(No Model.)

J. W. GRAYDON.

EXPLOSIVE CHARGE.

No. 382,229. Patented May 1, 1888.

Fig. 1.

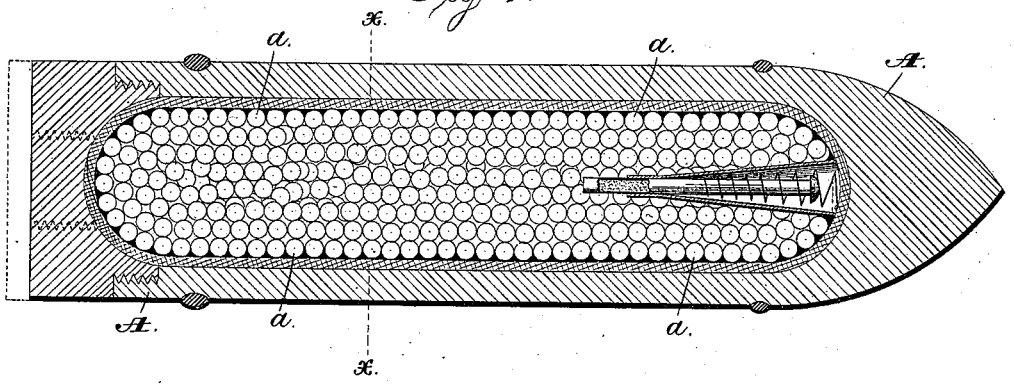


Fig. 2.

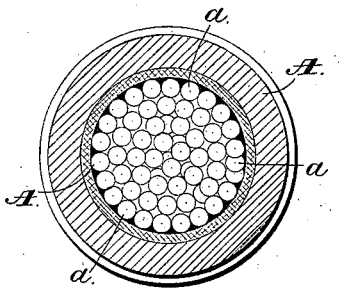
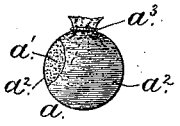


Fig. 3.



Witnesses.
Jas. C. Hutchinson.
Henry C. Hazard.

Inventor.
James W. Graydon.
by Prindle & Russell.
his attorneys.

UNITED STATES PATENT OFFICE.

JAMES W. GRAYDON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO THE GRAYDON DYNAMITE PROJECTILE CARTRIDGE AND HIGH EXPLOSIVE COMPANY, OF SAME PLACE.

EXPLOSIVE CHARGE.

SPECIFICATION forming part of Letters Patent No. 382,229, dated May 1, 1888.

Original application filed May 7, 1887, Serial No. 264,652. Divided and this application filed March 20, 1888. Serial No. 267,841.

(No model.)

To all whom it may concern:

Be it known that I, JAMES W. GRAYDON, of Washington city, in the District of Columbia, have invented certain new and useful Improvements in Explosives; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows an explosive-shell charge made in accordance with my invention; Fig. 2, a transverse section of the same on line *x x* of Fig. 1, and Fig. 3 a detail enlarged view of a portion of the charge.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide certain improvements in explosive charges and cartridges; and to this end my invention consists in the charge or cartridge made up in accordance with my invention, as hereinafter specified.

This application is filed as a division of my pending application, No. 264,652, for United States patent. In such other application, as filed, I set forth and claim both a method of putting up or preparing explosives for use, and also the product or result of such method.

The present application is made to cover the product, as subject-matter taken out of the other case, the intention being now to limit such case to the method. I do not therefore intend to cover said method in the present application.

As fully set forth in my other case, where it is attempted, as heretofore, to handle and use dynamite or other high explosive in a mass or lump, or in a cartridge made up of an undivided mass of the explosive, there has been great danger of explosion, as under certain conditions and from pressure or shock the explosive was liable to be put into a highly sensitive condition.

In the case of dynamite or the nitro-glycerine compounds and other high explosives in which the nitro-glycerine or other active explosive agent is absorbed and held by an absorbent material such glycerine or other active agent is liable, under the influence of pressure from a blow or shock, or when the explosive is stored for a long time, to concentrate out of the absorbent, thus leaving the explosive in a dangerous and too sensitive state.

As is well known, nitro-glycerine in its liquid form is very sensitive to shock and friction. Its concentration out of the absorbent or material by which it is taken up and held, as in the various well-known nitro-glycerine compounds, is therefore a thing particularly to be guarded against in order to make the handling of such compounds safe.

It is the special purpose of my invention, as embodied in the method set forth in my other application and in the product of the method claimed in the present case, to effectually guard against the dangerous change in high explosives caused by the described concentration of their actively-explosive component parts.

In carrying out my invention I separate the mass of explosive into small portions and inclose each portion in a wrapper or envelope adapted to hold its contents inclosed separate from the rest of the explosive.

A cartridge or charge of explosive put up in accordance with my invention, instead of being in a mass or stick, would be wholly subdivided into a number of small portions, each entirely divided from the others.

