

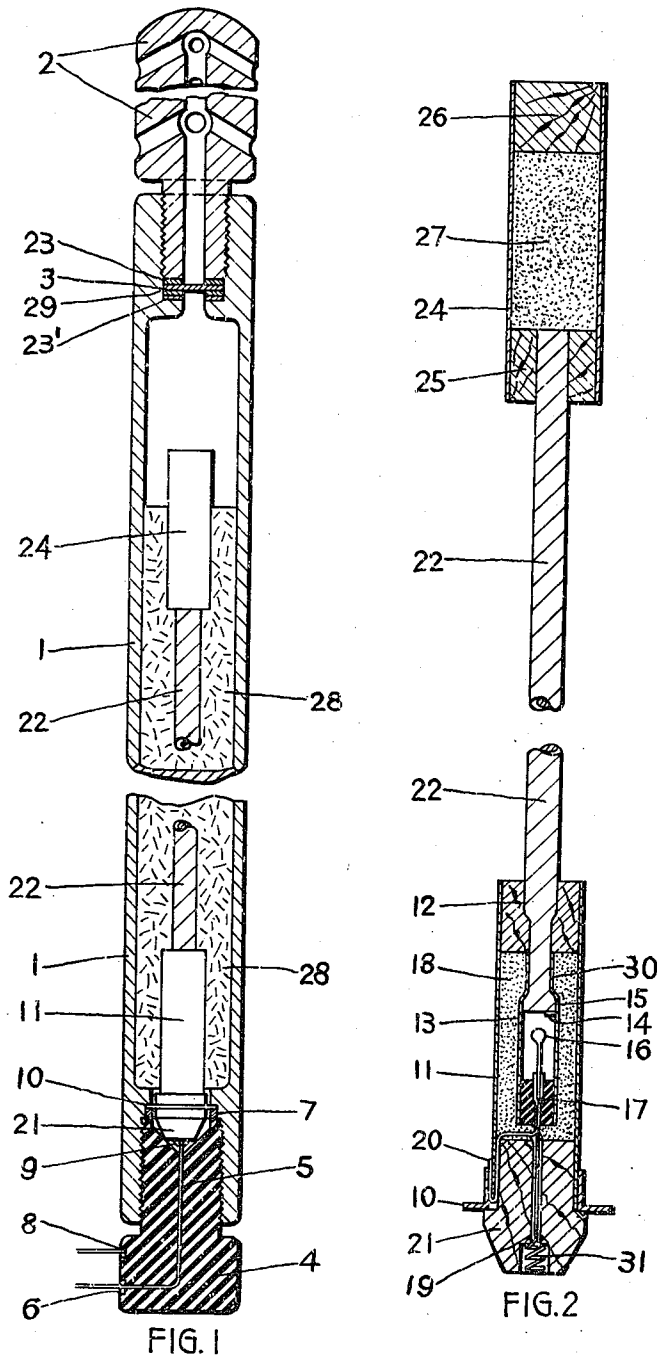
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BLASTING CARTRIDGE AND INITIATOR THEREFOR

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## BLASTING CARTRIDGE AND INITIATOR THEREFOR

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4 Claims. (Cl. 102—25)

The present invention relates to improvements in or relating to blasting cartridges and to initiators therefor.

The invention is particularly concerned with blasting cartridges wherein the blasting charge comprises a mixture comprising an alkali metal nitrite and an ammonium salt of an inorganic acid and capable of self-sustained gas-producing decomposition on local heating which is contained in a rigid casing having a firing head and a venting head, wherein said firing head is provided with means for transmission of electric energy from without to initiating means within the casing capable of initiating the chemical reaction of the charge and wherein said venting head is separated from the body of the casing by a member adapted to yield under a predetermined pressure.

A blasting cartridge of the aforesaid kind is employed for the blasting of coal in fiery and dusty mines since the decomposition of the charge occurs entirely without flame. The gentle heaving action obtained and its exceptional freedom from the liability to ignite methane/air or coal dust/air mixtures render it particularly suitable for use in coal mining operations.

In a blasting cartridge of the aforesaid kind the said initiating means usually consists of an electric powder fuse, comprising a small charge of blackpowder fired by an electric fusehead. In this kind of blasting cartridge an appreciable time is required for the decomposition once initiated to progress through the entire blasting charge. This delay may be as much as one second and may vary somewhat in successive shots and while for single shot blasting operations this is of little or no importance for simultaneous shot firing it is desirable considerably to reduce the variability of the time required for the propagation of the decomposition.

It has now been found that this object can be achieved in a blasting cartridge of the aforesaid kind wherein the initiating means comprises an electric fusehead and a charge of blackpowder located near one end of the container by including in the initiating means a second charge of blackpowder in the vicinity of the other end of said container and a length of instantaneous fuse having its textiles fireproof positioned for ignition at one end by said electric fusehead and extending to said second charge of blackpowder.

According to the present invention therefore a blasting cartridge wherein the blasting charge comprises a mixture comprising an alkali metal nitrite and an ammonium salt of an inorganic acid and capable of self-sustained gas-producing decomposition on local heating which is contained in a rigid casing having a firing head and a venting head, wherein said firing head is provided with means for transmission of electrical energy from without to initiating means within the casing capable of initiating the chemical reaction of the charge, wherein said venting head is separated from the body of the casing by a member adapted to yield under a predetermined pressure, and wherein the initiating means comprises an electric fusehead and a charge of blackpowder located near one end of the container is characterised in that the initiating means includes a second charge of blackpowder in the vicinity of the other end of said container and a length of instantaneous fuse having its textiles fireproof positioned for ignition at one end by said electric fusehead and extending to said second charge of blackpowder.

