

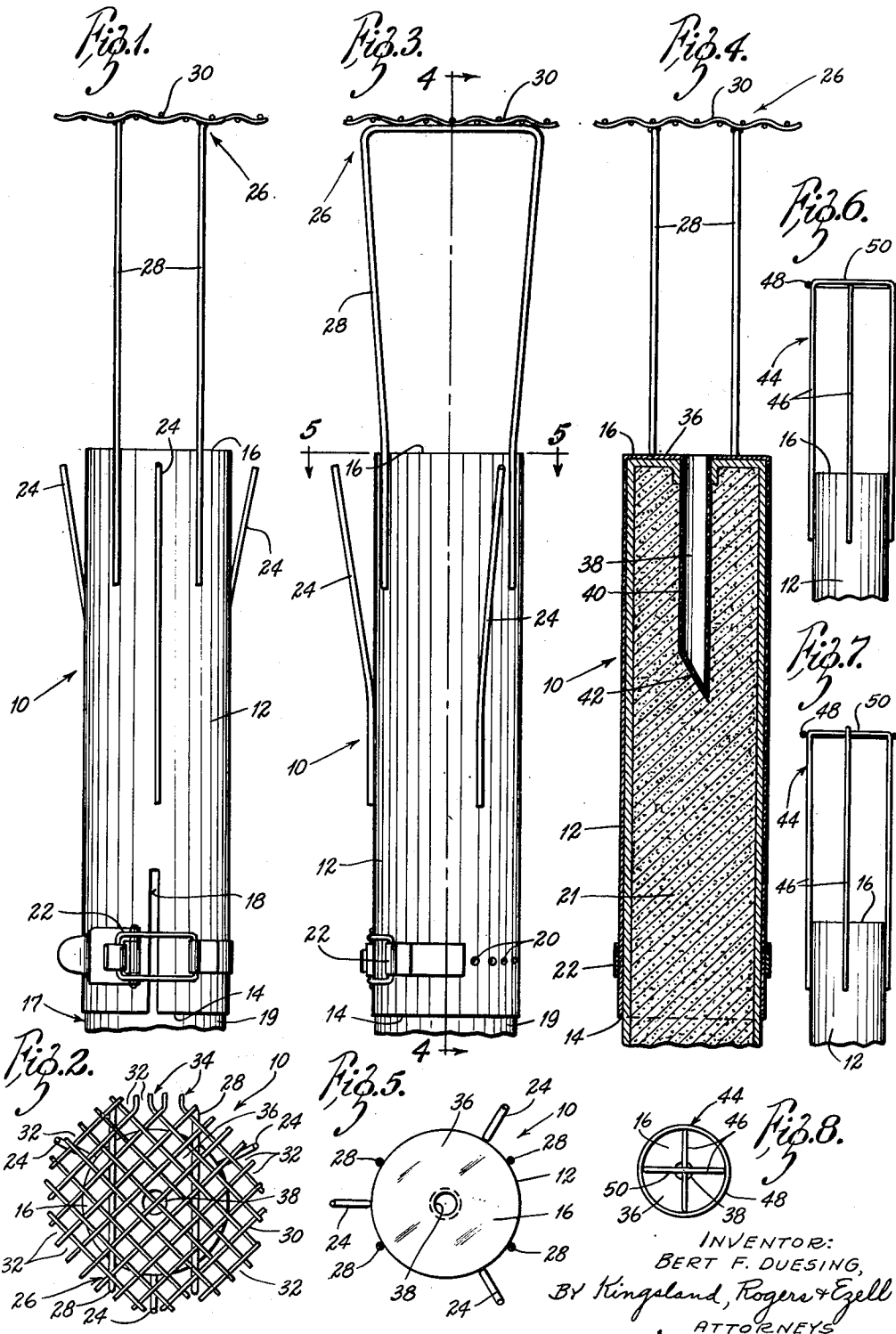
Aug. 24, 1954

B. F. DUESING

2,687,092

PROTECTIVE DEVICE FOR BLASTING CARTRIDGES

Filed Feb. 26, 1951



UNITED STATES PATENT OFFICE

2,687,092

PROTECTIVE DEVICE FOR BLASTING CARTRIDGES

Bert F. Duesing, Big Lake, Tex.

