(No Model.)

J. A. HOWELL.

SHELL FOR HIGH EXPLOSIVES.

No. 373,459. Patented Nov. 22, 1887.

Fig. 1.

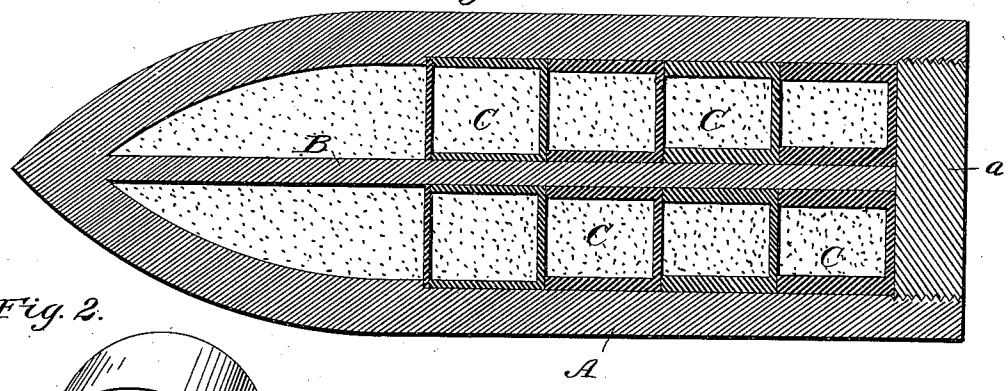


Fig. 2.

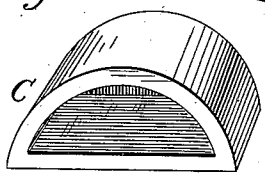


Fig. 3

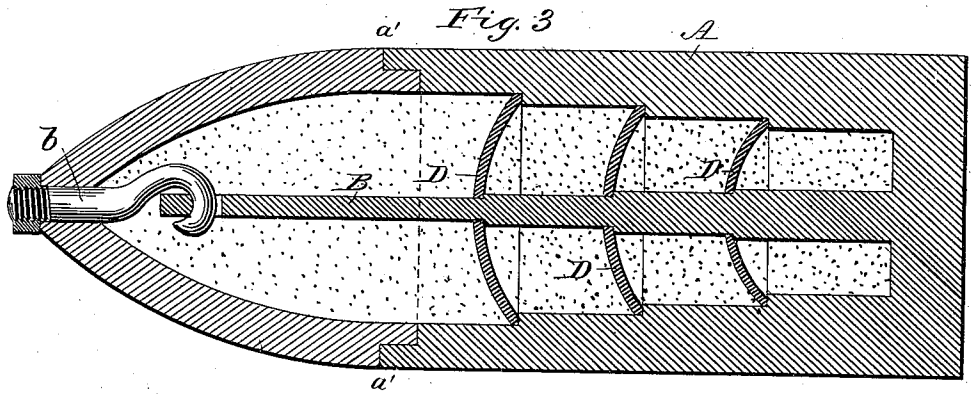
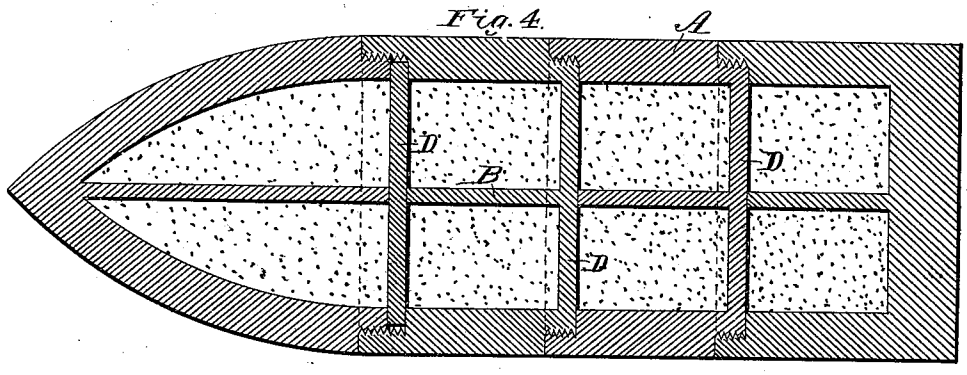


Fig. 4.



Witnesses:
H. N. Low
F. W. Paine

Inventor:
J. A. Howell

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN A. HOWELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

SHELL FOR HIGH EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 373,459, dated November 22, 1887.

Application filed January 15, 1887. Serial No. 224,445. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. HOWELL, a citizen of the United States, residing in Washington, District of Columbia, have invented an Improvement in Projectiles known as Shells or Bombs, of which the following is a specification.

