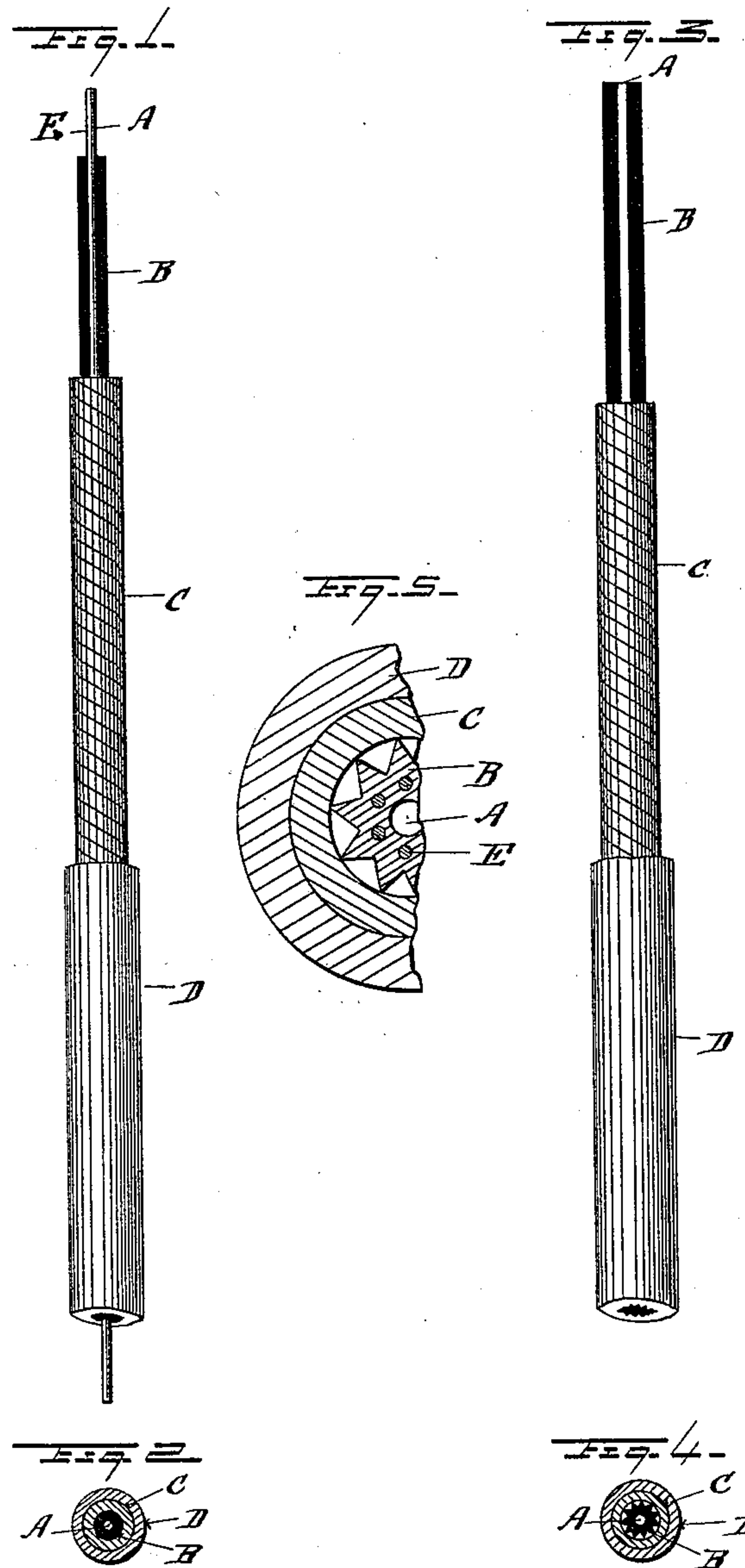


(No Model.)

J. WATSON.  
BLASTING FUSE.

No. 548,022.

Patented Oct. 15, 1895.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JAMES WATSON, OF LONDON, ENGLAND.

## BLASTING-FUSE.

SPECIFICATION forming part of Letters Patent No. 548,022, dated October 15, 1895.

Application filed November 30, 1894. Serial No. 530,466. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES WATSON, a subject of the Queen of Great Britain, and a resident of London, England, have invented certain new and useful Improvements in the Manufacture of Blasting-Fuses, of which the following is a specification.

This invention relates to igniferous fuses, generally termed "blasting-fuses," being such as convey fire to blasting charges in a safe manner and at a regular speed, which cannot explode or enter into combustion of themselves nor become a source of danger in any way, at any time, or under any circumstances.

The improvements are designed to supply such a fuse and are applied to that class of fuses in which the fuse-core is composed of a plastic composition manufactured into the form of the fuse while still in the plastic state and retaining its continuous form after manufacture of the fuse and having the requisite qualities of adhesion, combined with resiliency and sufficient elasticity to enable the fuse to be put to its ordinary use.

The improvements on this class of fuses consist, first, in a method or construction for cushioning the fuse-core while attenuating the material thereof, by which means the fuse is not liable to be fired by a blow and the emission of sparks through the fuse-covering is, owing to the attenuation of the core, reduced to a minimum; second, in combining with a plastic fuse-core a longitudinal textile thread or threads in intimate adherence with the material of the core and embedded therein, whereby a parting of the fuse-core is prevented.