Application February 26, 1951, Serial No. 212,734

6 Claims. (Cl. 102-22)

1

The present invention relates generally to blasting accessories, and more particularly to a device affording protection for a blasting cartridge during emplacement thereof in a shot hole and during the period which it "sleeps."

Briefly, the invention comprises a novel device adapted to fit over the end of a cylindrical blasting cartridge to serve both as means to effect emplacement of the cartridge without damage thereto and as means to exclude water therefrom. Additionally, the device may include guiding means for snaking the cartridge past projections in the shot hole, means to contain a detonator within the cartridge, means to ground an electric detonator, and means to guide detonator leg wires away from the cartridge so as not to be damaged during emplacement of the cartridge.

Geophysical prospecting for minerals with the seismograph has become increasingly widespread during the past several years. In this type of geophysical activity, a basic aim of the prospector is to set off an explosion or "seismic blast" at a predetermined depth below the surface of the earth and to receive a record of the disturbance on a seismograph. With foreknowledge of the location and approximate force of the blast, the prospector is able to interpret the recorded effect of the blast in terms of geologic structure.

In the conduct of this type of geologic exploration, it has been found most practical to drill and charge a number of holes in an area to be investigated before exploding any of the individual charges. Thus, many of the explosive charges must "sleep" for a period which may extend for days or even weeks. It is then not uncommon for the charge to fail to explode properly due to poor detonation of the primer charge.

Poor detonation may result from several causes, one being admission of water to the primer charge which may result from damage to the blasting cartridge during emplacement in a shot hole. It is a general object of the present invention, therefore, to provide a device which will afford protection to a blasting cartridge during its emplacement in the shot hole.

In loading a vertical shot hole, which may be several hundred feet deep, as in seismic blasting, the charge is generally lowered as far as possible into the hole by suspension means in order to avoid unnecessary shock and resulting damage to the charge. Frequently, however, due to roughness of the hole, changes in direction of the hole, or the encounter of water and mud, the charge must be pushed or pounded upon with considerable force. The implements used in the past for

2

thus lowering and forcing a charge into a shot hole have been generally of a type that depended upon cooperation of the blasting cartridge itself for attachment thereto with resultant puncturing or bursting of the container for the explosive mixture. It is a more specific object of the invention, therefore, to provide a device for attachment to a standard blasting cartridge which will confine that portion of the blasting cartridge most susceptible to damage as above described and which further will provide means both for suspending the cartridge and for absorbing the shock of forces applied to drive the cartridge downward in a shot hole.

It has also been common practice in the past to prime a blasting cartridge by punching a hole through the container to permit the insertion of a detonator. Obviously, if a cartridge thus primed is placed in water, as is more often than not the case, in seismic blasting especially, this method of priming affords access of water to the primer charge with resulting deterioration thereof. It is another specific object of the invention, therefore, to provide a device of the type described which device incorporates a detonator holder by means of which the blasting cartridge may be efficiently primed without adverse effect in respect to water resistance thereof.

In lowering a primer charge having an electric detonator inserted therein, the electrical conductors or leg wires are susceptible to being broken or having the insulation scraped off by sharp rock ledges within the shot hole. This may cause short circuiting and failure to detonate. Detonating fuse, when used, is of course subject to similar damage. Obviously, the susceptibility to such damage is increased where the lead elements must run along the side of the blasting cartridge as in "sidewall priming." To reduce the likelihood of such damage to the lead elements, resort has been had to "end priming," but this has only substituted one type of difficulty for another, in that the emplacement of the primer charge is complicated by the presence of a detonator at the upper end of the cartridge. It is another specific object of the invention, therefore, to provide a device of the type described, which device incorporates means for protecting an end primed cartridge including means for protecting the detonator from contact with appropriate emplacing implements, and including means for guiding the detonator lead elements for protection thereof.

