March 12, 1929. J. FRITZSCHE 1,705,360

SAFETY FUSE AND METHOD OF MANUFACTURING THE SAME

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Fig. 1

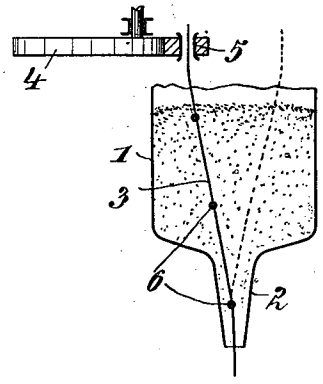


Fig. 2

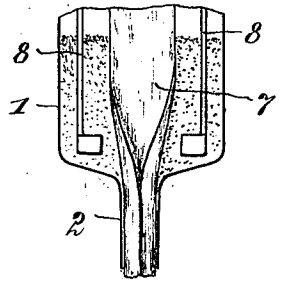
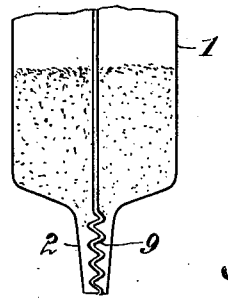


Fig. 3



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SAFETY FUSE AND METHOD OF MANUFACTURING THE SAME.

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My invention relates to safety fuses and the method of manufacturing the same.

Safety fuses for blasting purposes as heretofore manufactured consist of a core and a filament covering for such core, a wrapper and a sheath surrounding such wrapper being interposed if desired between the core and the filament covering.

In the safety fuses heretofore manufactured the core consists of ordinary gun powder which is a composition containing about 10% by weight of sulphur, 14% by weight of charcoal and 76% of saltpeter or nitrate of potassium, the constitutents being finely powdered and intimately mixed, then moistened, pressed, dried, and granulated. Finally the grains may be coated with graphite. Thus the powder comprising the core is a homogeneous mass of grains, each grain being like every other grain, but each grain being composed of an intimate mixture of all of the elements and compounds which constitute the powder.

Safety fuses as heretofore manufactured with such gun powder cores are however open to a series of objections.

First of all the feed of the gun powder to the narrow nozzle through which it has to pass to form the core meets with difficulties resulting in irregularities of the core. In some parts of the core the gun powder grains are only in loose contact with each other and in others they are tightly compressed, so that the core does not burn regularly whereby the reliability of the safety fuses as heretofore manufactured is greatly impaired. Furthermore the manufacture is dangereous as explosive gun powder has to be dealt with throughout.

The object of my invention is to provide a safety fuse and a method of manufacturing the same whereby the aforesaid objections are obviated.

With this object in view my invention consists in promoting the feed of the granular core mass, consisting of discrete grains of any definite size, however small, to and through the nozzle by properly agitating the core mass on its way from the container to the nozzle and through the nozzle attached to such container. Thereby I am also enabled to use a granular core mass composed of a uniform heterogeneous mixture of discrete grains, the agitation preventing any disturbance of the uniformity of the mixture.

For facilitating the understanding of my invention I have illustrated in the annexed drawing by way of example a few ways of carrying it into practice. I wish it, however, to be understood that the mechanisms shown in the drawing do not form part of my invention.

Figs. 1, 2 and 3 are diagrammatical sections of mechanisms for carrying into practice my invention. 1 is the container for the core mass composed of discrete grains and 2 is the nozzle attached to such container. 3, Fig. 1, is a thread or wire passing through the granular core mass in the container and through the nozzle along with the core mass flowing through the nozzle, thus serving to feed the core mass through the nozzle. In order to agitate the core mass in the vicinity of the nozzle and thereby to secure a perfect uniformity of the core mass escaping from the nozzle I impart to the thread or wire an additional, for instance, a reciprocating movement perpendicular to the axis of the nozzle either by imparting to such thread or wire a to and fro movement by means of a cam 4 acting on the guide 5 of the thread or wire, or by rotating the guide 5 around an axis excentric thereto and coinciding with the axis of the nozzle so, that the thread or wire moves between the extreme positions indicated in full and dotted lines in Fig. 1. In some cases instead of an additional movement I may provide the thread or wire with knots 6 for breaking any bridges formed by the core mass in the nozzle or in its vicinity. The movement of the thread or wire agitates the granular core mass whereby its feed through the nozzle is promoted and any choking of the nozzle is prevented.

