

UNITED STATES PATENT OFFICE.

MAX BIELEFELDT, OF WITTENBERG, GERMANY.

BLASTING-FUSE.

SPECIFICATION forming part of Letters Patent No. 579,786, dated March 30, 1897.

Application filed April 29, 1896. Serial No. 589,566. (No model.)

To all whom it may concern:

Be it known that I, MAX BIELEFELDT, doctor of philosophy, a subject of the German Emperor, residing at Wittenberg, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Fuses Propagating the Inflammation without the Appearing of a Flame; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

A principal drawback to fuses or match-cords as at present employed consists in that they burn with a flame, whereby fire-damp is liable to be exploded.

As additions of materials to the fuses for the purpose of reducing the intensity of the flame afford no guaranty for the safety against such ignition, quick-burning fuses have recently been prepared which consist of a fuse-thread contained within igniting materials. These fuse-threads contain unprepared textile fibers—for instance, cotton, jute, &c.—which are dusted over with readily-burning solid substances and pulverized substances, such as ground tin-fer, lycopodium seeds, resins, combustible salts, and oxygen-carriers. These fuses, however, do not afford perfect security for a safe transmission of the combustion. On the other hand, perfectly safe fuses or match-cords are obtained according to the present invention by taking threads or cords consisting of ordinary fibers that have not been chemically altered or consisting of nitrated fibers and impregnating the same with an oil and then adding salts or compounds which produce a diminution of the flame or which entirely prevent its formation. It is necessary for the security of such fuses to employ a drying-oil, such as linseed-oil, poppy-seed-oil, or the like. A further necessary condition is that if it be desired to completely prevent the production of flame it is necessary to add to this mixture salts or substances that are capable of preventing the formation of a flame. Suitable salts for this purpose are those which have a large proportion of water of crystallization, such as sulfate of magnesia, crystallized soda, alum, borates, ammonia salts, and sulfate of ammonia.

The fuse-threads prepared as above de-

scribed can be manufactured into fuses either by embedding the same in a combustible compound, such as gunpowder, or by merely winding them around with a covering of jute or the like, so that a fuse of the kind known as the "Bickford" fuse is produced.

For the production of the fuse it is not necessary to employ the said thread as such in the fuse, as nitrated cellulose granules can be used in the same way as gunpowder for the manufacture of the fuses. The thread of the fuse can also be produced by preparing a mixture of nitrated and non-nitrated cellulose and then treating the same with oils and salts in the manner above described.

For increasing the security of ignition while still preventing the production of a flame the addition of diazo compounds of the benzol series and the naphthalene series has proved advantageous.

In particular diazobenzolsulfonic acid, as also its salts, the chromium and bromin compounds, have proved suitable. For suppressing flame in fuses or preventing the production thereof it has proved advantageous to add to the above substances glue or substances containing albumen or similar bodies. The glue and albumen substances can either be used together or separately and either in a solid or liquid condition.

The kind of albuminous bodies and the form in which they are applied are immaterial. The suppression of flame is brought about by the fact that the said substances burn with difficulty and are carbonized without the production of flame.

If it is desired to render the fuses proof against moisture as well as against explosion of fire-damp, it is advisable to use chromium glue, which is exposed to the light after admixture with the other substances, whereby it is rendered impervious to moisture and consequently also renders the fuse waterproof.

The above-named substances can either be prepared separately or together for the formation of fuses.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is—

1. An improved manufacture of fuses and match-cords which consists in impregnating

a fiber with a drying-oil and a salt having high percentage of water of crystallization with diazo compounds and with albuminous bodies.

5 2. An improved manufacture of fuses and match-cords which consists in impregnating a fiber such as guncotton, with a drying-oil and a salt having high percentage of water of crystallization with diazo compounds and
10 with albuminous bodies.

3. An improved manufacture of fuses and match-cords which consists in impregnating a fiber, consisting of granulated guncotton, with a drying-oil and a salt having high percentage of water of crystallization with diazo
15 compounds and with albuminous bodies.

4. An improved manufacture of fuses and match-cords which consists in impregnating a fiber, consisting of granulated guncotton,
20 with a drying-oil and a salt having high percentage of water of crystallization, with diazo

compounds of the benzol series and with albuminous bodies.

5. An improved manufacture of fuses and match-cords, which consists in impregnating
25 a fiber, consisting of granulated guncotton, with a drying-oil and a salt having a high percentage of water of crystallization, with diazo compounds of the benzol and naphthalene series and with albuminous bodies. 30

6. A fuse composed of readily-burning material impregnated with a drying-oil, such as linseed-oil, and treated with a substance operating to suppress flame, such as sulfate of
magnesia, substantially as set forth. 35

In testimony whereof I have affixed my signature in presence of two witnesses.

MAX BIELEFELDT,

Witnesses:

JOHN B. JACKSON.

MAX WAGNER.