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Patented Dec. 11, 1900.

C. F. BRYANT & C. H. BROWN.

BLASTING.

(No Model.)

(Application filed Mar. 24, 1899.)

FIG. 1.

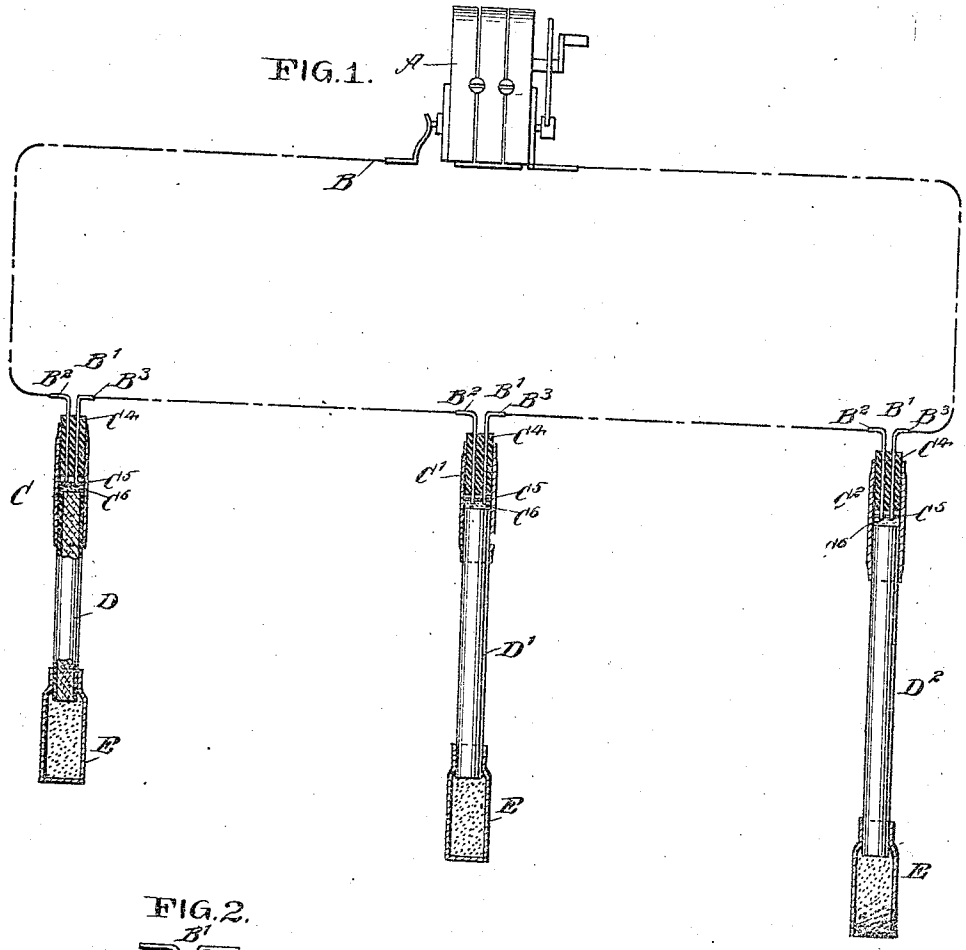
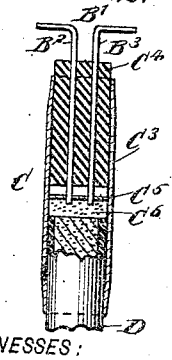


FIG. 2.



WITNESSES:

Conn Pitchell

Rud. G. Hoosten

INVENTORS

Caleb F. Bryant

Charles H. Brown,

BY

Munn

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CALEB F. BRYANT AND CHARLES H. BROWN, OF CRIPPLE CREEK, COLORADO.

BLASTING.

SPECIFICATION forming part of Letters Patent No. 663,724, dated December 11, 1900.

Application filed March 24, 1899. Serial No. 710,363. (No model.)

To all whom it may concern.

Be it known that we, CALEB F. BRYANT and CHARLES H. BROWN, of Cripple Creek, in the county of El Paso and State of Colorado, have invented a new and useful Improvement in Blasting, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in blasting whereby a plurality of charges are fired successively from a firing source common to all the charges, so that the charge in any desired drill-hole (usually the weakest) is first exploded, that desired to go next (which is usually the next stronger one) following at an interval of time, and so on until all the charges are exploded, and the miner is enabled to count the reports of the successive explosions to make sure that all the charges have exploded, and if not he can readily locate an unexploded charge to avoid drilling into the same and accidentally exploding it to the injury of himself and those around.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of our invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a sectional side elevation of the improvement, and Fig. 2 is an enlarged sectional side elevation of the primary igniting device.

