Sept. 1, 1931. H. K. BABBITT 1,821,608

BLASTING CAP

Filed June 1, 1929

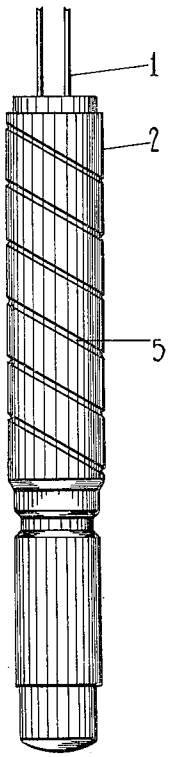

Fig. 1

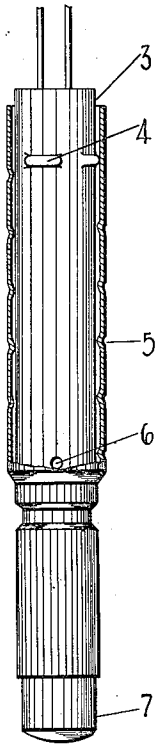

Fig. 2

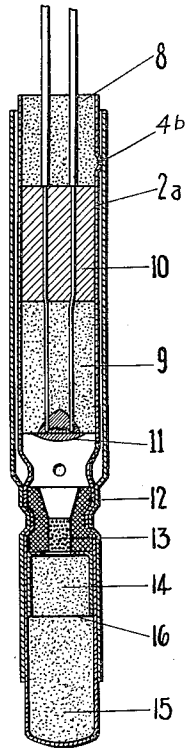

Fig. 3

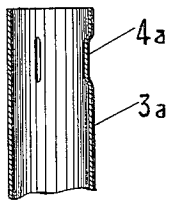

Fig. 4

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By his attorney

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Patented Sept. 1, 1931

1,821,608

UNITED STATES PATENT OFFICE

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BLASTING CAP

Application filed June 1, 1929. Serial No. 367,805.

This invention relates to delay electric blasting caps, and more particularly to means for releasing the pressure of the gaseous products of combustion of the priming charge in order to prevent pre-ignition of the explosive charge.

Delay action caps for use in mining and blasting operations have heretofore comprised essentially a shell containing a suitable explosive substance, such as fulminate of mercury, or tetryl at its inner end, a plug of sulphur or like substance at the outer end, through which insulated conducting wires for the shot firing circuit pass to the igniting compound, and a retarding means containing a core or train of slow burning powder interposed between and spacing the fuse end of the cartridge and the detonating end.

Various methods have been suggested for the escape of the gases and avoidance of pressure within the shell, such as providing vent holes in the shell wall, and it has been proposed to carry a rubber jacket over the perforations for the purpose of excluding moisture. Closable vents laterally to the fuse which open automatically under the action of the generated pressure have been suggested by Eschbach (U. S. Patent No. 1,570,733). Eschbach furthermore provides a free-air space between the fuse cartridge and the retarding means and an air vent communicating with the space within the fuse for the escape of the gases and pressure resulting from the ignition of the match head in order to prevent pre-ignition of the shot.

An object of the present invention is to provide a means whereby the heated gases and pressure produced within the cartridge at the time of initial ignition may be allowed to escape at as low a temperature as possible so as to avoid premature ignition of the explosive material in which the blasting cap is embedded or surrounded.

Another object of my invention is a means whereby the gas is diffused in order to provide greater cooling effect of the gases than has heretofore been the practice.

A further object of this invention is a device having the foregoing and other advantages and at the same time may be more simply constructed than devices of the prior art.

Other objects will appear as the description proceeds.

