Aug. 29, 1939. F. YOUNG 2,171,384

BLASTING ASSEMBLY

Filed Nov. 4, 1937 2 Sheets-Sheet 1

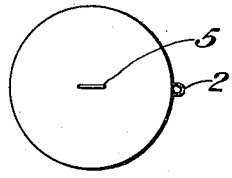


Fig. 3

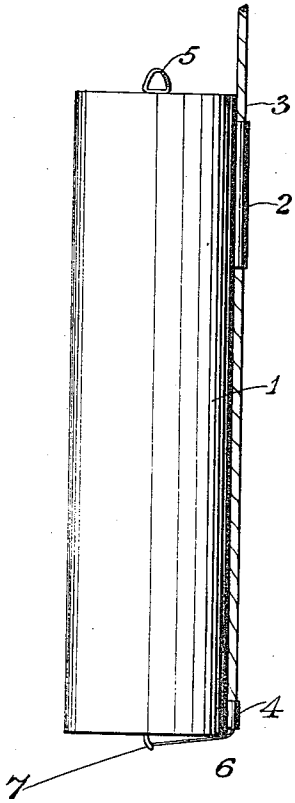


Fig. 1

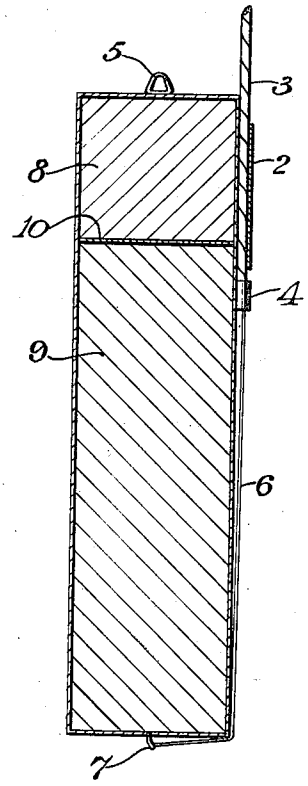


Fig. 2

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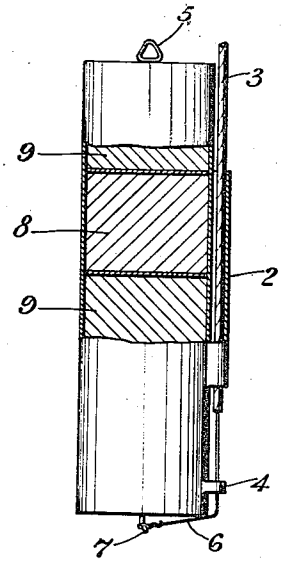


Fig. 4

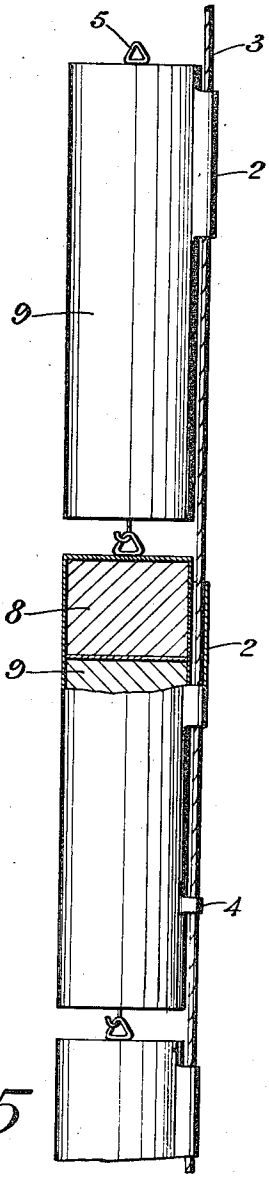


Fig. 5

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BLASTING ASSEMBLY

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Application November 4, 1937, Serial No. 172,699

6 Claims. (Cl. 102—6)

This invention relates to a new and improved blasting assembly particularly adapted for use with explosives which are incapable of detonation by means of the more commonly known initiators.

The recent introduction into practical use of these relatively insensitive explosives, as disclosed by Kirst and Woodbury in U. S. P. 1,992,217, necessitates the employment of a booster charge of high velocity explosive more sensitive than the main charge. The addition of said booster charge has, in turn, required modification of the blasting assemblies heretofore known to the explosives art.

The object of my invention is an improved blasting assembly capable of initiating a main charge of explosive not sensitive to the action of a commercial blasting cap. A further object is a blasting assembly which is completely moistureproof. A still further object is a blasting assembly whereby loading in the bore-hole is facilitated. Additional objects will be disclosed as the invention is herein described.

