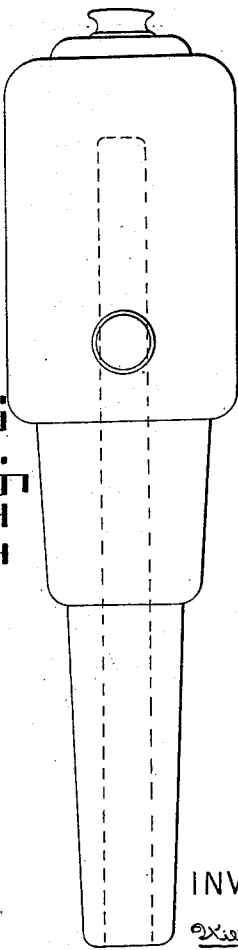
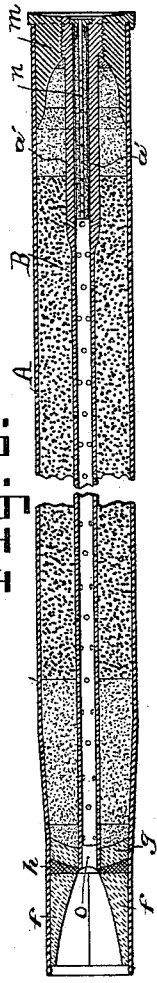


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM HOPE, OF LONDON, ENGLAND, AND ROSWELL SABINE RIPLEY,
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FORGES DE TERRE-NOIRE, LA VOULTE ET BESSEGES.

CARTRIDGE FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 314,127, dated March 17, 1885.

Application filed April 22, 1884. (No model.) Patented in England July 15, 1880, No. 2,923; in France July 24, 1880, No. 137,920; in Belgium December 27, 1883, No. 63,672, and in Italy January 5 1-84, XXXII, 262.

To all whom it may concern:

Be it known that we, WILLIAM HOPE, a subject of the Queen of Great Britain, residing in London, England, and ROSWELL SABINE RIPLEY, a citizen of the United States, residing in Paris, France, have jointly invented certain new and useful Improvements in Cartridges for Ordnance and Fire-Arms, (for which patents have been granted to us, or to our assignees, LA CIE. DES FONDERIES ET FORGES DE TERRE-NOIRE, France; in Great Britain July 15, 1880, No. 2,923; in France July 24, 1880, No. 137,920, and in Italy, application filed January 5, 1884, register Vol. XXXII, No. 262, the term of which Italian patent begins April 1, 1884,) of which the following is a specification.

Our invention relates to ammunition for ordnance and fire-arms generally, but particularly to cartridges for heavy guns. The novel features relate to the peculiar construction of the cartridge, whereby dangerous waves of pressure are avoided when the charge is exploded, and the strain on the gun is so much reduced that a very much greater quantity of explosive material may be employed than in guns as ordinarily constructed, while the gun itself may be much lighter. The construction is such that the inertia of the projectile is either wholly or in part overcome by the primary explosion of an igniting-charge, while the explosive material in the main or principal cartridge is ignited throughout its length by said igniting-charge. Thus the lateral force of the explosion and the recoil are reduced to the minimum, and the maximum initial velocity, penetrating power, accuracy, and flatness of trajectory are attained.

In the drawings which serve to illustrate our invention, Figure 1 is a side elevation of a breech-loading gun of the form we prefer for use with our cartridge. Fig. 2 is a longitudinal horizontal axial section of the same, showing our cartridge in position in same. Fig. 3 is a rear view of same. Fig. 4 is a vertical longitudinal section of the breech of the same.

Fig. 5 is a side elevation of a "Woolwich" gun having nearly the same power as the gun shown in Figs. 1 to 4. Fig. 6 is a longitudinal axial section of our improved cartridge drawn to a larger scale. The object being to increase the range, accuracy, penetration, and flatness of trajectory, and these being dependent in a great measure upon the amount of powder that can be converted into gas before the projectile leaves the gun, we have sought to attain all of these advantages in the highest degree with a cartridge containing a very heavy charge, that may be exploded with safety in a much lighter gun than those in ordinary use. Indeed we are enabled to produce better results with our improved cartridge with a six and one-fourth ton gun than can be produced with an ordinary Woolwich gun (see Fig. 5) of thirty-eight tons. This is a very important advantage, and is wholly due to the improved construction of our cartridge, which we will now describe with reference to Fig. 6.

