F. A. CANFIELD.

Protector for Explosive Caps.

No. 168,225. Patented Sept. 28, 1875.

Fig. 1.

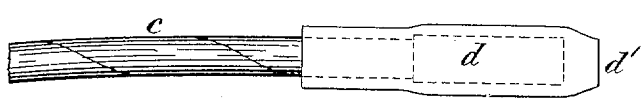
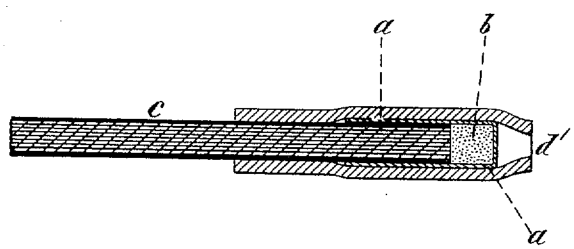


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

FREDERICK A. CANFIELD, OF DOVER, NEW JERSEY.

IMPROVEMENT IN PROTECTORS FOR EXPLOSIVE CAPS.

Specification forming part of Letters Patent No. **168,225**, dated September 28, 1875; application filed July 2, 1875.

To all whom it may concern:

Be it known that I, FREDERICK A. CANFIELD, of Dover, Morris county, State of New Jersey, have invented certain new and useful Improvement in the Protection of Explosive Caps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

This invention relates to an improvement in the protection of explosive caps.

In order to explode nitro-glycerine—a substance in its various compounds at present much used in blasting—an initial explosion of considerable violence is necessary, and explosive caps of various sorts are used. These caps are primed with fulminate of mercury and other unstable and dangerous substances, which are liable to explode from sudden jar or friction.

These explosive caps are liable to two difficulties: In the first place, miners or workmen carrying them carelessly will sometimes drop them or place them in situations where they are exposed to a sudden blow, and the resulting explosions are very dangerous, occasioning sometimes loss of life and limb. In the second place, these caps, being constantly exposed to water and moisture, are liable to become wet, and thus inoperative and useless.

My invention is designed to remedy both of these difficulties: first, to render these caps perfectly safe from any danger arising from sudden jar, fall, or concussion; and, in the second place, to render them thoroughly water-proof. The nature of my invention is clearly shown in the drawings.

Figure 1 is an external view of the fuse and cap. Fig. 2 is a longitudinal cross-section, showing the internal arrangement.

The same letters in both drawings represent similar parts.

c is a portion of the ordinary tarred fuse used in exploding these caps and powder generally. *a* is the explosive cap, with its charge *b*, of fulminate of mercury or other explosive. *d* is the protecting cover or tube, in which the essence of my invention consists. A tube of rubber or other suitable elastic material is slipped over the explosive cap. This tube projects at both ends of the cap, but more at its open than at its closed end. By means of this elastic cover or tube the cap is thoroughly protected on all sides from any explosion arising from jar or concussion, and caps thus protected can be safely tamped with black powder. The closed end of the cap *d* might be still further protected by a soft filling of rubber or other suitable material. Into the open end of the cap *a* and its surrounding tube is slipped the fuse *c*, which is thus brought into contact with the explosive *b* contained in the cap *a*. The rubber tube *d* is made of such a size as to compress and hold tightly the entering fuse *c*, and when this fuse has been placed in position the cap *a* is perfectly water-proof, and may be kept under water for several days without danger of becoming inoperative.

There is another advantage connected with these exploders, namely, this: that if it ever becomes necessary to withdraw a charge, a pull upon the projecting fuse will withdraw the exploder, owing to the close contact and friction between the rubber tube and the entering tarred fuse, while, as ordinarily arranged, miners are unable to withdraw these exploders, and consequently the entire charge is useless, and another hole has to be drilled.

What I claim as my invention, and desire to secure by Letters Patent, is—

An exploder for miners, arranged with an elastic inclosing covering, *d*, for the purpose of embracing and holding firmly the entering fuse, substantially as described.

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