These objects may be accomplished by means of an outer sleeve adapted to fit over the electric detonator and engage the casing at a point below the vent in the wall. This sleeve should be slightly larger than the shell of the fuse cartridge and spaced therefrom to permit ready exit of the gases. For this purpose spacing means inside the sleeve are essential, and in my preferred form I propose to provide an inner bead which, besides serving as a spacing means between the sleeve and the shell of the fuse cartridge, will also form a spiral channel through which the escaping gases may pass. In this manner the desired cooling effect may be produced due to the extreme length of the channel and the diffusion of the gases that occurs. Where the spiral bead is not desired, pointed or oblong beads may be provided.

My invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a view of one form of my proposed sleeve in combination with a delay electric blasting cap.

Figure 2 is a view similar to Figure 1 with the sleeve shown in part in longitudinal section.

Figure 3 is a view in central longitudinal section, showing the blasting cap unit and a modified form of sleeve positioned thereon.

Figure 4 is a sectional view of another modification of my proposed sleeve.

Referring more particularly to the drawings it will be seen that 1 represents the insulated conducting wires of the shot firing circuit, 2 the sleeve member, 3 the ignition head, 4 spacing means for the sleeve member, 5 the spiral bead forming a channel for the escape of the gaseous products of combustion, 6 the gas vent communicating with the free air space within the electric detonator, 7 the cap load, 8 and 9 sulphur plugs, 10 the waterproofing compound, 11 the ignition (match)

head, 12 the insertion piece containing a central bore, 13 a slow burning powder, 14 and 15 the charge for the electric detonator, and 16 a thimble for holding the explosive charge in place. In Figure 3 is shown at 2*a* a modified form of the sleeve without the spiral bead, this form being a plain sleeve which fits over the detonator and is spaced therefrom by means of the pointed bead shown at 4*b*. This bead may, of course, be provided on either the sleeve or the shell of the detonator as desired as it will serve the same function equally well since it acts merely as a spacing means. This bead may also take an oblong form such as that shown at 4*a* in Figure 4, in which case it may likewise be produced on the shell of the detonator.

It will be understood that the foregoing parts are those conventionally used in this type of detonator. My improvement consists principally in providing the sleeve which may be inserted over the detonator and adapted to engage the shell of the same below the exit vent for the gases.

The sleeve may be combined with the detonator in various ways. Preferably, I propose to crimp the lower end of the sleeve so as to engage the grooves in the retarding element, together with the shell of the blasting cap. The retarding agent may consist of any one of several materials such as black powder, fuse, or other slow burning materials.

In some cases it will be found desirable to have the gas vent closed at the exit from the air chamber, and for this purpose I propose to provide a low melting wax, lacquer or pyroxylin covering for the vent to prevent undue moisture or water from entering the air chamber. Other suitable means for closing the vent may be used, such as low melting solder, but I prefer to use a pyroxylin material because of its quick response to increase in temperature.

As many changes may be made in the above construction, and as apparently many widely different embodiments of my invention may be made without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawings shall be interpreted as illustrative merely, and that my invention shall not be limited except as stated in the following claims:

I claim:

1. A delay electric detonator comprising in combination an ignition head, an explosive load, a retarding means interposed between the ignition head and the load means, a free air-space between the ignition head and the retarding means, a vent in communication with the free air space for exit of the gases formed during initial firing, a filler of low fusible material covering the vent, and a sleeve surrounding the detonator and spaced therefrom, and provided with an inner spiral channel adapted to diffuse and cool the gases and conduct them away from the vent in order to prevent pre-ignition of the detonator charge.

2. A delay electric detonator comprising in combination an ignition head, an explosive load, a retarding means interposed between the ignition head and the load means, a free air-space between the ignition head and the retarding means, a vent in communication with the free air-space for exit of the gases formed during initial firing, a filler of low fusible material covering the vent, a sleeve surrounding the detonator, said sleeve having a spiral rib adapted to space the sleeve from the detonator and form a spiral channel for the diffusion and exit of the gases of combustion formed during initial firing so as to prevent pre-ignition of the detonator charge.

In testimony whereof, I affix my signature.

HENRY K. BABBITT.