I have found that the foregoing objects are accomplished by the use of a blasting assembly comprising a rigid moistureproof receptacle containing at least one solid detonating explosive composition capable of initiation by a commercial blasting cap or Cordeau fuse. This receptacle is provided with external means for holding an initiator parallel to the longitudinal axis of the explosive charge, said means being adjacent thereto and in propagating relationship therewith.

Preferably, the rigid receptacle is made of tin-coated steel or similar material which permits a facile assembly that is moistureproof. Although the receptacle may be made in any desired form, I prefer the cylindrical shape because of the convenience it affords at the place of application. The means for holding the initiator in the desired position may be constructed of the same material as the receptacle and likewise may assume any form. I have found it desirable to use a U-shaped length of material because the "legs" of the U may be affixed readily to the walls of the receptacle to form a tunnel-shaped holder. The wall thickness of the initiator holder should be such that the wall is sufficiently strong to withstand the crushing action encountered in the loading and tamping of the bore-hole. When tin-coated steel is employed, I have found a wall thickness of 0.022 inch to be satisfactory, although an appreciable variation may be made therefrom if loading conditions be varied. The U-shaped holder, when attached to the outer wall of the receptacle, forms a tunnel having a cross-section which permits the insertion of the initiator, Cordeau fuse for example, said tunnel extending in a direction parallel to the longitudinal axis of the main explosive charge so that the initiator is held adjacent to and in propagating relationship with said explosive charge.

The assembly is particularly adapted for use with those detonating explosives which are insensitive to the action of Cordeau or a commercial blasting cap, as well as to those that do not perform satisfactorily when initiated thereby. An example of such insensitive explosive is one comprising 92% ammonium nitrate, 4% dinitrotoluene, and 4% paraffin at a density not less than 1.0. Such a composition may comprise the main charge of my blasting assembly. As a booster charge, I prefer to use trinitrotoluene, although any solid detonating explosive that is sensitive to the action of a blasting cap may be employed; for example, tetryl, pentaerythrite tetranitrate, picric acid, various dynamites, and many others. These materials are used in amounts capable of detonating the main explosive charge. The booster charge may be in actual contact with the insensitive main charge but I prefer to keep it separate, although, of course, in propagating relationship therewith.

It should be understood that it is more desirable in some operations to locate the primer containing the booster charge of trinitrotoluene or the like in some position in the column of explosive away from the ends of said column. For instance, the primer receptacle containing the booster charge may be located near the center of a column of receptacles containing charges of the principal explosive. The body of the booster charge of trinitrotoluene or the like may in turn be located in the center of the primer receptacle, the ends of which may be filled with the principal explosive. The tube for the initiator will, of course, be located outside of the container, and at least a portion of said tube will extend adjacent to said booster charge. Accordingly, if the booster charge of trinitrotoluene or the like is located in the center of a container or column, the explosive wave will be initiated at that point and travel in two directions towards each end of said container or column of explosive.

To illustrate the invention more clearly, reference is made to the accompanying drawings. Fig. 1 is a vertical view of my blasting assembly. Fig.

2 is a view in cross-section, while Fig. 3 is a plan view of the same.

Fig. 4 is a view in cross-section depicting the booster located within the charge. Fig. 5 is a similar view depicting the booster located within the column of a plurality of charged receptacles. Similar numerals refer to similar parts throughout the drawings.

Referring to Fig. 1, the numeral 1 designates a cylindrical rigid moistureproof receptacle. The means for holding the initiator parallel to the longitudinal axis of the explosive charge is shown at 2. The cross-section of this holder is shown more clearly in Fig. 3, said cross-section being of such size that the Cordeau fuse 3 may pass therethrough. Although the initiator holder, as shown, extends only a short distance along the wall of the receptacle, it may, in certain cases, be desirable to extend said holder over the entire length. The upper end of the Cordeau fuse (not shown) extends beyond the bore-hole so that a blasting cap or other initiator may be attached thereto, while the lower end is retained in position by means of a tube 4, which is crimped about the fuse 3. The tube 4 may be made of gilding metal, copper, or similar material and is provided with projections at the base in order that the string 6 may be conveniently fastened thereto, the other end of said string being tied to the loop 7, which is firmly attached to the base of the receptacle. The bail 5 affords a means for lowering the blasting assembly.

Fig. 2 shows the cap-insensitive main charge at 9 with the booster charge comprising trinitrotoluene or similar material 8 adjacent thereto but separated therefrom by the disc 10. In this figure the Cordeau fuse extends downward only a short distance beyond the booster charge thereby necessitating a change in the position of tube 4. This is done by increasing the length of the string 6. It will be noted that the initiator holder extends substantially over the entire depth of the booster charge, but over only a small portion of the main charge. However, the length of the initiator may be varied according to the particular explosive charges employed, in order that the desired results may be obtained. Likewise, the booster charge may, if desired, be located in the center rather than at the top of the container.