A dynamo, battery, or other suitable source of electricity A is connected by a wire B with a switch for sending an electric current through the same. This wire B is connected with primary igniting devices C C' C^2 for igniting fuses D D' D^2, respectively, having ordinary caps E in contact with the charge to be ignited and located in the drill-hole. The primary igniting device shown in the drawings consists of a shell C^3, containing in its upper end a plug C^4, of wood or other insulating material, and the lower end of the shell engages the upper end of the fuse D, D', or D^2, and between the top of the fuse and the bottom of the plug C^4 is arranged a thin disk C^5 of tin-foil or other metal to lessen the resistance of the air-space between the terminals B^2 B^3 of the wire B, a small amount of black powder or other combustible material C^6 being arranged between the disk and the upper end of the fuse D.

Through the plug C^4 and the disk C^5 extend the terminals B^2 B^3 of a spark-producer B', forming part of the electric circuit, the lower ends of the terminals extending into the combustible material C^6.

Now when a current is sent through the wire B it passes from one terminal to the other by way of the disk C^5, and as the latter is extremely thin it can carry but a small amount of the current, and it either burns out or causes a spark from one terminal to the other, so that in either case the combustible material C^6 is ignited and the fuse D is thereby lighted. Now it is evident that when an electric current is sent through the wire B the several igniting devices C C' C^2 are simultaneously ignited, and consequently the several fuses D D' D^2 are set off. The fuses D D' D^2 are made of different lengths, the shortest fuse leading to the charge desired to explode first, which is usually in the weakest drill-hole—that is, one that will break the easiest—and the next longer fuse is connected with the drill-hole desired to explode next, which is usually the next stronger drill-hole, and so on, so that the several explosive charges in the various drill-holes are exploded at intervals and according to the length of the fuses.

It is evident that by the arrangement described the operator is enabled to readily count the reports of the several explosions as they take place at intervals, and in case one charge does not explode the operator knows by the interval of time that has elapsed between the preceding and the following charge which one of the charges has not exploded. Thus the operator is enabled to locate the unexploded charge to avoid drilling into the same and accidentally exploding the charge.

By using tin-foil as a partial conductor for the electric current in the primary igniter a positive ignition is always insured, and more primary igniters can be set off at the same time by an electric current of a given

strength than would be possible if the partial conductor were omitted. The shells C^3 render the primary igniters moisture-proof to prevent the danger of the formation of a short circuit, especially as the ends of the shells C^3 are securely crimped on the plugs and the fuses.

An ordinary cap E is generally used when dynamite or the like forms the explosive charge in the drill-hole; but in case gunpowder or like explosive is used for blasting then the cap E may be dispensed with and the lower end of the fuse D, D', or D^2 may be directly extended into the gunpowder or like explosive, which is then ignited when the burning fuse reaches the powder.

It is understood that by the arrangement described a miner has absolute control of the explosion of the charges and may have any one or any set of charges set off at different times and still connect the same in series, allowing, say, ten to fifteen or any number of seconds to elapse between successive charges.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A blasting device, provided with a fuse, a primary igniting device for the fuse comprising a shell engaged by the fuse, terminals forming part of an electric circuit and extending into the said shell, a disk of metallic foil connecting the terminals, and a combustible material arranged between the disk and the fuse, substantially as described.

2. A blasting device, consisting of an electric circuit comprising a source of electricity, a single leading-in wire, a single return-wire, a plurality of primary igniting devices, connected in series in the said circuit and set off simultaneously by the electric current, the said primary igniting devices each comprising a shell engaging a fuse at one end, a plug of insulating material in the other end of the shell, terminals forming part of the electric circuit and extending through the said plug, a disk of metallic foil located between the inner end of the plug and the fuse and connecting the said terminals, and combustible material arranged between the disk and the fuse, the said fuses being of different lengths, substantially as described.

CALEB F. BRYANT.
CHARLES H. BROWN.

Witnesses:
CLINTON S. FLETCHER,
JOHN ALISON.