E. GOMEZ.

CONSTRUCTION OF TRAINS OR FUSES.

No. 34,057. Patented Jan. 7, 1862.

Fig. 1.

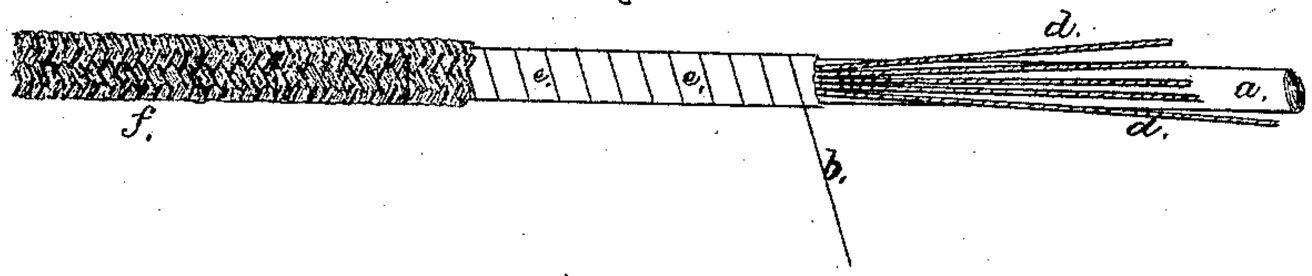


Fig. 2.

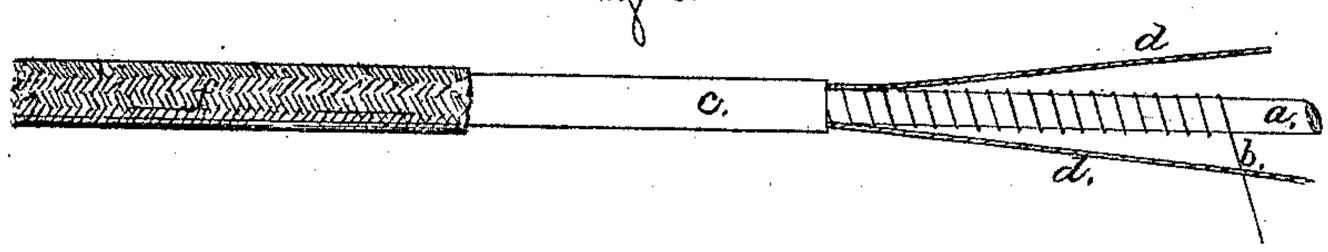


Fig. 3.

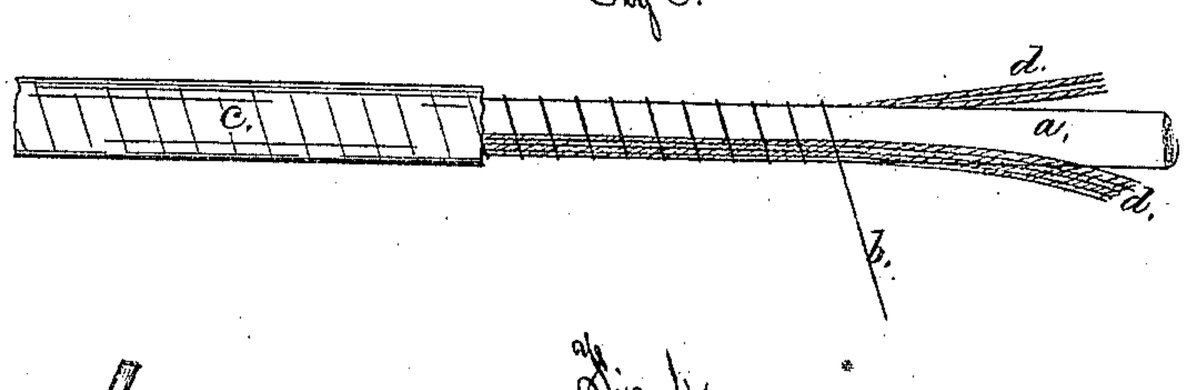


Fig. 4.