The Fig. 4 depicts the booster charge 8 located near the center of the cap-insensitive main charge 9, while the tube 2, disposed outside the lateral wall of the receptacle 1, is shown as adapted to receive and hold a continuous detonating fuse 3 adjacent to and in propagating relationship with said booster charge 8.

Fig. 5 depicts the booster charge 8 located at the end of one charged receptacle but within a column formed by two of said charged receptacles.

The modus operandi comprises lowering the blasting assembly into the bore-hole by means of the bail, the upper end of the Cordeau fuse remaining above the surfaces so that it is accessible for initiation by means of a blasting cap or similar device. Once initiated, the Cordeau fuse attains a high velocity of detonation, which is transmitted to the booster charge, which in turn causes detonation of the insensitive main charge.

My blasting assembly is particularly effective when employed in conjunction with the relatively insensitive explosives disclosed by Kirst et al, in U. S. Patents 1,992,216 and 1,992,217. When employed therewith, the containers filled with the Kirst explosives are loaded into the bore-hole. The blasting assembly is then lowered and centered on the top container, and initiation of the charge is effected in the usual manner. Likewise, the assembly shown herein has a high practical value in the so-called deck loading, i. e. when the explosive charge is spaced at intervals in the bore-hole. In this case, it will be desirable to use two blasting assemblies, placing one at a lower level in the bore-hole, so that it is in propagating relationship with one of the explosive charges, while the second assembly is placed in propagating relationship with the uppermost explosive charge, said assemblies being interconnected by a Cordeau fuse, said Cordeau fuse running substantially the depth of the bore-hole. When employed in this manner, very satisfactory performances result, while failures to detonate are reduced to a minimum. Moreover, the blasting assembly shown herein is moistureproof so that the danger of the explosive charge becoming insensitive, due to the absorption of moisture, is obviated.

The blasting assembly herein disclosed possesses many characteristics that make its application advantageous. It will be understood, however, that many variations may be made from the details set forth without departing from the spirit and scope of the invention. For example, for certain combinations of booster and main explosive charge, it may be desirable to employ one or more blasting caps in place of the Cordeau fuse. Furthermore, although Cordeau fuse has been mentioned throughout, I do not wish to be limited thereto; for example, Primacord or the like, may be employed instead of Cordeau fuse as desired. I wish to be limited, thereto, only by the following claims.

I claim:

1. A blasting assembly comprising a substantially cylindrical watertight metal container, a charge of detonating explosive within said container comprising a main charge incapable of detonation by means of a blasting cap and a booster charge including trinitrotoluene, and a metal tube secured on the outside of the lateral wall of said container and approximately parallel with the longitudinal axis thereof for confining a detonating fuse in propagating relationship with said booster charge.

2. A blasting assembly comprising a substantially cylindrical watertight metal container, a booster charge comprising trinitrotoluene in said container, a metal tube permanently secured on the outside of the lateral wall of said container and approximately parallel with the longitudinal axis thereof for confining a detonating fuse in propagating relationship with said booster charge.

3. A blasting assembly comprising a substantially cylindrical watertight metal container, a relatively insensitive explosive charge within each end of said container, a booster charge of trinitrotoluene disposed between said insensitive charges therein, and a metal tube permanently secured on the outside of the lateral wall of said container for confining a detonating fuse in propagating relationship with said booster charge.

4. A blasting assembly comprising a substantially cylindrical watertight metal container, a charge of detonating explosive within said container comprising a main charge incapable of detonation by means of a blasting cap and a booster charge sensitive to the action of a blast-

ing cap and capable of initiating said main charge, and a metal tube permanently disposed on the outside of the lateral wall of said container at a locus adjacent to said booster charge for confining a continuous detonating fuse parallel to the longitudinal axis of said explosive charge and in propagating relationship with said booster charge.

5. A blasting assembly comprising a substantially cylindrical watertight metal container, a charge of detonating explosive within said container comprising a main charge incapable of detonation by means of a blasting cap and a booster charge sensitive to the action of a blasting cap and capable of initiating said main charge, and a metal tube permanently disposed on the outside of the lateral wall of said container at a locus adjacent to said booster charge for confining a continuous detonating fuse parallel to the longitudinal axis of said explosive charge and in propagating relationship with said booster charge and anchoring means located on the outside of said container near one extremity thereof for aligning said detonating fuse.

6. A blasting assembly comprising a substantially cylindrical watertight metal container, a booster charge in said container comprising a detonating explosive sensitive to the action of a blasting cap and having a sensitiveness of the same order of magnitude as trinitrotoluene, a metal tube permanently secured on the outside of the lateral wall of said container and approximately parallel with the longitudinal axis thereof for confining a detonating fuse in propagating relationship with said booster charge.

FRED YOUNG.