A is the case of the cartridge, which is made to fit the cartridge-chamber of the gun, and which may be constructed of brass or other suitable material. This case is provided with a stout breech-piece, *m*. In the axis of the case A is arranged a perforated igniting-tube, *a*, which is secured at its rear end in the breech-piece *m*, and extends forward to a projectile which fits in the end of the case A. Around the igniting-tube is packed the charge of powder B. The end of tube *a* opens out at the butt of the cartridge-case, and is adapted to receive an igniting-cartridge, *n*. This cartridge is constructed in substantially the same manner as the principal cartridge—that is to say, it comprises a tubular case, a butt-piece, a perforated axial igniting-tube, and a charge of powder.

For cartridges for heavy guns the igniting-cartridge is very powerful, being substantially a blank-cartridge. It should have a length equal to ten to fifteen of its own calibers, and a caliber of from 0.10 to 0.20 of that of the main cartridge. The walls of the portion *a'*

of the tube *a*, which receives the igniting-cartridge *n*, are not perforated, and should be made thick enough to withstand the force of the explosion of the igniting-cartridge, and the perforations in the remaining portion of the tube should increase in area and number, one or both, in proportion to their distance from the igniting-cartridge, in order that when the latter is exploded and sends a sheet of flame through the igniting-tube the charge of powder B may be ignited throughout and almost simultaneously at all points; but the object is to ignite first that portion of the powder next to the projectile in order that it may burn backward and no unburned powder be discharged from the gun.

In order to further assure the above conditions when the charge is exploded, we may make up the charge of powder B of different grades as to capacity for burning slow or fast, and arrange these grades in stratified order, as indicated in Fig. 6, by the coarser or finer grain. The igniting-cartridge *n* serves a double purpose—namely, to send a sheet of flame through the igniting-tube *a* for igniting the main charge, and for starting the projectile in motion, or at least overcoming its inertia before the explosion of the main charge, whereby dangerous waves of pressure are avoided.

For guns intended for armor-piercing, we prefer to make the powder-chamber of the cartridge equal to fifteen calibers of the gun, and to make the cartridge-case A to exceed in caliber the caliber of the projectile about 0.15 to 0.20. The caliber of the igniting-tube *a* should be from 0.10 to 0.25 of the caliber of the gun. The igniting-cartridge *n* is exploded by a powerful "primer," which is inserted in the rear open end of the axial perforated tube in said cartridge, and which is adapted to throw a strong flame through said tube when said primer is exploded. The axial perforated tube of the igniting-cartridge *n* should be a little shorter than the tubular case of the same, and the latter is securely closed by a substantial wad and the whole covered by varnished paper. If the grains of the powder are smaller than the holes in the perforated igniting-tubes used in the main and igniting cartridges, which will usually be the case, the outside of these tubes must be covered with an open woven fabric—as tulle or gauze, or thin paper—and these tubes must be fixed in their respective cases in such a way that they can be taken out, recovered, and replaced when the cartridge-cases are returned to the arsenal or magazine to be refilled. The igniting-cartridge is not placed in position in the tube of the main cartridge until after the latter is in place in the gun, and the main cartridge, being very long, may serve as a rammer for sending home the projectile.

To receive the projectile the end of the case A of the cartridge is provided with a mold, *f*, of papier-maché, through which, by preference, the end of the projectile is made to pro-

ject rearward to enable the exploded charge of the igniting-cartridge *n* to act directly upon the rear of the projectile. This mold *f* may be conveniently divided into sections to prevent it from adhering to the projectile after the latter leaves the gun. At the rear of this mold is a wad, *g*, of papier-maché or other similar material, about a quarter of a caliber thick and dished, as shown, the space between it and the mold *f* being filled with grease *h*. When the charge is exploded, the wad *g* tends to flatten and forces the grease out laterally, thus effectually cleansing out and lubricating the gun at each discharge. This construction of the wad *g* provides an absolutely gas-tight construction and a superior "gas-check."

In the forward end of the igniting-tube *a* is fitted a highly-compressed stopper or wad, *o*, which, when expelled by the discharge, fills the central opening in the wad *g*.