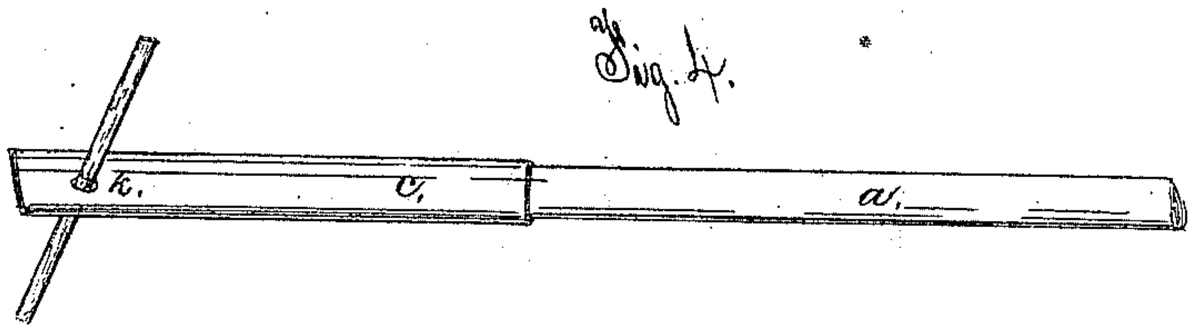
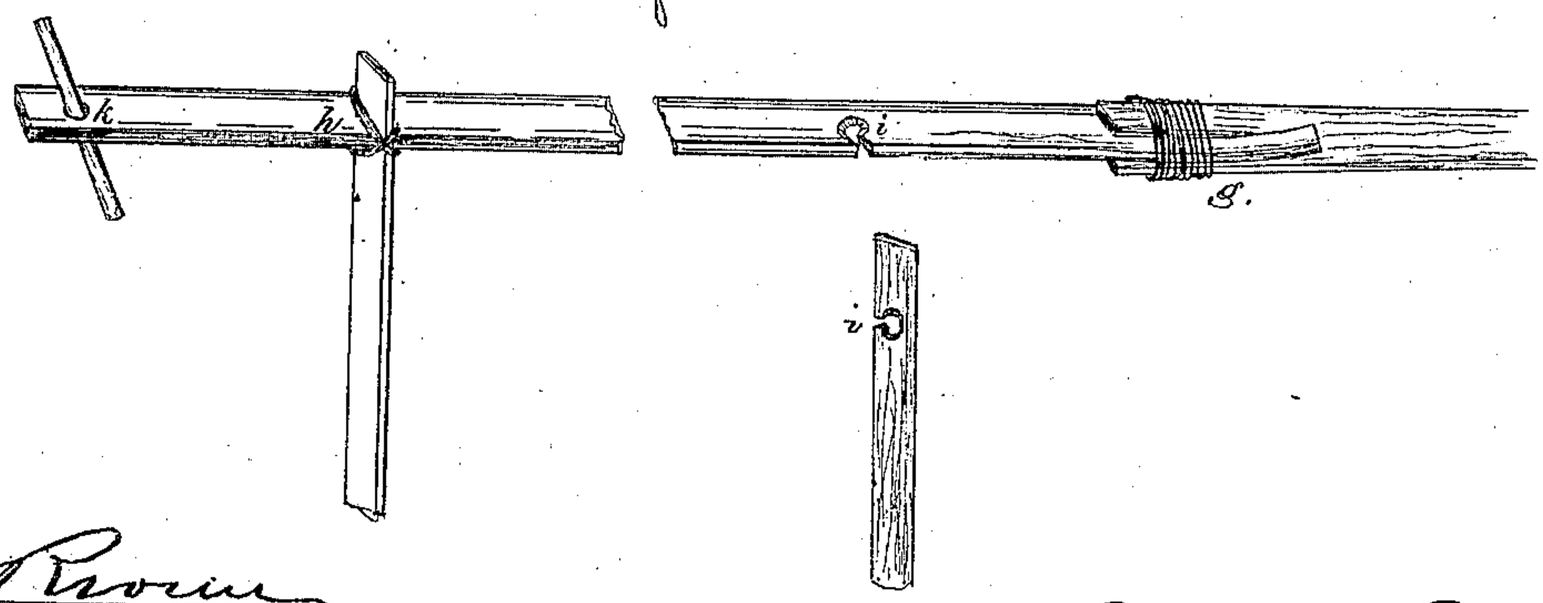


Fig. 5.



Witnesses.

E. H. Thorne

Lemuel W. Serrell

Edwin Gomez

UNITED STATES PATENT OFFICE.

EDWIN GOMEZ, OF NEW YORK, N. Y.

IMPROVEMENT IN THE CONSTRUCTION OF TRAINS OR FUSES.

Specification forming part of Letters Patent No. **34,057**, dated January 7, 1862.

To all whom it may concern:

Be it known that I, EDWIN GOMEZ, of the city and State of New York, have invented, made, and applied to use a certain new and useful Improvement in Trains or Safety-Fuses; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, wherein—

Figures 1, 2, and 3 represent the various ways in which the parts composing my safety-fuse may be combined, and Figs. 4 and 5 illustrate the mode in which the lengths of fuse are to be connected and exploded.