In Fig. 2 I have substituted for the thread or wire 3 shown in Fig. 1 a paper strip 7, passing through the container and the nozzle, such strip forming a wrapper for the core mass in the safety fuse. As the strip moves towards the nozzle it feeds the core mass thereto and in order to agitate the core mass in the container so as to promote such feed I provide in the container near the nozzle rotary agitators 8, tending to facilitate the feed of the core mass towards the nozzle.

In Fig. 3 I dispense with the thread or wire 3 and with the strip 7 and the agitators 8 and provide in the nozzle 2 a helically wound wire 9, which is rotated in any suitable way so as to act as a feed screw for the core mass and agitate the latter at the same time.

I do not limit myself to the precise methods

of agitating the core mass and I wish it to be understood that the core mass may be agitated in any other suitable or preferred manner provided the agitation promotes the feed of the core mass to and through the nozzle, I may use for this purpose a difference of air pressure within the container and outside the nozzle.

After the core mass has left the nozzle with or without a wrapper as the case may be it is provided with a filament covering in the usual way. This, however, does not form part of the present invention.

By thus agitating the granular core mass and promoting the feed through the nozzle I am enabled to use a core mass differently constituted from that heretofore employed in safety fuses. Although the core mass heretofore used has been composed of like grains each grain contained all of the elements or compounds required to constitute the powder of which the core is formed. Where my invention is employed it is possible to use discrete grains, each grain being composed, for example, of but a single ingredient entering into the composition of the core mass. For instance I may use a mixture of grains of charcoal and saltpeter with or without the addition of sulphur. The grains of different nature may either be mixed before filling them into the container or they may be supplied separately to the container, the agitation of the grains hereinbefore referred to securing an intimate mixing of the different grains before or while they pass through the nozzle.

I thereby secure various advantages, as for instance with grains each of which is composed of but a single ingredient of the core mass. I may select the proportions of the ingredients as circumstances may require, for instance discrete heterogeneous grains of gun powder of different kinds and grades. Furthermore I prefer to enclose the core mass in a wrapper or in a wrapper and a sheath of paper or similar material little pervious to gases, whereby accidental escape of sparks or flames from the safety fuse is prevented and at the same time the pressure within the burning safety fuse is increased to an extent sufficient for causing the flame at the end of the safety fuse connected to the cartridge or detonator to be projected so vigorously that the ignition of the cartridge is effected with certainty. Moreover the wrapper has for its effect that the safety fuse having a core mass consisting of discrete grains none of which contains all of the ingredients of the core mass burns better. Finally if a core mass consisting of discrete grains is used, each grain comprising a single ingredient of the core mass, the danger of explosion before the manufacture of the safety fuses is entirely obviated, as the ingredients may be kept on store without danger and manipulated separately up to the moment when they are charged into the container.

What I claim is:

1. A method of manufacturing safety fuses comprising feeding a core composed of discrete grains to a nozzle agitating the core mass in proximity to and within the nozzle to promote its movement through the nozzle, and surrounding the mass with a wrapper of thin flexible material as it passes through the nozzle.

2. A method of manufacturing safety fuses comprising mixing in desired proportion discrete homogeneous grains, into a heterogeneous mass feeding the mass to a nozzle agitating the mass in proximity to the nozzle, thus promoting the movement of the mass through the nozzle, and surrounding the mass with a wrapper of thin flexible material as it passes through the nozzle.

In testimony whereof I have affixed my signature.

JOHANNES FRITZSCHE.