(No Model.)

A. F. ANDREWS.

FUSE FOR EXPLODING GUNPOWDER AND OTHER EXPLOSIVES.

No. 328,172. Patented Oct. 13, 1885.

Fig. 1.

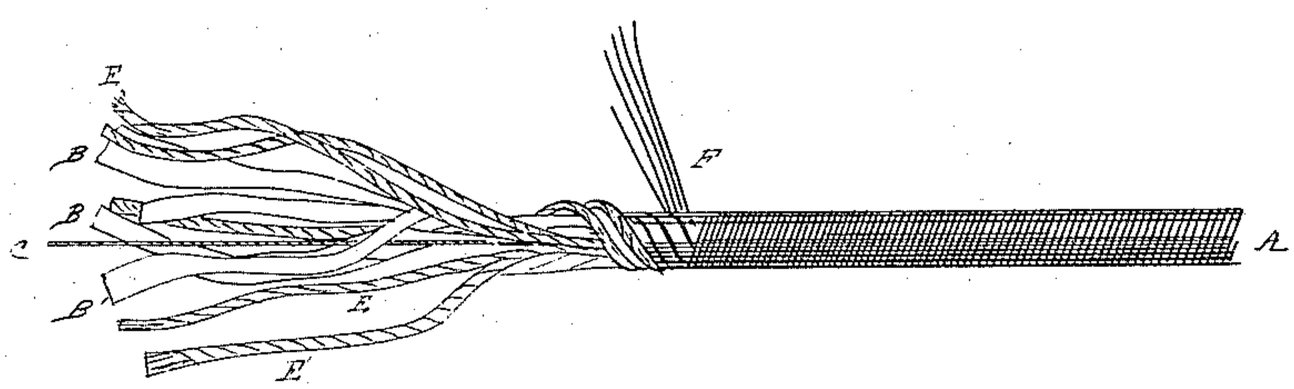


Fig. 2.

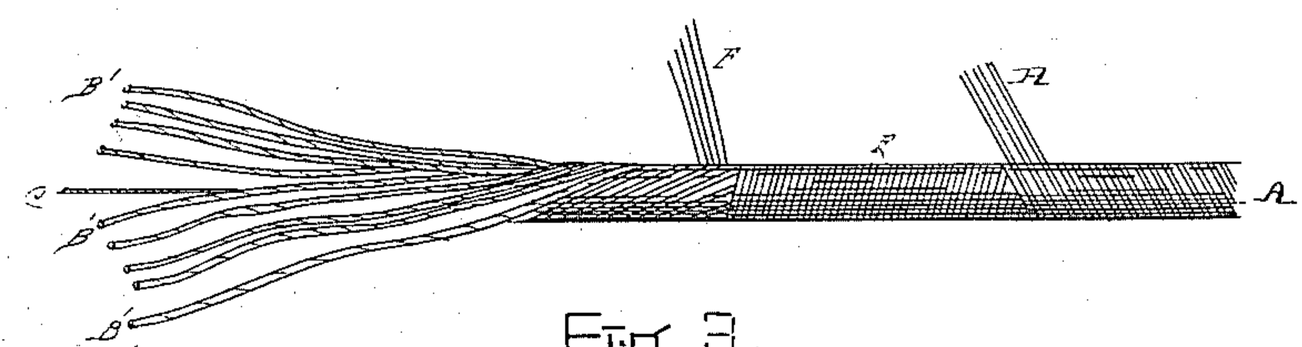
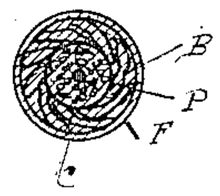


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALBERT F. ANDREWS, OF AVON, CONNECTICUT, ASSIGNOR TO THE CLIMAX FUSE COMPANY.

FUSE FOR EXPLODING GUNPOWDER AND OTHER EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 328,172, dated October 13, 1885.

Application filed May 25, 1885. Serial No. 166,663. (No model.)

To all whom it may concern:

Be it known that I, ALBERT F. ANDREWS, a citizen of the United States, residing at Avon, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Fuses for Exploding Gunpowder and other Explosives, of which the following is a full, clear, and exact specification.

My invention consists in inclosing the powder in one or more layers of paper, preferably spirally wound, and each layer consisting of two or more strips of folded tissue or thin paper, there being intertwisted at the same time with the paper strands strengthening strands of fibrous material. The whole is then wound with fine cotton thread to keep the parts together. The fuse may be afterward wound with heavy rope-yarn to protect it, and, when necessary, it can be water proofed. I find that I can also use to advantage either tightly or loosely twisted paper twine, and where very great tensile strength is required in the fuse, strands of jute, hemp, Manila, or other rope-yarn are intertwisted with the paper during the process of forming the fuse; and these yarns may be either uniformly distributed through the covering or they may form the outer layer.

In the drawings, Figure 1 is a view of the fuse when a part of the strands are of rope-yarn. Fig. 2 shows a form of the fuse in which the paper strands are of paper twine. Fig. 3 is a cross-section of Fig. 1.

A is the completed fuse in all the figures. B B are the paper strands when made of folded tissue paper. B′ B′ are the paper-twine strands. C is the central or core thread. E E are the rope-yarn strands; F, the outer winding-thread; H, the outer winding of rope-yarn, when required for extra protection. The water proofing is not shown, as it is applied in the same way as to any other fuse.

P indicates the powder.

In some cases it may be desirable to have two layers of paper, one wound over the other.

The paper used is preferably the ordinary thin Manila tissue paper, as this possesses great strength and pliability. It is folded several times into a flat strand, and I preferably employ from five to nine strands, as it renders the process of winding in forming the fuse more rapid, and also makes the covering more secure.

To increase the tensile strength, I intertwist strands of rope-yarn, and these yarns may be either uniformly distributed through the covering or they may form the outer covering. In some cases, also, I make use, for the paper strands, of paper twine, which may be loosely or tightly twisted; but in most cases I find that the folded paper strands are the best. The folded paper and the paper twine may also be combined.

After the powder has been inclosed in the paper covering the fuse is completed by an outer winding of cotton thread, wound, for greater convenience, five or more strands at once.

I have found as the results of experiment and practical use that a fuse made up, as above described, of paper, is better than when made of yarn in the usual manner, because dry paper is the best substance to keep powder, because it is cheaper than yarn, and because it takes a water-proof coating to better advantage than yarn fuses.

For greater strength I sometimes combine rope yarns, but as a protective coating for the powder I rely upon the paper. The paper strands might be put on straight and overlapping—that is, not spirally wound.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A fuse having around a core-thread a layer of powder incased in two or more spirally-wound strands of tissue-paper, combined with strands of rope-yarn or other fibrous material coincidently intertwisted therewith, all substantially as shown and described.

2. A fuse having a powder-incasing layer of spirally-wound twisted paper strands, combined with coincidently intertwisted strands of rope-yarn or other similar fibrous material, substantially as shown and described.

3. A fuse having a powder-incasing layer

of two or more spirally-wound strands of tissue-paper, combined with strands of rope-yarn or other fibrous material coincidently intertwisted therewith, and with an outer layer of spirally-wound threads to act as a protective covering, all substantially as shown and described.

In witness whereof I have hereunto set my hand.

ALBERT F. ANDREWS.

Witnesses:
H. S. CHAPMAN,
HARTSHORN WHITE.