Similar marks of reference denote the same parts.

My present invention relates to improvements upon and the details connected with the manufacture of safety-fuses; and I would here make reference to Letters Patent granted September 15, 1857, to Edwin Gomez and William Mills, as setting forth an explosive compound adapted to fuses and safety-trains, and which compound I make use of in the fuse herein set forth; and, also, I would refer to Letters Patent granted to me August 9, 1859, for means for folding a wrapping-paper, said means being used for folding a strip of paper inclosing the said explosive compound.

The nature of my said invention consists in the forming of safety fuses or trains in the form of a flattened strip or tape; also, in the manner of strengthening and protecting the said tape fuse by the introduction of longitudinal strings or cords and a serving or binding surrounding the same to keep the fuse and cords together; and for the purpose of rendering the fuse water-proof I apply a thin coating or covering of gutta-percha.

In order to connect the lengths of fuse to each other, or to make several branches from one main line, I notch or lap the fuse in such a manner that the powder contained therein shall come sufficiently in contact to insure an explosion.

In order that the general character of my safety-fuse may be fully understood and the application thereof become easy, I remark that the aforesaid-patented composition is of that instantaneous explosive character that I have practically demonstrated that a mile of said fuse will explode in four seconds of time, and that the flame travels some distance beyond the powder, so that the fuse will be operative even if breaks exist in the powder.

In the drawings, *a* is a strip of paper, folded up and containing the explosive compound, and this strip is to be compressed, so as to form the fuse into a tape or ribbon shape. This fuse requires to be strengthened and stiffened, in order that the paper may not become loose and open, whereby the powder would shake together, instead of remaining in a uniform and even layer throughout the fuse. I therefore apply a binding or serving of string or thread, as at *b* in Fig. 2; or a thin layer of gutta-percha, forming a complete envelope, may be made use of, as at *c*, Fig. 4. In order to put on this envelope of gutta-percha, the fuse is to be drawn through a hollow die, into which gutta-percha is to be pressed while melted. In most instances, for ordinary blasting and land operations the said covering of gutta-percha or the serving *b*, with suitable varnish, may be all that is required; but, in order to prevent the fuse breaking, particucularly when suspended or when placed in rivers or streams, or otherwise exposed to tension, I make use of one or more cords or strings, *d d*, running longitudinally of the fuse, as seen in Figs. 1, 2, and 3, and the serving *b* may be outside and inclosing the strings *d*, as in Figs. 1 and 3, or inclosed in and held by the gutta-percha envelope *c*, as in Fig. 2.

The fuse may be varnished, as at *e*, Fig. 1, or wrapped with a braided cover, as at *f*, Figs. 1 and 2, or both, the covering *f*, Fig. 2, being over the gutta-percha *c*, and may be coated with coal-tar or other material, thereby rendering the same especially adapted to submarine uses.

The mode of connecting lengths of this fuse or making branches from the same as required in blasting several charges simultaneously will be seen by Fig. 5. In this figure I have represented a lap or splice at *g*. In this case I cut the fuse at the ends, and place the ends together, as shown, simply binding the parts around to keep them together, and the explosion will pass this joint with unerring certainty.

By the use of a punch to cut out a notch or hole, as seen at *i i*, Fig. 5, the branch lines of fuse may be connected to the main line by

slipping notches into each other and tying them together, as seen at *h*, Fig. 5. The same mode of connection might be used in the general line of fuse.

Fine copper or other wires might be substituted for the springs *d d*, and inclosed, as specified.

To explode the fuse and avoid the cost of considerable lengths, as would be required in blasting, I perforate the tape fuse by a cutter or punch, as at *k*, and introduce an ordinary slow-match, the length of the same from the fuse regulating the time occupied in burning before the instantaneous explosion of the entire train through the agency of my fuse.

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

1. A flat or tape fuse formed of an explosive compound inclosed in a strip of folded paper protected by a winding of string in an envelope of gutta-percha or other suitable material.

2. The longitudinal strings or cords *d d*, in combination with the said flattened or tape fuse, in the manner and for the purposes specified.

3. The manner herein set forth of uniting lengths or sections of tape fuse by the notching or lapping, as specified.

In witness whereof I have hereunto set my signature this 26th day of August, 1861.

EDWIN GOMEZ.

Witnesses:
E. H. BROWN,
LEMUEL W. SERRELL.