In the annexed drawings the improved fuse is shown on an enlarged scale, Figure 1 being an elevation, partly in section, showing one form of the fuse; Fig. 2, a cross-section thereof; Fig. 3, an elevation, partly in section, of another form of the fuse embodying the same principles; Fig. 4, a cross-section of the latter fuse, and Fig. 5 an enlarged section thereof.

The method or means of cushioning and attenuating the fuse-core B consists in making the latter to form an annular continuous sheath for an interior cushion, so that the annular wall of the fuse-core B is cushioned between the interior cushion A and the exterior cushion C, which latter is formed by the ordinary textile covering surrounding the

fuse-core B. It is immaterial, so far as this part of the invention is concerned, of what the interior cushion A is composed. In Fig. 2 it is composed of atmospheric air. In Fig. 1 it consists of a thread or threads of textile material. The exterior cushion may also not consist wholly of the ordinary textile cover, but by corrugation of the exterior surface of the fuse-core B, whether spirally or in lines parallel to the axis, spaces are left, as shown in Fig. 4, in which air lodges inside the textile covering C, thus adding to the cushioning effect. The air used for cushioning in this manner will also assist the combustion of the core B when fired.

The second part of this invention, the longitudinal strengthening of the fuse-core B, is provided for by the insertion of a thread or threads longitudinally embedded in the material of the fuse-core and brought into intimate adherence therewith, so as to form a means of connection in a longitudinal direction between every portion of the continuous fuse-core. Such threads are represented in the enlarged section, Fig. 5, at E. Where the central cushioning-column consists of textile matter, as in Fig. 1, this matter can be made to fulfill the two purposes—namely, of a cushion and of a longitudinal connector, and it is then composed of a thread, yarn, or cord of sufficient size and strength, around which the plastic material of the fuse-core B is spread, preferably under pressure, to bring it into intimate contact and engagement with the fiber of the thread, yarn, or cord.

This invention may be carried out by subjecting the plastic composition of which the fuse-core is to be made to pressure in a vessel provided with a suitably-shaped outlet, so as to press it through said outlet in the form desired with or without a central cavity, as in Figs. 3 and 4, the embedded threads being drawn out through the said outlet; also, so that they issue therefrom embedded in the material of the fuse-core. Such central thread or cord may be in the first instance oxidized by being steeped in a solution of bichromate of potassium or other suitable bath and then dried before being drawn down through the plastic material.

My invention is applicable to any fuse-core material which is or can be made of a plastic



nature, and I purpose using the plastic material of the best and most suitable kind. I can use an igniferous compound made as follows: In thirty-eight parts, by weight, of nitroglycerine dissolve thirty parts of nitrocellulose, either by the application of heat up to 50° centigrade, kneading carefully, or by the addition of some of the known volatile solvents, such as acetate of ethyl, and carefully mix with the same thirty parts of very finely-powdered bichromate of potassium, adding two parts of vaseline to complete the compound and kneading the whole. By using it in an annular sheet, as it would be when spread around a central thread or cord, the liability to throw out sparks or flames through its outer coverings will to a great extent disappear. Additional cushioning should in every case be supplied in the shape of external coverings, beginning with textile yarns applied in spiral forms, as in Bickford fuse, with one or more external tapes added, where desired, and an incombustible varnish prepared with kaolin, ocher, or other similar earthy or mineral matter mixed with glue or the like may be spread over the outside, as shown at D.

By the improvements herein described I obtain great security against any effects of concussion, also against any breaking or interruption in the fuse-core, and by using a diminished quantity of the plastic material great relative cheapness of manufacture is attained.

I am aware that a thread has been drawn down through the outlet of the powder-hopper in all cases where the fuse is charged with grains of powder for the purpose of causing an even flow of grains from the hopper as the fuse-covering is being woven; but such

thread does not answer the purpose of the connecting-threads used in the present invention, since it is not in cohesion with the fuse-core, which, moreover, is in discontinuous granular form.

I therefore claim as my invention—

1. The combination with a continuous celluloidal fuse core of an interior cushion and an exterior cushion, substantially as set forth.
2. The combination with a continuous celluloidal fuse core of an interior cushion and an exterior cushion the latter of textile material inclosing air in cavities around said fuse core.
3. The combination with a continuous corrugated fuse core of an interior cushion and an exterior cushion thereto substantially as set forth.
4. The combination with an externally corrugated continuous fuse core of an interior cushion and an exterior cushion the latter of textile material inclosing air in the cavities of said corrugations substantially as set forth.
5. The combination with a fuse core composed of celluloidal paste of a textile thread or threads embedded longitudinally within and in adhesion with the material of said fuse core substantially as set forth.
6. The combination of a thread or threads, a tubular fuse core of continuous celluloidal paste surrounding said thread and in adhesion therewith and an outer textile covering substantially as and for the purpose set forth.

In witness whereof I have signed this specification in presence of two witnesses.

JAS. WATSON.

Witnesses:

H. J. HADDAN,  
A. E. MELHUISE.