April 21, 1936. J. R. HOLRAN ET AL 2,037,906

EXPLOSIVE CONTAINER

Filed April 29, 1933

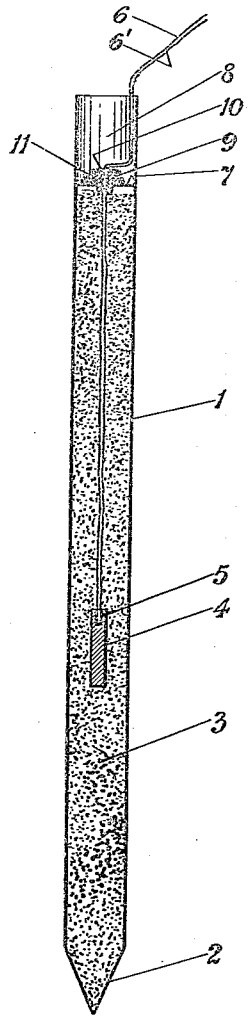


FIG. 1

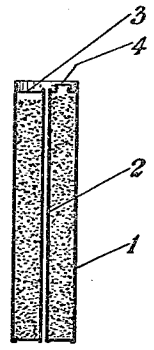


FIG. 2

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Patented Apr. 21, 1936 2,037,906

UNITED STATES PATENT OFFICE

2,037,906

EXPLOSIVE CONTAINER

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Application April 29, 1933, Serial No. 668,560

6 Claims. (Cl. 102—4)

This invention relates to a method of blasting involving the use of explosives having a relatively low water resistance, and more particularly it relates to a container adapted to carrying out such a process and still more particularly it relates to a water-proof container for black blasting powder having associated with it means for initiating the explosive charge.

In recent years, there has been an increasing application of explosives where it has been desirable to obtain firm foundations for heavy loads in wet lowlands and swampy places. In road construction across such areas, for example, it has been necessary to use a large amount of fill material in order to obtain a firm raised surface on which a permanent roadway could be constructed. Difficulties have been met in such work from the fact that gradual settlement of fill took place over a considerable period of time, with the result that the pavement became rough and broken, leaving the road unsafe for travel, or else an undesirably long time was necessary for the natural and complete settlement of the material before the finished surface could be constructed.

In order to accelerate the fill settlement, explosives of the dynamite type have been used, the explosive being loaded in, and on top of the muck beneath the filling material. As a result of this blasting, the soft, wet material has been displaced, allowing the fill material to sink of its own weight to make a firm foundation. The dynamites used in such blasting have customarily been of the high velocity, water resistant type that were especially adapted for wet work.

Considerable success has been obtained by the described course of procedure. One disadvantage has been, however, that the employment of high velocity explosives has been necessary, from which the blasting and disruptive effect was greater than was required. It has been necessary also to utilize explosives which were not affected by the wet surroundings, the choice of explosives being thus limited to the high velocity dynamite type.

It is an object of this invention to develop a method of blasting in wet surroundings with explosives of low water-resistance. A further object is to prepare a container for such explosives which is water tight and a still further object is to associate with such a container means for initiating the explosive charge. Other objects will appear hereinafter.

We have now found that such explosives of relatively low water resistance may be employed for blasting in wet places if they are placed in the proper sort of water tight container.

We have found that black blasting powder, for example, can be used advantageously in fill settlement work, provided it is used in relatively long columns of explosive, with the holes spaced sufficiently close together, and provided the powder is contained in a water-tight receptacle, with enclosed means provided for the initiation of the explosion. Preferably, the container for the black powder is made of metal.

Various means are available for initiating the explosion. The black powder may be ignited by an electric squib or an electric blasting cap, for example. A more certain ignition results, however, from the use of a booster charge of high explosive. As such, we may use a 1¼" x 8" cartridge of dynamite with electric blasting cap embedded therein, means being provided for the cap leading wires to pass out without destroying the water tightness of the container. Preferably, however, we bring about the explosion by means of Cordeau detonating fuse, passing lengthwise throughout the charge. Such a means of ignition requires a special type of waterproof powder container, having an open passageway throughout the charge, this passageway being so constructed that the powder chamber remains absolutely water-tight to this passage.

In order to illustrate our invention more exactly, two types of containers, applicable according to our invention, are shown in the accompanying drawing, wherein Figure 1 is a sectional view along the longitudinal axis of one type of the container and Figure 2 is a similar sectional view of the second type.

