(No Model.)

J. W. GRAYDON.

SHELL FOR EXPLOSIVES.

No. 382,223. Patented May 1, 1888.

Fig. 1.

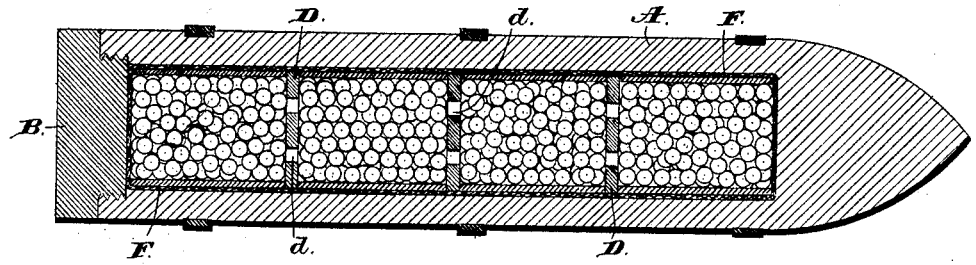


Fig. 2.

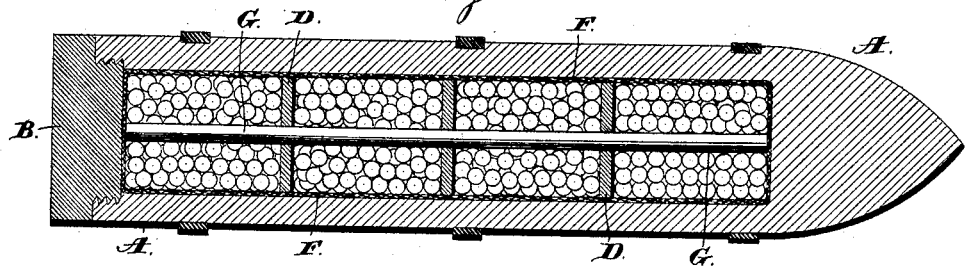


Fig. 3.

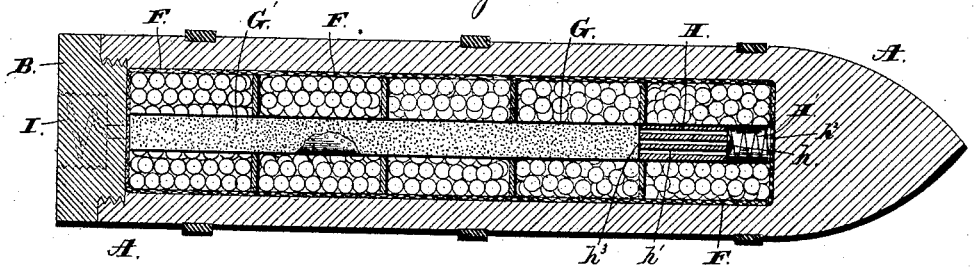
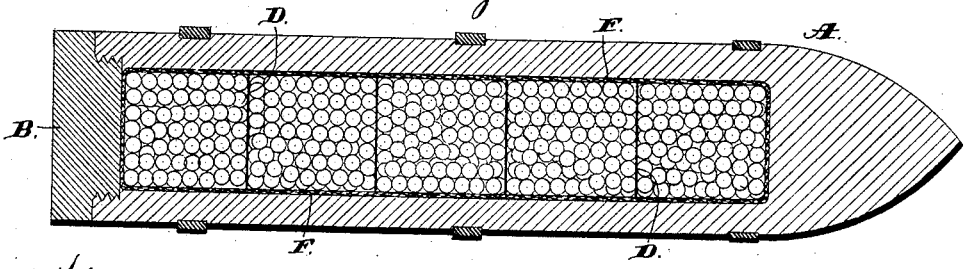


Fig. 4.



Witnesses:
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by Pinckle & Russell
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UNITED STATES PATENT OFFICE.

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

SHELL FOR EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 382,223, dated May 1, 1888.