Heretofore it has generally been customary to place the whole shell-charge in one chamber or cavity in the shell. As a result, when the shell is propelled from the gun, the inertia of the charge is overcome by pressure proportional to the mass and acceleration, which pressure is communicated to the charge mass by the rear surface of the cavity, and the pressure per unit of mass (with the same charge) will vary inversely as this surface, which we shall call the "accelerating-surface." Therefore the pressure on the charge, although always the same in the aggregate for the same acceleration of velocity, may be reduced per unit by increasing the accelerating-surfaces, or (in other words) by not transmitting the force from mass to mass, but by accelerating each small portion of the charge by its own accelerating surface.

In the ordinary shell there is no accelerating-surface for the angular velocity given by the rifling; but the angular motion is gradually acquired by the charge simply through friction. The longitudinal diaphragms, proposed to effect the angular acceleration about the longitudinal axis, are also useful in giving additional strength to the shell and facilities for fastening its parts together.

My improvement consists in dividing the charge, even minutely, if necessary, and providing means whereby each portion may be accelerated in velocity without dangerously affecting the other portions of the charge by causing pressures or movements sufficient to produce premature explosion. I propose to effect this by the following means.

Figures 1, 3, and 4 show sections of shells differing in details of construction, but all exemplifying the same idea, viz: the portion within the exterior part, A, usually occupied by the shell-charge in bulk is divided into cells by longitudinal and transverse diaphragms, each cell being strong enough to resist the accelerating force without movement or distortion. Fig. 2 is a perspective view of one form of such cells. Within these cells the charge divided into small portions is floating in a fluid of about equal density. By this method each particle would get the most perfect support, but probably in many cases a less complete application of the principle would suffice, as filling the cells with the explosive compound in mass without division, with fluid to fill cavities and transmit the explosion, if necessary.

The invention practically gives the shell a core of cells, each containing its charge, (divided and suspended in fluid, if necessary.)

The core can be built up in the shell, or it can be constructed separately, charged, and secured in the shell. It can be made as represented in the drawings or can be made of plastic matter, or the charges can be surrounded by liquid which becomes rigid by crystallization.

Fig. 1 shows a shell with movable base-plug *a*. A is the main portion of the shell constituting the exterior walls. B is a longitudinal diaphragm cast with the shell and forming part of it. In this case there are two longitudinal chambers, and these chambers are filled from the rear with the cell-boxes C, the bottoms and sides of which are strong enough to accelerate their charges, and the boxes themselves, (the sides being thicker as we approach the base,) since in this case all the other boxes are accelerated by the rear one, and so on. Fig. 2 gives a different view of this kind of cell.

Fig. 3 shows a solid-base shell with one longitudinal diaphragm attached. In this case the spindle portion separates from the cylinder on the line *a' a'*, the nut and bolt hooking into the diaphragm, securing them together. The cells are formed by arched transverse diaphragms resting on steps cast in the other parts.

Fig. 4 shows another method of construction, the shell being built up lengthwise with the cells.

I claim as my invention—

1. A shell having its charge chamber or chambers subdivided by a series of horizontal closed diaphragms separable from but secured against rotation relative to the shell, the cells thus formed being filled with the charge, whereby full acceleration of all parts of the charge is secured without undue pressure on any part thereof, as set forth.

2. A shell having its charge chamber or chambers subdivided by a series of horizontal diaphragms separable from but secured against rotation relative to the shell and braced against longitudinal thrust by supports bearing upon the base of the shell, as set forth.

3. A shell having its charge chamber or chambers subdivided by a series of horizontal diaphragms separable from but secured against rotation relative to the shell and braced against longitudinal thrust by a longitudinal diaphragm, against which such cross-partitions bear.

4. A shell having its charge chamber or chambers subdivided by a series of cross-partitions separable from the body of the shell, and having thrust-bearing against the inner walls of the shell and against a brace that is supported by the base of said shell.

5. A shell having an outer body and a charge-containing core composed of a series of cells, the core being inserted into the outer body and secured against rotation relative to the outer body, the thrust due to its acceleration of velocity being received by said body alone, or partially so, considering the breech-plug as part of the core.

6. A shell having an outer body and a charge-containing core composed of a series of closed cells secured against rotation relative to the body of the shell, and having thrust-bearing against the same, the partitions forming such closed cells being separable from the body of the shell, and the cells of such core being filled with a fluid of suitable density, holding the particles of explosive in suspension.

J. A. HOWELL.

Witnesses:
E. H. EAKLE,
D. P. COWL.