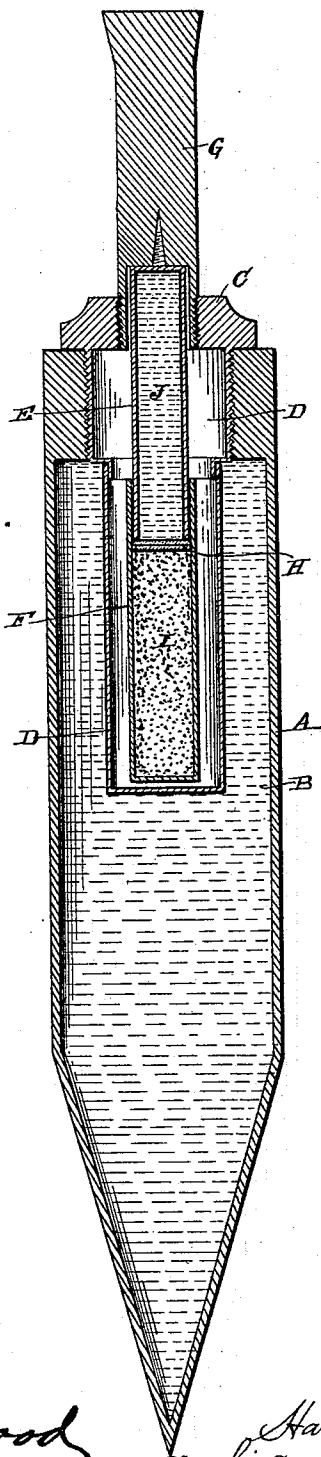


(No Model.)

H. A. CALLAHAN.
TORPEDO AND TORPEDO DETONATOR.

No. 425,860.

Patented Apr. 15, 1890.



Witnesses

Joseph Blackwood

Albert B. Blackwood

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HARRY ARMER CALLAHAN, OF BRADFORD, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO RICHARD ARTHUR DEMPSEY, OF SAME PLACE.

TORPEDO AND TORPEDO-DETONATOR.

SPECIFICATION forming part of Letters Patent No. 425,860, dated April 15, 1890.

Application filed December 12, 1889. Serial No. 333,389. (No model.)

To all whom it may concern:

Be it known that I, HARRY ARMER CALLAHAN, of Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Torpedo-Exploders, of which the following is a specification.

The object of this invention is to provide an improved device for exploding shells or torpedoes filled with nitro-glycerine or similar explosive material which is exploded on being subjected to a shock, such as one used in connection with oil and artesian wells. The means or device for exploding the nitro-glycerine constitutes the present invention, which is illustrated in the accompanying drawing, wherein a torpedo provided with the present improvements is shown in central vertical longitudinal section and in position for use.

A is the hollow shell which contains the explosive—such as nitro-glycerine—which is indicated at B. The lower end of the chambered shell is pointed, so as to facilitate its descent and insure its vertical position on reaching its point of lodgment. The upper open mouth of the shell is covered by a hollow cap C, which enters the shell and is screwed thereto. The chamber D of the cap C is located within the nitro-glycerine chamber and constitutes an air chamber or receptacle for the detonating or firing means, its upper end being open.

The exploder or detonator consists of two open-mouthed cups E F, which fit one within the other to form a sealed receptacle, the two fitting together by screwing or otherwise, so as to be water-tight. The two cups thus joined are both secured to a stem or guide G. The space or receptacle formed by the two cups E F is divided by a partition H into two compartments I and J. The compartment I, which is the lower compartment when in use, is filled with a powder, and the upper compartment J is filled with a liquid. The powder and liquid should be such that when united an explosive mixture is formed. The powder may be, and preferably is, a mixture of chloride of potassium and sugar, and the liquid, preferably, is sulphuric acid. When

this powder and acid unite, they instantly explode violently. The partition H, which separates the powder-compartment and the acid-compartment, is composed of a suitable porous or absorbent material—such as felt—through which the acid can percolate. Normally, when not in use, the exploder is kept in such position that the powder is above the acid and the exploder is kept separate from the nitro-glycerine shell. When, however, the latter is to be fired, the exploder is connected to the shell. In connecting these devices the stem or guide G screws (or otherwise fits) into the mouth of the cap C, so that the cups E F are wholly inclosed therein and are separated from the nitro-glycerine only by the thin walls of the cap C. The torpedo is then held in the position shown in the drawing (thus bringing the acid-compartment J above the powder-compartment I) and is immediately dropped into the well. During the descent of the torpedo the acid percolates through the porous partition and mixes with the powder, and so causes the explosion first of the detonator and then of the nitro-glycerine.

The thickness of the porous partition regulates the time in which the explosion will take place, so that the torpedo can be timed so as not to explode until it reaches the position where its explosion is desired. The porous partition is thus seen to be the only means of separation between the acid and the powder, so that no fracture of any parts and no sudden jar, shock, or concussion is necessary to cause the explosion to take place. This elimination of a shock or concussion constitutes an essential merit of the invention. The torpedo can be gently lowered into the well or other place, so that there is no danger of its premature explosion by reason of coming in forcible contact with projections from the sides of the well; and when the torpedo reaches its place of discharge there is no necessity for any manipulation of a concussion device, which necessitates the dangerous presence of an operator in the immediate vicinity of the well. The porous partition constitutes a medium through which the acid can percolate; but it is at the same time a re-

tarding medium preventing any quick access of the acid to the powder, so that ample time is given to the operators to retire to a place of safety before the explosion takes place.

5 I claim as my invention—

1. A torpedo-exploder consisting of a powder-compartment, a liquid-compartment, and a porous partition constituting the only means of separation between said compartments, through which partition the liquid may slowly percolate, in combination with a powder and a liquid in said respective compartments, which by their union constitute an explosive mixture, substantially as set forth.

15 2. A torpedo consisting of a shell containing the explosive and a hollow cap extending thereinto, in combination with an exploder entering and fitting into said cap, said exploder consisting of a receptacle having a powder-compartment and a liquid-compartment, a porous partition constituting the only means of separation between said compartments, through which partition the liquid may slowly percolate, and a powder and a liquid

in said compartments, respectively, which by their union constitute an explosive, substantially as set forth.

3. The shell A and the hollow cap C, fitting therein and extending thereinto, in combination with stem G, fitting in said cap, cups E F, secured to said stem and held within said cap, a porous partition H within said cups dividing the space therein into a powder-compartment and an acid-compartment, the acid-compartment being above the powder-compartment when the apparatus is dropped, and a powder and a liquid in said compartments, respectively, which by their union constitute an explosive mixture, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HARRY ARMER CALLAHAN.

Witnesses:

G. L. ROBERTS,
D. H. JACK.