I have found by experiment and have proved by long-continued demonstrations that by putting up any of the high explosives, as the different grades of dynamite, milenite, or roberite, in small packages, each package consisting of a small portion of the explosive entirely inclosed and held by an envelope of such material as is not liable to become broken during transportation or in handling, such explosives can be rendered as safe to handle and use as ordinary gunpowder. As long as the packages remain unbroken there cannot be that concentration of the active explosive ingredient which, as stated hereinbefore, is liable to take

place when the explosive is handled, used, or stored in the bulk or mass, and consequently the explosive cannot get into its dangerous supersensitive state.

It is my practice to inclose and separate the different small portions of the explosive by an envelope or inclosing medium tough enough to stand considerable shock without breaking. The materials which I prefer or contemplate using for the envelopes or the separating medium will be described fully hereinafter.

In the drawings, Fig. 1, I show a shell, A, loaded with a quantity of my packages or inclosed pellets, *a a*, of explosive, but do not, of course, limit myself to the charge inclosed in a shell-casing or to charges for projectiles.

As shown, the packages or pellets are of a rounded form; but I do not intend to limit myself to such shape for them.

Each pellet consists, as indicated in Fig. 3, of a small portion, *a'*, of high explosive inclosed by a wrapping or covering, a^2. I prefer to make such covering or envelope of strong thin paper, cloth, or other close-grained material. Where paper, cloth, or other flexible material is used the requisite portion of explosive can be wrapped in it, and the mouth of the wrapper can then be tied up with a thread or string, a^3. The paper or cloth, to prevent any fluid or semi-fluid constituent of the explosive from oozing out through or saturating it, should be treated with paraffine. Where the pellet is first made up and then dipped in melted paraffine the latter will seal it up securely.

Instead of paper or cloth treated with paraffine, some other close-grained material can be used to inclose the explosive without treatment to render it impervious. I contemplate, also, instead of taking a piece of material and wrapping it around a portion of explosive, to attain the same result in isolating such portion of explosive by dipping it in or coating it with some substance which will form a tough, non-absorbent, and impervious envelope around it. I prefer flexible material—such, for instance, as paper or cloth—for enveloping and segregating the portions of a charge, but do not limit myself thereto.

Where the pellets are made with flexible envelopes they can be best packed together to form a charge or cartridge, because each pellet can then yield a little to accommodate itself to its respective space between the other pellets. As they are pressed together they can change their shape somewhat, if necessary, in order that they may pack more closely to fill as completely as possible the entire space allowed for the charge.

A charge or cartridge of dynamite or other high explosive put up in accordance with my invention, as set forth hereinbefore, I have found to be perfectly safe, not only for transportation, shipping, storing, and use in blasting, but also for use in explosive shells fired from service-guns of any caliber with the full service-charge of black powder for such guns.

With the shell-charge separated into small portions and put up in accordance with my invention it has been found as safe to use the nitro-glycerine compounds and other high explosives for the bursting-charge of projectiles fired from the modern high-power guns with their large charges of powder as it has been to use shell-charges of powder.

The high explosives put up in accordance with my invention are very desirable, not only for use in projectiles, but also for tunneling, mining, and blasting of all kinds, as they are then stable, unchangeable, and safe to store or handle.

The full force of the amount of explosive used can be obtained as desired, both in blasting and in projectiles or torpedoes, by using an exploding-fuse provided with a quantity of quick-burning explosive sufficiently strong to shatter the envelopes of the packages and fire the explosive all together.

The size of the packages or pellets can be considerably varied, as desired; but I prefer for ordinary use for any grade of dynamite, and where a flexible envelope is used, to have each package or pellet contain about one-half of a cubic inch of the explosive.

The envelopes for the pellets can, whether flexible or inflexible, be made on some former by hand or machinery to be filled with explosive, and then sealed up in any suitable way.

It will be observed that the whole charge made up of my pellets or packages of high explosive is divided up in every direction into small separated portions.

The shell-charge shown in the drawings is divided up both longitudinally and transversely.

The nitro-glycerine or other active component part of the explosive is thus effectually prevented not only from concentration toward the ends of the charge, but also toward or at its sides.

The envelope or casing within which the charge of high-explosive pellets is packed can be flexible or inflexible, as desired.

In the drawings the pellets are shown as packed within an envelope, which is inserted within the shell-casing.

Having thus described my invention, what I claim is—

1. An explosive charge consisting of a mass of rounded pellets, each made of a small portion of explosive inclosed in a flexible envelope, substantially as and for the purpose shown.

2. An explosive charge consisting of a number of small portions of high explosive separated from each other only by a flexible medium, each of such portions of explosive being entirely inclosed by a flexible envelope, substantially as and for the purpose set forth.

3. An explosive cartridge consisting of a mass of nitro-glycerine compound divided up into a number of small portions, each inclosed and separated entirely from the other by an envelope made impervious to the nitro-glycerine of the compound, such enveloped portions being packed together within a suitable envelope or casing to form the cartridge, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of March, A. D. 1888.

JAMES W. GRAYDON.

Witnesses:
ROBINSON WHITE,
PHILIP G. RUSSELL.