Oct. 14, 1924. 1,511,488

F. I. ALEXANDER

WELL TORPEDO

Filed Sept. 11, 1922

Fig. 1

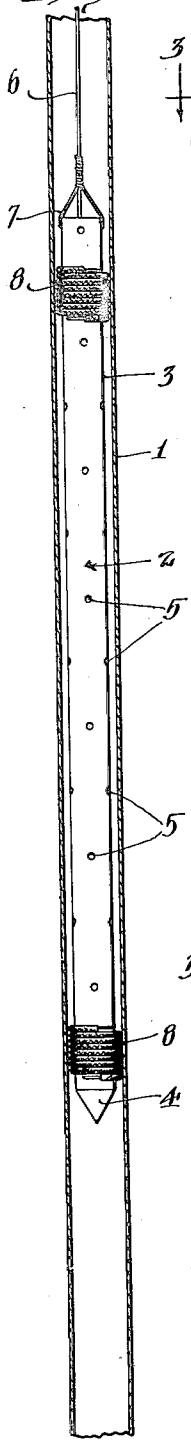


Fig. 2

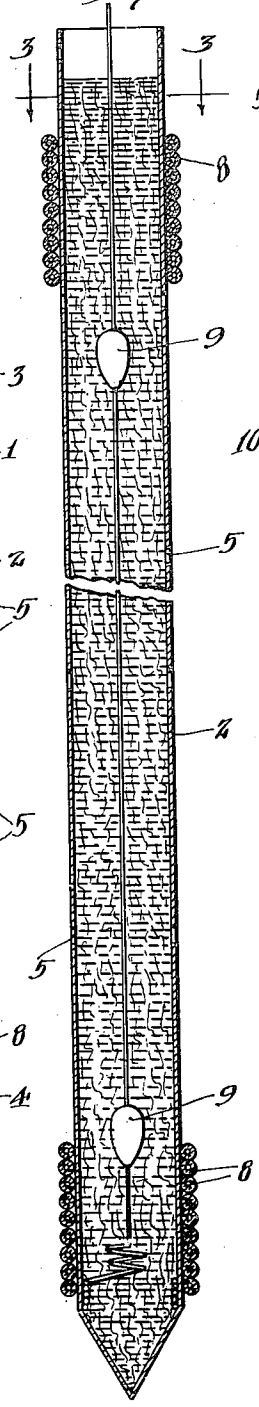


Fig. 3

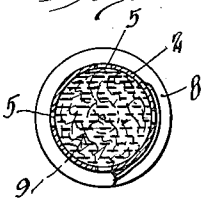


Fig. 4

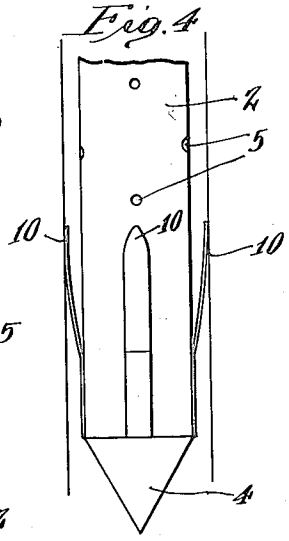


Fig. 5

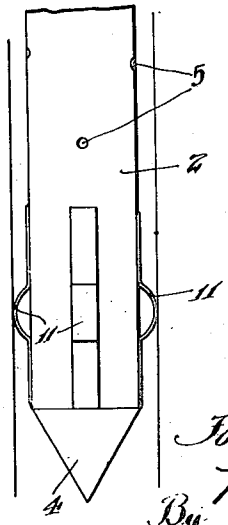
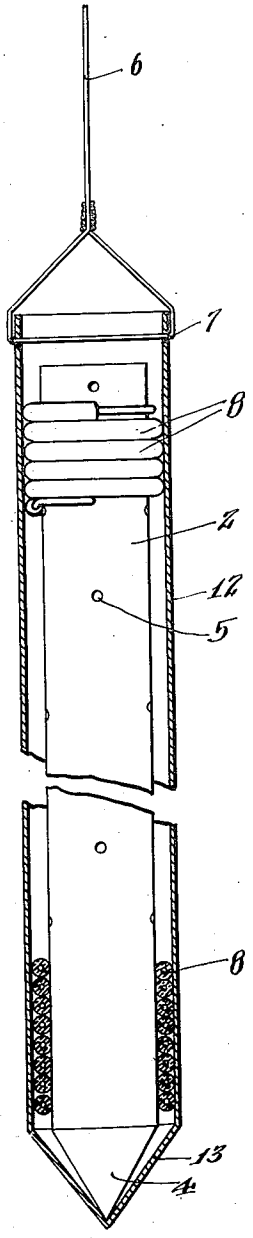


Fig. 6



Inventor

Ford I. Alexander

By Lyon & Lyon Attys

Patented Oct. 14, 1924. 1,511,488

UNITED STATES PATENT OFFICE.

FORD I. ALEXANDER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE FORD ALEXANDER CORPORATION, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

WELL TORPEDO.

Application filed September 11, 1922. Serial No. 587,340.