Not infrequently, electric detonators have been set off prematurely through an accumulation of

static electricity thereupon, particularly during electrical storms. Such an occurrence not only results in loss of explosive and frequently of drilling effort, but also is dangerous to personnel. Fortunately, such premature explosions can be almost completely eliminated by grounding the case of the detonator. This may be accomplished, as in the past, by attachment of a "third wire" to the detonator. However, it is another specific object of the present invention to provide a device of the type described, which device incorporates means for grounding an electric detonator without the necessity of a third wire being attached to the detonator.

Shot holes, particularly those which penetrate the lithosphere as far as is customary for seismic blasting, generally contain water or "driller's mud" which tends to float the blasting charges disposed therein. Thus, a charge which has been emplaced to a predetermined depth, there to sleep until detonated, may, during the interim between emplacement and detonation, rise to an unknown depth thereby destroying the accuracy of the interpretation given to the data recorded by the seismograph. A charge or a portion thereof may also be inadvertently dragged upwards from the depth to which it has been obviously lowered during withdrawal of loading implements from the hole. It is another specific object of the present invention, therefore, to provide a device of the type described, which device incorporates means to prevent a blasting cartridge from rising above a depth to which it has been lowered.

Other objects and advantages will be obvious from the following description taken with the accompanying drawing, in which:

Fig. 1 is a side elevational view of a protective device constructed in accordance with the teachings of the present invention;

Fig. 2 is a top view thereof;

Fig. 3 is a side elevational view thereof, as viewed from the right of Fig. 1;

Fig. 4 is a sectional elevation taken generally along the line 4—4 of Fig. 3, the anchor rods being removed to conserve space;

Fig. 5 is a sectional plan taken generally along the line 5—5 of Fig. 3, the clamp being removed to maintain clarity of the figure;

Fig. 6 is a reduced fragmentary sectional elevation of a modification of the protective device of Fig. 1;

Fig. 7 is a reduced fragmentary sectional elevation thereof, as viewed from the right or left of Fig. 6; and

Fig. 8 is a reduced plan view thereof.

Referring to the drawing more particularly by means of reference numerals, an embodiment of the present invention is shown as 10 in Figs. 1 through 5. Here, the protective device 10 comprises a sleeve 12, preferably of sheet metal, having a lower open end 14 and an upper closed end 16. The sleeve 12 is adapted to fit over the end of a standard cylindrical blasting cartridge 17 comprising a container 19 and an explosive mixture 21. A slot 18 extends vertically from the open end 14 to provide means for partially collapsing the lower portion of the sleeve 12, thereby to assure substantial frictional engagement with the cylindrical container 19 of the blasting cartridge 17. Additionally, indentations 20 may be provided to extend inwardly of the sleeve 12 and thus more positively to engage the container 19. An appropriate well known type of clamp or clasp 22 is secured as by welding, soldering, or riveting, to opposite sides of the slot 18 to aid in

collapsing the sleeve 12 and to retain it in collapsed position. Alternatively, the here mentioned means for retaining the cartridge 17 in received relationship with the sleeve 12 may be dispensed with, and internal anchors, as disclosed in my co-pending application for Device for Receiving and Anchoring Blasting Charges, Serial No. 212,732, filed February 26, 1951, may be substituted therefor.

A plurality of flexible anchor rods 24, preferably at least three, are secured as by welding or soldering, at their lower ends to the outside of the sleeve 12 intermediate the ends thereof and are disposed in substantially equal spaced relation around the circumference of the sleeve 12 to extend upwardly therealong as shown in Figs. 1 and 2. The upper portions of the rods 24 are bent outwardly away from the sleeve 12 for a purpose to be described hereinafter. These anchor rods 24 are structurally similar to those described in the aforementioned application, Serial No. 212,732, this application being a continuation-in-part of the subject matter originally disclosed therein.

