

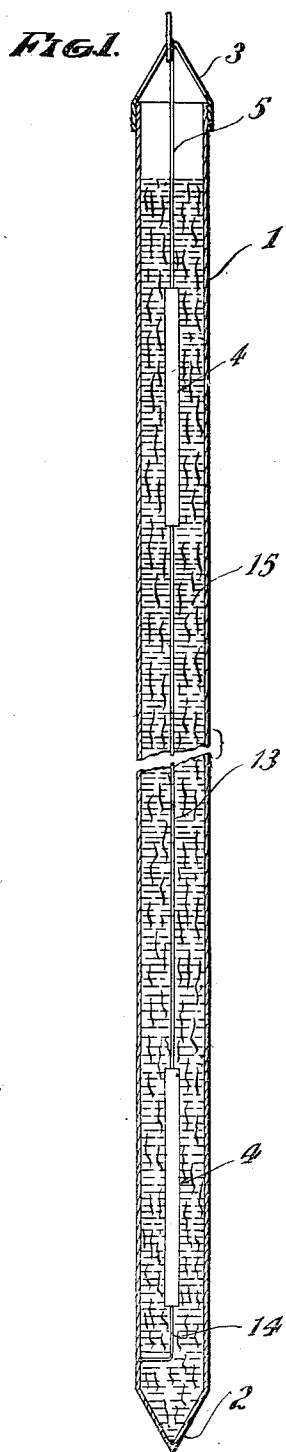
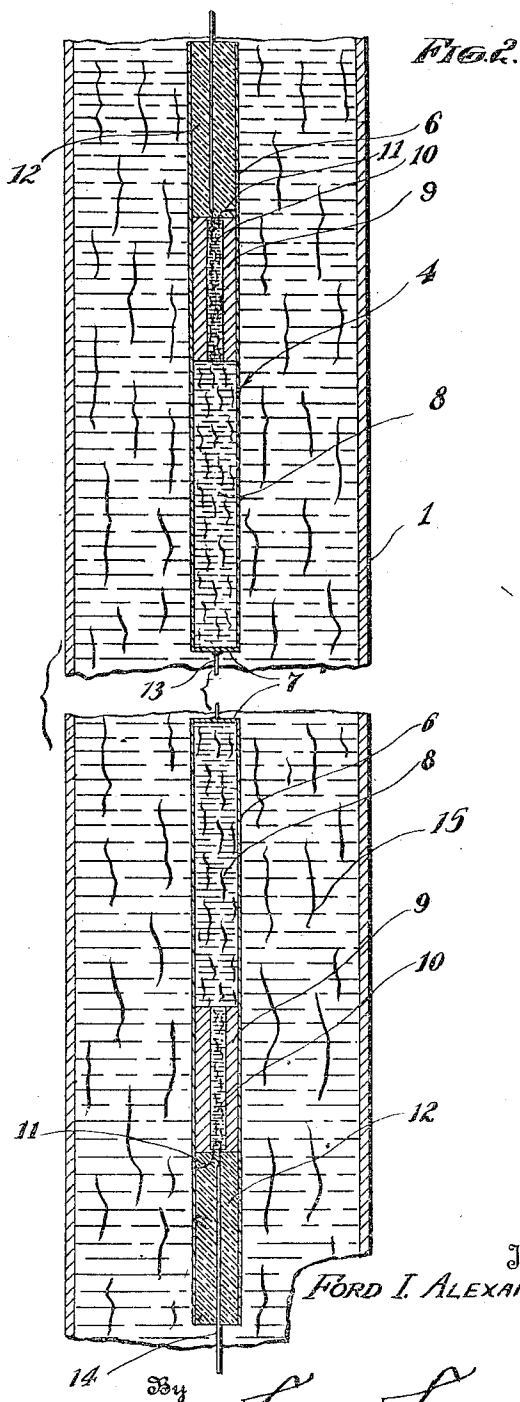
May 11, 1926.

1,584,068

F. I. ALEXANDER

DEVICE FOR TORPEDOING OIL WELLS

Filed March 19, 1924



Inventor
FORD I. ALEXANDER

14 By

Lyon & Lyon Attorneys

Patented May 11, 1926.

1,584,063

UNITED STATES PATENT OFFICE.

FORD I. ALEXANDER, OF LOS ANGELES, CALIFORNIA.

DEVICE FOR TORPEDOING OIL WELLS.

Application filed March 19, 1924. Serial No. 700,393.

This invention relates to a device for torpedoing oil or other similar wells and relates particularly to the detonators to be employed in a torpedo and the manner of arranging such detonators in the torpedo or torpedoes.

The torpedoes now in use for blasting or shooting oil or gas-bearing sands or other strata encountered in drilling or boring wells for petroleum for gas or in the drilling of artesian wells and the like, require the use of an explosive charge of comparatively great length and narrow cross-section. This is due to the bore of the well through which the torpedo must be lowered being ordinarily only a few inches in diameter and accordingly the length of the explosive charge must be considerable if a high explosion is to be attained in the well. In a torpedo of this class it is extremely difficult to insure the complete detonation of the entire explosive charge as there is a decided tendency with the explosives best adapted for the purpose, such as blasting gelatine, to throw off the lower section of the torpedo and either consume the same by combustion rather than detonation or leave a quantity of undetonated explosive in the well hole. This is particularly true of blasting gelatine or similar nitroglycerine products which are not homogeneous; but which have been found to give the most satisfactory results in well blasting if properly detonated.