Application filed June 25, 1887. Serial No. 242,520. (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 Shells for 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 a longitudinal sectional view of my improved explosive shell; and Figs. 2, 3, and 4, similar views of other forms of the shell.

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 shells; and to this end my invention consists in the shell and in the construction, arrangement, and combination of the parts thereof, as hereinafter specified.

In my application, No. 237,448, for United States patent now pending, I show and describe a high-explosive shell loaded with a mass of pellets, each consisting of a portion of high explosive inclosed in a flexible envelope. Shells of ordinary length, and even those of a length largely in excess of that of the projectiles commonly made and used in large guns, can be safely thrown from a gun with an ordinary charge of black powder when loaded with the high-explosive pellets, as set forth in my said application. Still, to meet a possible demand, when projectiles a large number of calibers in length are used, I have invented certain improvements in the explosive shell shown and described in my said application, which improvements I will now set forth.

In the drawings, A designates the casing of the shell, having within it the usual cylindrical or elongated charge-receiving chamber. For convenience in loading, the rear end of the shell is closed by the removable head or large flanged plug B, which can be fastened in place by screwing or in any desired way, but which should have, as shown, a strong flange or annular shoulder to engage the end of the shell-casing and prevent any possibility of the plug or head being blown into the shell by the explosion of the propelling-charge used in the gun.

Instead of filling the charge-chamber of an extra-length shell with one single undivided mass of the explosive pellets, as shown in my other application, I, in accordance with my present invention, separate the charge into several portions by transverse partitions or divisions D D. Such separating-divisions can be made of paper, wood, metal, or other desired material.

In Fig. 1 I show the partitions or divisions provided with perforations *d d* for the free passage of fire throughout the entire charge.

For supporting the several partitions at proper distances from each other various means can be used. In Fig. 1 several tube-sections, E E, are used, inclosing the several portions of the charge between the divisions D D. With this arrangement the rear tube-section rests against the rear end of the charge-chamber, and at its forward end engages the rear side of the first division or partition. The next tube-section rests against the forward side of this partition, and at its forward end engages and supports the second partition. This arrangement is carried out throughout the shell-chamber.

If desired, disks or plates can be placed at the opposite ends of the series of tube-sections E E also, so as to entirely inclose the end sections or portions of the explosive charge.

I contemplate making the tube-sections and the division plates or partitions of material non-conductive of heat, but do not limit myself to such material. To take away any chance of heat from the propelling-charge being conducted through the walls of the shell and reaching and firing the shell-charge, I prefer, as shown and described in my said other application, to line the shell-chamber completely with asbestus or other material non-conductive of heat. Such lining is designated by F in the drawings, and should entirely surround the shell-charge, as shown.

Where the shell has a clear cylindrical charge-chamber, with its end closed by a plug, cap, or head, as shown, the removal of which leaves an opening the full diameter of said chamber, the whole divided charge can, obviously, be made up within a tube having the

divisions or partitions fastened in place within it, and the loaded tube can then be pushed into the charge-chamber. In Fig. 2 I have shown the divisions supported against end-thrust or movement within the charge-chamber by the tube or rod G, to which they are fastened in any desired way. Such tube can be empty and act merely as a support for the charge-divisions; or, as shown in Fig. 3, it can be loaded with a charge, G′, of powder adapted to shatter the tube and the envelopes of the pellets throughout the divided charge and explode all of such charge at once.

For igniting the explosive within the tube G when the shell strikes an object, I have provided within the forward end of the tube a sliding plunger, H, provided on its forward end with a percussion primer or cap, *h*, and having one or more passages, *h′*, for allowing the fire from the primer to reach the body G′ of explosive and ignite the same. A spring, H′, engaging the plunger, holds it normally rearward, as shown, but allows it to travel forward of its own inertia to explode the cap or primer against the shell-chamber end when the shell strikes an object which checks its forward motion.

If desired, an abutment or stop for the plunger to strike its cap against can be provided on the tube, as indicated in dotted lines at h^2.