A welded or soldered buffer assembly 26 comprising buffer rods 28 and a buffer platform 30 constructed as clearly shown in Figs. 1 through 5 is secured to the upper portion of the sleeve 12. The buffer platform 30 may be expanded metal, woven wire, or even a flat plate. It is desirable for the buffer platform 30 to have side openings as at 32 in Fig. 2, and to this end, the outer ends or edges of a screen may be bent as shown at 34. If a plate, rather than a screen is used, appropriate slots or indentations may be provided around the periphery to correspond to such openings.

The end 16 of the sleeve 12 is closed by a disk 36. A detonator holder 38 comprising a tubular member 40 having a closed, tapered end 42, as shown in Fig. 4, may depend from the disk 36. The detonator holder 38, however, is not requisite to the construction herein disclosed, and, even if used, need not be of the exact form depicted in the drawing. Any appropriate modification of a detonator holder as disclosed in my co-pending application for Detonator Holder, Serial No. 212,733, filed February 26, 1951, of which this application is a continuation-in-part, may be used.

A modified form of buffer assembly is shown in Figs. 6, 7 and 8. Here, a buffer assembly 44 comprises buffer rods 46 and a buffer ring 48 which cooperate to form a buffer platform 50 when arranged as clearly shown in Figs. 6, 7 and 8.

It is obvious that a protective device as herein described may be joined with a standard blasting cartridge 17 in the field or assembled with a blasting cartridge such as 17 during manufacture thereof. In either case, additional or alternative means for waterproofing the joint between the protective device and the container 19, such as the use of waterproof coatings, for example, may be employed.

The protective device 10, when slipped over a standard blasting cartridge 17 and secured thereto, provides for the suspension of the cartridge 17 by any appropriate implement designed to engage the buffer platform 30 or 50. Also, the platform 30 or 50 is adapted to receive any downwardly applied force necessary for emplacement of the cartridge 17 at a desired level in the shot hole, while the sleeve 12 so constrains the container 19 against bursting as practically to eliminate damage to the upper end thereof.

5

Moreover, the arrangement of the buffer assembly 30 or 50 with respect to the sleeve 12 and the detonator holder 38, where used, provides protection for an end-primed cartridge 17, and the openings, such as 32 and 34, provide means to guide the detonator lead elements, such as a detonating fuse or the leg wires of an electric detonator, away from the detonator itself and over toward the side of the shot hole.

Prior to insertion of the protective device 10 in a shot hole, the flexible anchor rods 24 are bent outwardly, away from the sleeve 12, sufficiently to insure their making resilient contact with the sides of the shot hole, thereby to serve a dual purpose. The anchor rods 24 will obviously permit the protective device 10 to be lowered or pushed downwardly into a shot hole, but they resist upward movement of the device 10 in the hole due to their upper ends engaging the normally rough inside surface of the hole and thereby serve to anchor the associated cartridge 17 at the lowest level at which it is emplaced. The anchor rods 24 also serve as grounding elements for electric detonators. Static electricity accumulating on an electric detonator disposed in a metal detonator holder 38 may be led off by way of the detonator holder 38, the disk 36, the sleeve 12, and the anchor rods 24, which are in contact with ground, thus eliminating the necessity for a "third wire" to the detonator for grounding purposes.

It is apparent that a protective device of the general type above described fulfills the objects and advantages sought therefor.

It is further apparent that numerous combinations and variations of elements and construction will be obvious to those skilled in the art. It is to be understood, therefore, that the foregoing description and the accompanying drawing have been given by way of illustration and example. It is further to be understood that changes in the form of elements, rearrangement of parts, and substitution of equivalent elements are contemplated as within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. For use with a blasting cartridge, a protective device to protect an upper end of the cartridge against damage during and after emplacement thereof in a shot hole, said device comprising tubular confining means closed at one end to withstand a tendency of said end of the cartridge to burst, means to secure said confining means to the cartridge, and means cooperative with said confining means whereby said device may be engaged by suspension means for the purpose of lowering the cartridge in a shot hole and whereby said device may receive downwardly directed forces intended to overcome resistance to desired downward movement of the cartridge in the shot hole, said means cooperative with said confining means including a platform disposed above and apart from said confining means, there being a plurality of supporting elements therebetween.

