P. CASTELLANOS.

DEVICE FOR EXPLODING MINING POWDER.

No. 193,485. Patented July 24, 1877.

Fig. 1.

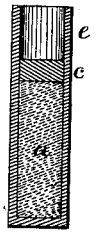


Fig. 2.

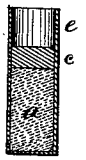
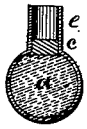


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

PRUDENCIO CASTELLANOS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN DEVICES FOR EXPLODING MINING-POWDERS.

Specification forming part of Letters Patent No. **193,485**, dated July 24, 1877; application filed January 8, 1877.

To all whom it may concern:

Be it known that I, PRUDENCIO CASTELLANOS, of the city and county of San Francisco, State of California, have invented a new and useful Improved Device for Exploding Mining-Powders, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The object of this invention is to produce a quick and strong shock by means of the explosion of a percussive powder confined in a solid case of paper, pasteboard, copper, or of any other equivalent resistive material. This device is used to explode certain classes of mining-powders that are detonated by percussion, and I call it "percussive petard," a detailed description of which is as follows:

In Figure 1 is represented a vertical section of the paper or pasteboard petard. This consists of a small rocket-cartridge, closed at the lower extremity, and filled up to about two-thirds of its capacity with a percussive powder, *a*, in the form of grains, and in the quantity of from ten to sixteen grains in weight. The composition of this powder will be given hereinafter. Said powder is retained by a top or cover of quick-match, or of powder in paste, *c*, which prevents the grains from escaping or running out of the cartridge when it is inverted. The space *e* is empty, and serves to insert in it the end of the fuse which is to give fire to the charge that is contained in the petard when this is used. Figures 2, 3, and 4 represent vertical sections of petards of thin copper or other equivalent metal. Said petards have the form of a capsule or cartridge, Fig. 2, a vial, Fig. 3, or a matrass, Fig. 4, and are charged and stopped in the same manner as the pasteboard petard already described.

The percussive powder which is contained in these petards is of my invention, and was the object of an application for Letters Patent allowed the 8th of September, 1876; but I have found that other powders, composed principally of chlorate of potassium and a picrate, picramate, metapurpurate, &c., are percussives when they are in the form of grains, and accordingly the first-class powders invented by Messrs. Designoble and Casthelaz, and patented the 31st of March, 1868, can be used to charge these petards. Horseley powder (a mixture of chlorate of potassium and galls) can also be used, (previously granulated;) but I find it of less percussive force than that of Designoble's, and the latter ought to be used.

The device described is designed to effect the explosion of the mining-powders of my invention. To this effect the petard is put in contact or is inserted in the mass of mining-powder, and it is fired by means of a fuse inserted in it, as has already been described. The gases which result from the explosion of the powder contained in the cartridge or vase burst it to pieces, and escape with great violence, producing a strong percussion that effects the explosion of the mining-powder.

The percussive petards of paper or metal, of any form whatever, are equally efficient for the use indicated; but those of those of paper or of pasteboard are less dangerous in fire-accidents than those of metal, because the greater part of the cartridge is burned away before the charge takes fire, and in this condition the explosion and percussion are less intense. However, the use of the metallic petards is preferable in some cases—mining under water, for example.

These petards can be used for the explosion of giant and other similar powders, in place of the percussion-caps loaded with fulminate of mercury, that are generally used for this purpose, and from which occur frequent and disastrous accidents. My petards are not dangerous, because the powder contained in them is less easily exploded than the fulminate of mercury, and is not compressed inside the tube. For these reasons they do not explode intempestively by any light shock, or by compression, as the percussion-caps. The petards explode by heat or fire, but less easily than the percussion-caps, especially those of pasteboard.

My petards will be found very similar to other articles already known, and it is indispensable to relate here the exact distinction between them.

a. The percussive petard of pasteboard differs from the fire-crackers, in that the former is loaded with a percussive powder, and the latter, on the contrary, contain common black powder, and for this reason their explo-

sion makes a noise only, without striking or effecting the explosion of the mining-powders referred to.

b. It is well known that for the explosion of nitro-glycerine large wooden or tin or pasteboard petards are used, loaded with gunpowder, in quantity of from one-third to one-fourth of an ounce. These petards, whose explosion occasions an emission of hot gases and a commotion, (not percussion,) have been experimented with for the explosion of dynamite, and have been found unprofitable in practice, on account of their large bulk, weight, and cost, and also because their action is uncertain, occasioning frequently the combustion of the dynamite without explosion. The petards which I propose are small and light, containing a small quantity of very percussive powder in grains, and do not burn the nitro-glycerine powders without exploding them.

c. A class of percussion-caps are known, equal in form to the petard, Fig. 2, loaded, as are all my petards, with a powder composed of chlorate of potassium, picrate, &c. The essential difference between both articles consists in the condition in which the charge is placed in each one of them. My petards, containing said powder in grains, make a very percussive explosion by contact with the fire of the fuse, but cannot be used as percussion-caps for fulminating-arms or artillery, because they do not detonate by an ordinary shock. The aforesaid percussion-caps are, to the contrary, very fulminating by shock, because the powder contained in them is heavily compressed in the tube, and for this reason they do not produce a percussive explosion when they are ignited by means of a fuse, and I have found that they are useless for the explosion of nitro-glycerine powders, which they only ignite without exploding them.

d. The petards of pasteboard, Fig. 1, and those of copper, Figs. 2 and 3, have the same form as certain cartridges for the loading of fire-arms. However, neither of said petards can be applied to this use, because the powder contained in them is so powerful that its explosion would burst the barrel, and its use would be very dangerous.

I claim as my invention—

The percussive petard here described, as an improved device for exploding mining-powders which fulminate by percussion, the same consisting in a small cartridge or vase of paper, copper, or of other equivalent material, charged, in part, with a percussive granulated powder, composed of chlorate of potassium and a picrate, and with a top of quick-match or its equivalent, the same vase having an empty space to receive a fuse to fire it, constructed and adapted for use substantially as described.

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Witnesses:

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