Figure 1 represents a cylindrical sheet metal container 1, having, for example, an overall length of approximately 7 ft. and a diameter of 5.5 in. The container terminates at the bottom in a cone 2, having the length of about 6 in., adapted to facilitate the insertion of the container in the hole. The container is filled with a charge of black powder 3, in which is embedded a high velocity primer 4, consisting of a stick of dynamite. The blasting cap 5 is inserted in the dynamite in the usual manner, and the cap wires 6 and 6' lead to the source of the firing current. In the example illustrated, a metal diaphragm 7 is soldered to the walls of the container about 6 in. below the top, leaving a cylindrical hollow space 8 at the top of the container. A hole through the center of this diaphragm allows the insertion of a cork stopper 9, with a hole 10 through the center to allow the passage of

the cap wires. It is important that the container be completely water-tight, so that, if desired, a seal of waterproofing material 11 may be poured over the cork and wires.

It has been found desirable to fill the hollow space 8 at the top with cement at the time the container is used in order to bring about better confinement of the charge. Preferably the cement is allowed to set before charging into the hole. A handle in the form of a heavy wire may, if desired, be soldered to the opposite sides of the container at the top to facilitate handling it and lowering it into the drill hole.

Another and preferred form of container is shown in Figure 2. The container itself, 1, is a cylindrical metal receptacle of tinned iron, for example, having a diameter of 5½'' and a length of 2 ft. A metal tube 2 of the same or different metal, ½ in. in diameter, passes through the center of the container, with respect to its longitudinal axis, throughout its entire length, and is soldered to the container proper in such a manner as to make the interior absolutely water-tight. The container is closed by a solid metal upper end 3, with an opening for the admission of the powder, closed by a screw cap 4. The explosion of the powder with this type of container is brought about by means of Cordeau detonating fuse running through the passageway 2, the Cordeau being detonated in the usual manner by means of an electric blasting cap. Any number desired of the above containers may be placed one on top of the other, depending on the weight of charge desired for blasting. Increased effectiveness due to improved confinement is found to be obtained by the use of cement blocks on top of the containers and, if desired, between the separate containers, arrangements being made for the uninterrupted passage of the Cordeau fuse throughout the series of containers.

In road settlement work, it is desirable that the explosive charge in general be well immersed in the ground and that the explosion take place in the soft wet ground below the top filling material. The length of containers and depth of hole may be varied to adapt the method to the particular work to be carried out. In the examples described, the containers illustrated have had diameters of 5½'', since this allows their ready use in 6-inch drill holes.

The use of explosive containers such as described in the foregoing has many advantages in fill settlement work. A container such as is described in the foregoing may serve as a powder keg. It may be packed for use at the place of manufacture of the powder, for example, in units of size and capacity of 25 pounds of black blasting powder. The explosive in the containers is not affected at all by the wet surroundings, so that the container may be left in place as long as desired before the time of firing, without any deterioration of the explosive. The use of black powder in place of dynamite in road settlement work, for example, has the advantage that there is little or no surface disturbance and a minimum of vibration effects on surrounding buildings and structures. Blasting may be carried out, also, with little interruption to nearby construction work. An additional advantage, of course, is the savings involved, because of the lower cost of black blasting powder.

While we have described our invention in detail, it will be understood that many minor variations may be made without departing from the spirit of the invention. The loading of the container, for example, may be carried out at the place of use, or at an earlier time. While we have cited the employment of this method of blasting mainly in road settlement work, we do not wish it to be limited to any particular type of blasting. We wish to be limited only by the following claims.

We claim:

1. A blasting assembly comprising the combination of a water-tight receptacle containing a main explosive charge, a high velocity priming charge extending longitudinally throughout the main explosive charge, and a water-tight partition separating said priming charge from said main charge.

2. The blasting assembly of claim 1, in which the main explosive charge comprises one of the black powder type.

3. The blasting assembly of claim 1, in which the high velocity priming charge comprises detonating fuse.

4. The blasting assembly of claim 1, in which the high velocity priming charge through the main explosive charge is centrally located longitudinally in said main charge.

5. A blasting assembly comprising the combination of a plurality of water-tight receptacles containing explosive charges, said receptacles each having a longitudinal pasageway therethrough having a water-tight wall, and a high velocity priming charge extending continuously through the main explosive charges in the several receptacles, whereby the explosion is propagated at high velocity through the priming charge and communicated therefrom to the main explosive charges in said receptacles.

6. The blasting assembly of claim 5, in which the several receptacles are so arranged that the passageways therethrough are in alignment.

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