2. For use with a blasting cartridge, a protective device to protect an upper end of the cartridge against damage during and after emplacement thereof in a shot hole, said device comprising tubular confining means closed at one end to withstand a tendency of said end of the cartridge to burst, means to secure said confining means to the cartridge, and means cooperative with said confining means whereby said device

6

may be engaged by suspension means for the purpose of lowering the cartridge in a shot hole and whereby said device may receive downwardly directed forces intended to overcome resistance to desired downward movement of the cartridge in the shot hole, said means cooperative with said confining means including a platform disposed above and apart from said confining means, there being a plurality of supporting elements therebetween, said platform having receiving means at the periphery thereof for guiding a lead element associated with a detonating device.

3. For use with a blasting cartridge, a protective device to protect an upper end of the cartridge against damage during and after emplacement thereof in a shot hole, said device comprising tubular confining means closed at one end to withstand a tendency of said end of the cartridge to burst, means to secure said confining means to the cartridge, means cooperative with said confining means spaced above said closed end whereby said device may be engaged by suspension means for the purpose of lowering the cartridge in a shot hole and whereby said device may receive downwardly directed forces intended to overcome resistance to desired downward movement of the cartridge in the shot hole, and a detonator holder disposed within said confining means adjacent said closed end, said detonator holder comprising a tube extending from said closed end coaxially inwardly of said confining means, said tube having a closed inner end and an open outer end.

4. In a device for use with a blasting cartridge, tubular means closed at an upper end to confine an upper end of the cartridge, means to secure the device to the cartridge, means forming a well-like chamber within said confining means adjacent the closed upper end thereof whereby to receive a detonator in the upper end of the cartridge, platform means disposed above and spaced from said means to receive a detonator, thereby to cooperate with said confining means to protect the upper end of the cartridge against downwardly directed forces required to emplace the cartridge at a desired depth in a shot hole, and means in said platform means for guiding a detonator lead element to the edge of said platform means for extension therepast.

5. For use with a blasting cartridge, a metallic protective device to protect an upper end of the cartridge against damage during and after emplacement thereof in a shot hole, said device comprising tubular confining means closed at one end to withstand a tendency of said end of the cartridge to burst, a detonator holder integral with said confining means and disposed there-within adjacent said closed end, and means including angularly disposed trailing rods secured to said confining means and adapted to maintain continuous contact with the wall of the shot hole, said latter means being adapted both to restrain said confining means from upward movement in the shot hole and to cooperate with said confining means and said detonator holder in providing a path of electrical conductance between a detonator disposed within said detonator holder and the wall of the shot hole.

6. In combination, a blasting cartridge comprising a closed cylindrical container containing an explosive mixture, and means for protecting an end of said blasting cartridge during emplacement thereof, said means comprising cup-like means adapted to receive said end of the blasting

cartridge and buffer means secured to said cup-like means, said buffer means including a platform spaced from said cup-like means and connected thereto by a plurality of substantially axial rod-like supports which are adapted to absorb impacts in excess of a predetermined amount.

References Cited in the file of this patent

UNITED STATES PATENTS

	Number	Name	Date
5	156,673	Peck	Nov. 10, 1874
	289,768	Freund	Dec. 4, 1883
	1,458,740	Wells	June 12, 1923
	1,560,815	Hill	Nov. 10, 1925
	1,571,122	Hutton	Jan. 26, 1926
10	1,832,132	Lanier et al.	Nov. 17, 1931
	2,529,763	Deputy et al.	Nov. 14, 1950