The length of said instantaneous fuse between the two charges of blackpowder is preferably such that the length

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of the casing occupied by the initiating means is substantially the same as that occupied by the main charge of the cartridge.

An initiator according to the invention comprises an electric fusehead, means for transmission of electrical energy from without to said electric fusehead, a primary charge of blackpowder positioned for firing by said electric fusehead, a length of instantaneous fuse, the textile content of which is fireproof, also positioned for firing by said electric fusehead, and a secondary blackpowder charge positioned at the remote end of said instantaneous fuse for firing thereby.

The main charge consisting of a mixture of an alkali metal nitrite with one or more ammonium salts such that the charge is capable of undergoing a self-sustained gas-producing decomposition also preferably includes a mildly alkaline stabiliser and preferably consists of an equimolecular mixture of sodium nitrite and ammonium chloride including from 1 to 3% of its weight of anhydrous sodium carbonate or magnesium oxide as stabiliser.

In the cartridges and initiators of this invention the two blackpowder charges are preferably of the order of 80–110 grains and it is also preferred that the burning speed of the second blackpowder charge should be slightly greater than that of the primary charge so that both charges are consumed at substantially the same time.

A preferred embodiment of the invention is illustrated in the diagrammatic drawing accompanying the specification wherein Fig. 1 shows a longitudinal section of a blasting cartridge in accordance with the invention and Fig. 2 shows a longitudinal section of the initiator shown in outline in Fig. 1. In the drawing, 1 is a high tensile steel container, 2 is a venting head, 3 is a mild steel disc adapted to yield at a predetermined pressure of the order of 15 tons per square inch, 4 is a firing head, 5 is a positive insulated leading wire, 6 is a positive terminal, 7 is a gasket, 8 is a negative terminal, 9 is a positive terminal ball contact maker, 10 is a flanged copper ring, 11 is a fireproofed cardboard cylinder containing the first blackpowder charge 18 which consists of 90 grains of blackpowder, 12 is a wooden plug, 13 is a copper sleeve, 14 is a metal flap bent into the copper sleeve 13 to form a hole 15, 16 is an electrical fusehead, 17 is a neoprene plug, 19 is a positive lead from the spring 31 which makes contact with the positive terminal ball contact maker 9 to the electric fusehead 16, 20 is a negative lead from the copper ring 10 to the electric fusehead 16, 21 is a wooden plug, 22 is a length of instantaneous fuse made with jute yarns which have been fireproofed prior to fabrication of the fuse and is crimped into the end of the copper sleeve 13 at 30, 23 and 33' are gaskets, 24 is a fireproofed cardboard container for the second blackpowder charge 27 which consists of 100 grains of blackpowder of slightly faster burning speed than that used for charge 18, 25 and 26 are wooden plugs and 28 is the main blasting charge and consists of 460 grams of a mixture of sodium nitrite, ammonium chloride and magnesium oxide in the proportions 55.25:43.25:1.5 by weight.

In using the cartridge illustrated the cartridge is positioned in the normal manner and a firing current passed through the leads connected to the terminals 6 and 8. This ignites the fusehead 16 which in turn ignites the blackpowder charge 18 and the instantaneous fuse 22 which latter simultaneously ignites the slightly faster burning blackpowder charge 27. The two blackpowder charges 18 and 27, which are consumed at substantially the same time, effect simultaneously commencement of the decomposition of the main charge at two widely separated points. Using this type initiator results in the period between application of the firing current and the bursting of the bursting disc being reduced to the order of 20–50 milliseconds, whereas the initiators hitherto available this period is of the order of 0.1–1 second. This reduction in time enables the initiators of the present invention to be used to fire a number of shots simultaneously, for example, by positioning a number of cartridges such as that illustrated, connecting these electrically in series or parallel and applying a firing current. On the other hand, the variability of the period between application of the firing current and the bursting of the disc, when using the initia-

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tors hitherto available, is such that simultaneous shot-firing is impracticable.

What we claim is:

1. An initiator for use in a blasting cartridge wherein the blasting charge comprises a mixture comprising an alkali metal nitrite and an ammonium salt of an inorganic acid, which mixture is capable of self-sustained, gas-producing decomposition on local heating and is contained in a rigid casing having a firing head and a venting head, said firing head being provided with means for transmission of electrical energy from without to initiating means within the said casing capable of initiating the chemical reaction of the charge, and said venting head being separated from the body of the said casing by a member adapted to yield under a predetermined pressure, comprising an electric fusehead, means for transmission of electrical energy from without to said electric fusehead, a primary charge of blackpowder positioned for firing by said electric fusehead, a length of instantaneous fuse, the textile content of which is waterproof, also positioned for

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firing by said fusehead and a secondary blackpowder charge positioned at the remote end of said instantaneous fuse for firing thereby.

2. An initiator as claimed in claim 1 wherein the two blackpowder charges are of the order of 80 to 110 grains.

3. An initiator as claimed in claim 1 wherein the burning speed of the second blackpowder charge is slightly greater than that of the primary charge.

4. An initiator as claimed in claim 1 wherein the length of said instantaneous fuse is such that the length of said rigid casing occupied by the initiating means is substantially the same as that occupied by the main charge of the blasting cartridge.

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