To all whom it may concern:

Be it known that I, FORD I. ALEXANDER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Well Torpedo, of which the following is a specification.

This invention relates to a well torpedo and particularly pertains to a container for high explosives which may be employed in well blasting or in any case where explosives are utilized below the surface of the ground or where explosives are employed which might be subjected to pressure and friction. It is common practice in the course of drilling or operating wells, whether they be gas, oil or water, to explode nitroglycerine products or other highly explosive compounds at some predetermined point in the well for the purpose of increasing the flow of the well or for correcting or remedying some difficulty which may arise in the course of drilling the well.

A review of the records pertaining to the use of these torpedoes will clearly illustrate that the handling of the torpedo has been accompanied with numerous accidents. These accidents occur during the lowering of the torpedo into the casing and frequently result in fatalities.

In lowering the torpedo down the casing, the container frequently contacts with the sides of the casing developing friction and heat, electrical and magnetic influences, the result being that the torpedo frequently prematurely explodes subjecting the operator to considerable danger and frequently severely damaging the well. Generally, the explosive material employed is some nitroglycerine product. These products have a tendency to sweat or accumulate a thin film of nitro-glycerine on their exterior. This film is extremely sensitive and very readily exploded; any of the above mentioned reasons being a likely explanation for the frequent accidents.

Further, it has been found practically impossible in loading the container to entirely eliminate voids or air pockets. When the torpedo is lowered into a well containing a liquid, these air voids are subjected to considerable pressure which tends to collapse the container at the voids resulting in a premature explosion. Further, the air being trapped in the voids, not being capable of circulation, gradually rises in temperature after continued contact with the explosive, and under pressure acts to spontaneously explode the torpedo.

An object of this invention is to provide a container which may be readily and safely lowered down a well casing and which will not prematurely explode due to any of the aforesaid causes.

Another object of this invention is to provide an explosive container with a plurality of pressure equalizing apertures whereby the pressure inside and outside the container is maintained equal and the explosive ventilated and cooled by circulation of air, water or oil in its downward descent.

Another object of this invention is to provide an explosive container with means to prevent frictional contact between said container and the walls of the casing.

Another object of this invention is to provide the explosive container with means for electrically insulating the container from the well casing.

Another independent object of this invention is to provide a well torpedo having two separate containers or compartments whereby the inner container may be filled with explosive and by being positioned in the outer container or compartment, adequately protected from contacting with the well casing.

Other objects of my invention will appear from the following description of the accompanying drawings, which illustrate a preferred embodiment of my invention.

Figure 1 is a vertical elevation of one embodiment of the invention, illustrating the torpedo positioned in a well casing.

Fig. 2 is an enlarged transverse section of Fig. 1.

Fig. 3 is a vertical section on the line 3—3 of Fig. 2.

Fig. 4 illustrates a modified form of the spacing means.

Fig. 5 illustrates another modification of the spacing means.

Fig. 6 illustrates a two compartment container embodying the principles of my invention, the outer compartment being sectioned to disclose the inner compartment.

Referring to the drawings, 1 indicates a well casing in which the well torpedo generally indicated at 2 is positioned to descend. The torpedo is illustrated as comprising an

elongated cylindrical container 3 pointed or cone shaped at its bottom 4 and provided with a plurality of vertically disposed apertures 5. The torpedo is supported from the top by a bail 7. In Fig. 1 the container is illustrated as being wound at each end with insulated wire 8 which is adapted to insulate the container from the well casing and prevent either electrical or frictional contact between said container and well casing.

Various forms of spacing means may be provided for the container. In Fig. 4 the spacing means are shown as comprising a number of circumferentially placed spring fingers 10. In Fig. 5 the spacing means are shown as comprising a plurality of circumferentially placed metal loops 11.

The container is shown as filled with an explosive charge which is generally some nitro-glycerine product, although other high explosives might be used. An electrical wiring passes through the explosive charge, being connected to suitable detonating caps 9. The detonating caps may be any of a number of constructions well known to the art.

In Fig. 6 of the drawings, for further protection, the explosive container is shown enclosed in an outer container 12, cylindrical in shape and pointed at the end 13. In the figure the inner container is illustrated as wound with an insulating wire 8 for spacing and holding the inner container properly within the outer. Any of a number of spacing means might be so employed.

The torpedo may be constructed of any material strong enough to hold the explosive and which will be readily destroyed and broken up upon the explosion. Tin, galvanized iron, wood fibre, brass or hard rubber are examples of such material.

My invention is not limited to the preferred construction shown but various modifications may be made, all of which fall within the scope set forth in the following claims.

I claim:

1. A well torpedo comprising an inner container provided with a plurality of vertically disposed pressure equalizing apertures, an outer compartment enclosing said inner container, and means maintaining said inner container from contacting with said outer compartment.

2. A well torpedo comprising a container and a solid explosive substantially filling the major part of the container, said container having a plurality of vertically disposed apertures establishing communication between the exterior of the container and the explosive therein, thereby equalizing the inner and outer fluid pressure on the container and permitting a circulation of fluid through the apertures and voids of the explosive.

Signed at Los Angeles, California, this 5th day of September, 1922.

FORD I. ALEXANDER.