A light perforated flat partition or plug, h^3, can be placed within the tube G, over the end of the body of explosive G′ therein, so as to prevent such body of explosive from falling or sliding forward in the tube. As indicated by dotted lines on a portion of the tube in Fig. 3, the tube-walls can, if desired, be perforated to allow of free outward passage of fire from within the tube; but I do not regard such perforations as at all necessary.

Where the shell is to be exploded, not by contact or percussion, but by a time-fuse, such fuse can be connected in any desired way with the igniting-body of explosive G′ within tube G.

At I in Fig. 3 is indicated in dotted lines one well-known form of time-fuse to be ignited by fire from the propelling-charge. This fuse is at its inner end adapted to ignite the explosive within tube G. For insuring this ignition the inner end of the fuse composition can be connected with such explosive, or can be adapted to blow through the non-conducting lining or wrapping into the tube end.

In Fig. 4 I show the divisions or partitions D D unsupported, but simply placed within the shell-charge, so as to divide the same up into several portions. These loose partitions can be of paper, wood, or other desired material, stiff or flexible.

I do not limit myself to any particular form of fuse for firing the contents of the shell; but whatever kind or form is used, it should be provided or connected with a body of explosive sufficient to shatter the envelopes of the explosive pellets throughout the shell-charge.

The pellets of which such charge is composed consist, as fully set forth in my other application referred to, of small portions of high explosive—as, for instance and by preference, dynamite—each inclosed in flexible wrappers or envelopes adapted to hold the portions of explosive entirely separate from each other. For the envelopes paper, cloth, or other flexible material may be used, and such paper or cloth can be, as I prefer, treated with paraffine, or equivalent material, to prevent the exuding of any of the ingredients of the inclosed explosive.

The divisions or partitions shown in Figs. 2 and 3 can, if desired, be made loose on the central tube or rod, so as to be unsupported, as those shown in Fig. 4 are.

The loose unsupported divisions separate the charge into several distinct parts, and prevent, to a considerable extent, such compression of the rear portion of the charge as would take place in an extra-long charge in one mass when the shell is fired with an ordinary charge of black powder. Such divisions also would prevent the contents of any of the small packages or pellets which might get broken from falling back to or collecting in the rear end of the shell.

The supported divisions or partitions not only entirely separate the different portions of the explosive charge, but they prevent the combined weights of the forward portions coming upon the rear portions when the shell is started suddenly by a strong propelling-charge.

Having thus described my invention, what I claim is—

1. In an explosive shell, in combination with the explosive charge consisting of a number of pellets, each formed of a portion of high explosive wrapped in a flexible envelope, one or more partitions or divisions dividing the explosive charge up into several portions, each portion containing a number of the explosive pellets, substantially as and for the purpose specified.

2. In combination with the casing, a series of bodies of explosive within the casing, each made up of a number of small portions of high explosive inclosed in separate flexible envelopes, and divisions or partitions separating the several bodies of explosive from each other, substantially as and for the purpose shown.

3. In an explosive shell, in combination with the casing and the lining non-conductive of heat, the explosive charge composed of small portions of high explosive, each inclosed in a flexible envelope, and one or more transverse divisions separating the charge into several bodies, each body being composed of a mass of the enveloped portions of high explosive, substantially as and for the purpose described.

4. In an explosive shell, in combination with the casing and the explosive charge composed of pellets of high explosive, each provided with a flexible envelope to separate the explosive of the pellet from the explosive of the other pellets, divisions or partitions separat-

ing the charge into several bodies, each composed of a number of the pellets, and a fuse provided with sufficient explosive to shatter the envelopes of the pellets throughout the charge and ignite the whole charge, substantially as and for the purpose specified.

5. In an explosive shell, in combination with the casing having the charge-receiving chamber, one or more transverse partitions supported against movement within the chamber, and the bodies of explosive separated from each other by the partitions, each body consisting of a mass of small portions of high explosive inclosed in separate flexible envelopes, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 24th day of June, A. D. 1887.

JAMES W. GRAYDON.

Witnesses:
H. C. HAZARD,
JAS. E. HUTCHINSON.