Another difficulty with the torpedoes generally employed in oil well use is that the explosive force of the charge is not properly confined to the locality where the explosion is desired but a very large amount of the force of the explosion is expended up and below said point and the corresponding damage to either the well casing or formation therearound with detriment to further operations in the well hole. It is also found that premature explosions frequently result from the detonating means of an explosive being improperly located within the torpedo with the result that enormous pressure within the well causes a collapse of the torpedo at such voids resulting in a premature explosion.

An object of this invention is to provide such a detonator or detonation controller as will insure a complete explosion of a torpedo or series of torpedoes when lowered into a well bore.

An object of this invention is to provide

a device by which an explosive charge such as blasting gelatine may be exploded within a well hole without danger of premature explosion of the torpedo.

Another object of the present invention is to provide a means by which a torpedo may be exploded within a well hole in such manner as to confine the force of the explosive to substantially the place desired so that a greater force may be exerted at such place and damage to the surrounding casing and formation avoided.

Various other objects and advantages of the present invention will be apparent from the following description of the accompanying drawings in which I have illustrated the invention as it is embodied in the preferred example of an oil well torpedo.

In the drawings—

Figure 1 is an elevation mainly in longitudinal vertical section of a well torpedo.

Figure 2 is a similar view to Figure 1 on an enlarged scale and with the detonating cap protector and detonation controller likewise shown in longitudinal vertical section.

In the drawings 1 indicates a container for an explosive of a torpedo, said container being preferably of cylindrical shape and of a substantial length compared with its cross-section. The container may be of any desired material and is preferably conically pointed at its bottom 2 and provided with means such as a bail 3 at its upper end by which the torpedo may be supported during its descent into a well hole. 4 indicates the detonation controllers. In the example of the invention shown, a detonation controller is placed near each end of the container 1 and connected with electrical leads 5 in series by which the detonation controllers may be exploded from the upper end of the well. The detonation controllers 4 comprise a casing or tubing 6 which is closed at one end as indicated at 7 and constructed so that the casing 6 may easily tear down or break up upon the explosion of an explosive located within the detonation controller 4. The closed end of each detonation controller 4 is filled with an explosive 8 such as trinitrotoluene, or other like material, thoroughly tamped or molded within the casing 6 so that no void exists in the same.

9 indicates a casing or holder for a blasting cap 10 which holder 9 is of a size to closely fit the inner diameter of the casing 6 and sufficiently strong and thick to with-

stand the force of the blasting cap 10 during the explosion so as to direct the force of the explosion from the ends of the casing 10. The cap 10 is of a size to fit snugly within the cap holder 9 but otherwise may be of any preferred or customary construction of fulminating cap or other similar cap. In use the cap 10 is placed in the holder 9 and the same lowered within the detonation controller 4 until pressed against the end of the controller explosive 8 one wire 11 of the cap 10 being then grounded into the casing 4 of the controller, the other wire extending longitudinally from the cap 10 as shown. So as to protect the cap while in the torpedo, the open end of the controller is sealed by means of asphalt, cement or similar material indicated at 12.

When employing a single torpedo, as in the example given, one controller 4 is placed at or near each end of the torpedo and arranged so that the closed ends 7 are faced towards each other and then connected together by a wire 13 fixed to the tubing 6 and one of the wires 11 leading to each cap is grounded to the casing 6, as before specified. The main explosive of the torpedo indicated at 15 may be blasting gelatine or similar material and is packed firmly in the torpedo so as to eliminate any possible voids around the controllers 4.

In use the torpedo is exploded by passing an electric current through the wire 5, the explosion first commencing in the caps 10 which, due to the substantially indestructible holders 9, direct their force from the ends onto the detonating explosive 8 which is thereby caused to impart a detonating ray in the direction of the closed ends 7 causing an explosion of the main charge 15, the main force of which is exerted away from the detonator 4 due to the direction in which the detonating ray is traveling. It is thus seen that by a provision of a single detonation controller 4 within the torpedo the explosive force of the torpedo may

be directed mainly downward or upward as desired. When employing two controllers 4 in the same torpedo 1, arranged as shown, the detonating ray from the upper controller 4 is directed downward whereas simultaneously a detonating ray is directed from the lower detonator 4 upward with the result that very little of the force of the explosion is imparted to any place except between the detonation controllers 4.

While I have shown only one container 1, if in torpedoing the well it is desired to employ a number of containers 1, and direct the force to the center of the line of torpedoes, it is apparent that the detonation controllers may be positioned to direct the force downward from the upper torpedoes and upward from the lower torpedoes so that in such case the force of the explosive can be confined to the desired locality or strata in the well.

While I have shown a preferred example of the invention, I do not desire to be limited to the construction of a torpedo or a device embodying this invention, but various modifications may be made within the spirit of the invention, and the scope of the invention is defined in the appended claim.

I claim:

In a device of the class described, the combination of means holding a main explosive charge, and a plurality of detonation controllers disposed within the main charge, said controllers comprising destructible casings having a closed end, detonating explosive filling the closed ends, caps, holders for the caps tightly fitting the casings and of sufficient strength to withstand the explosion of the caps, and means for tightly sealing the holders and caps within the casing, certain controllers being opposed to each other so as to concentrate the force of the explosive.

Signed at Los Angeles, California, this 6th day of March, 1924.

FORD I. ALEXANDER.