The case A of the cartridge is slightly tapered at its front in order to reduce the caliber of the case to the caliber of the projectile, and to render the retraction or withdrawal of the case easier after the discharge.

In Figs. 1, 2, 3, and 4 we have shown a breech-loading gun adapted for firing our improved cartridge. The breech-block *b* is mounted on a curved arm, *c*, which swings on a pivot or pintle, *d*. When the block is in place, it is held by a key or pin. The breech-block *b* is perforated to receive the primer for effecting the discharge.

e is the retractor.

As the construction of our improved cartridge avoids all dangerous waves of pressure, and permits us to obtain a pressure-diagram very nearly parallel with the axis of the gun, it will be seen that we are enabled, as before stated, to employ a gun of much less weight than those generally in use of the same or even of less power.

We illustrate the form of gun we consider best adapted to our cartridge; but we do not limit ourselves to this form.

Our cartridge may be used in breech-loading guns of other forms and in smaller arms.

The cartridges may be closed at both ends and varnished, so as to be made water-proof, and they can then, if desired, be stored under water.

We are aware that cartridges have been proposed wherein a simple perforated igniting-tube is arranged to extend through the powder-chamber, and a small charge of fulminate, to be exploded by percussion, is arranged in a shallow recess in the rear of the cartridge-shell. This we do not claim. We employ a distinct removable elongated cartridge adapted to be exploded by ignition to effect the ignition of the main charge, and powerful enough to overcome, or partially overcome, the inertia of the projectile. This may be called a "secondary" or "auxiliary" cartridge, and is entirely independent of the primer or fulminate

by which the ignition is primarily determined. This latter forms no part of our cartridge necessarily, but is supplied at the moment of firing.

Having thus described our invention, we claim—

1. A cartridge for ordnance and fire-arms, comprising a tubular case, an igniting-tube arranged in the powder-chamber of said case, said igniting-tube having perforations which increase in area, substantially as set forth, toward the forward end of the cartridge, and an igniting-charge arranged at the rear end of said perforated igniting-tube and designed to effect the ignition of the charge in the cartridge, substantially as and for the purposes set forth.

2. A cartridge for ordnance and fire-arms, comprising a tubular case, an axial perforated igniting-tube arranged to extend through the powder-chamber of the said case, and an elongated tubular removable cartridge, *n*, adapted to fit into the igniting-tube and to be exploded by ignition, and designed to ignite the main charge and to overcome, or partly overcome, the inertia of the projectile, substantially as set forth.

3. A cartridge for ordnance and fire-arms, comprising a tubular case provided with a perforated igniting-tube extending through the powder-chamber, and an igniting-cartridge adapted to fit into said igniting-tube, the said igniting-cartridge comprising a tubular case provided with a perforated igniting-tube extending through its powder-chamber, all constructed and arranged substantially as set forth.

4. A cartridge for ordnance and fire arms, comprising a tubular case, an igniting-tube ar-

ranged in said case and extending through the powder-chamber of the same, said igniting-tube having perforations which increase in area, substantially as set forth, toward the forward end of the cartridge, and an igniting-cartridge, substantially as described, adapted to fit into the rear end of said igniting-tube, substantially as and for the purposes set forth.

5. A cartridge for ordnance and fire-arms, comprising a tubular case, *A*, provided with a butt-piece, *m*, a perforated igniting-tube, *a*, having a thickened unperforated portion, *a'*, to receive the igniting-cartridge *n*, and the said igniting-cartridge of elongated tubular form and adapted to be exploded by ignition, all constructed and arranged substantially as and for the purposes set forth.

6. The combination, in a cartridge for ordnance and fire-arms, of the tubular case provided with a butt-piece and a perforated igniting-tube, as shown, the igniting-cartridge, the mold *f*, the dished wad *g*, the grease *h*, the compressed wad *o*, and the charge of powder *B*, all constructed and arranged substantially as set forth, and for the purposes specified.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

W. HOPE.

ROSWELL SABINE RIPLEY.

Witnesses as to signature of W. Hope:

WM. THOS. MARSHALL,

EDMUND S. SNEWIN.

Witnesses as to signature of Roswell S. Ripley:

ROBT. M. HOOPER,

DAVID T. S. FULLER.