P. CASTELLANOS.

BLASTING-CARTRIDGE.

No. 193,483. Patented July 24, 1877.

Fig. 1.

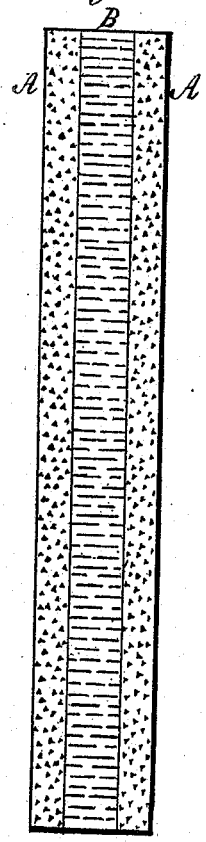


Fig. 3.

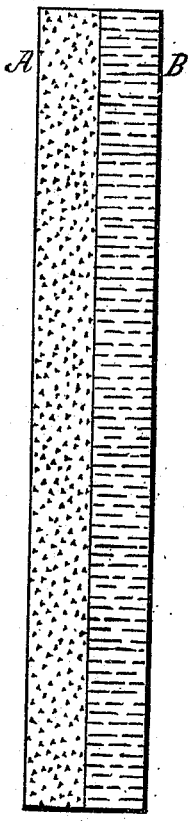


Fig. 5.

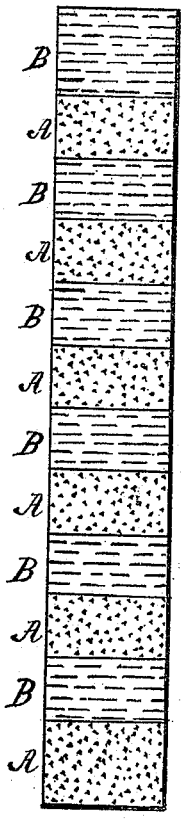


Fig. 2.

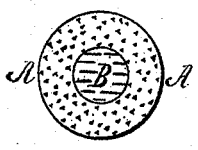
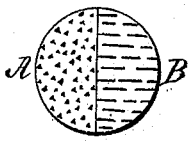


Fig. 4.



Witnesses;
I. de Arrieta
M. J. Aguirre

Inventor;
Prudencio Castellanos.

UNITED STATES PATENT OFFICE.

PRUDENCIO CASTELLANOS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN BLASTING-CARTRIDGES.

Specification forming part of Letters Patent No. **193,483**, dated July 24, 1877; application filed December 19, 1876.

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 Improvement in Cartridges for Blasting, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The object of this invention is to augment the power of a mining-powder which has for its base nitrate of sodium. I accomplish the firing of it by means of another explosive mining-powder, which is fired by percussion.

The invention consists of a cartridge whose interior capacity is divided into two or more compartments, filled with two different mining-powders.

The exterior of the cartridge is formed of two or three envelopings of paper, greased or varnished like the ordinary mining-cartridges, and the interior compartments are divided simply by a single leaf of the same paper. The cartridge is, in exterior form and dimensions, equal to the ordinary ones, and its interior form is shown in Figures 1 and 2, and 3 and 4, which represent vertical and horizontal sections of two cartridges, loaded in the following manner: The compartment A is filled with pyronome, (which is a well-known powder composed of nitrate of sodium, tan, and sulphur,) invented in France in 1861, by M. Reynaud, which is known to be explosive neither by percussion nor by fire in the open air. This should be used in the form of hard grains. The compartment B is loaded with a composition explosive by percussion, containing nitro-glycerine, like the "giant," the "Hercules," and other powders, and also some of the mining-powders invented by me. Powder of the second grade should be preferred, or such as contains nitrates of sodium or of potassium. The cartridge is enveloped in an impermeable covering, which protects it from dampness, and which I have invented to preserve the explosiveness of the hygrometric powders and the hardness of the grains, which invention is the object of a separate application for Letters Patent.

When a cartridge is confined in a bore-hole, and the powder of compartment B is caused to explode, the heat produced by this explosion inflames the powder in compartment A with great velocity, and causes it to explode with much more force than any other known system of firing can do.

The relative capacity of the compartments of the cartridge, Figs. 1 and 2, may be varied by the compartment A containing an equal amount, or double, or triple, or quadruple, &c., the quantity of powder contained in compartment B.

The cartridge Figs. 3 and 4 contains equal quantities of the two kinds of powder referred to before, as the compartments have the form of a half-cylinder. By giving the compartment B the form of a third or a fourth of a cylinder, enlarges the capacity of compartment A.

The cartridges may have many other forms, and also a greater number of compartments; but I find the forms of the cartridges described above more advantageous.

Fig. 5 represents a vertical section of a cartridge with many compartments, loaded with powder.

In the loading of the cartridges, the pyronome may be replaced by other powder in hard grains which has nitrate of sodium or nitrate of potassium for base—for example, ordinary gunpowder; but in that case the cartridges would be explosive by the action of fire, and would be more expensive.

The cartridges must be used in place of the black powder to load bore-holes, in the following manner: The cartridge is uncovered at one end, so as to expose the powder in compartment B. The cartridge is then introduced down to the bottom of the bore-hole, and then a fuse with a percussive petard or percussion-cap attached to its end, which must remain in contact with the powder, is introduced after the cartridge, and the hole is filled with earth, which must be compressed lightly.

I have found that many compounds of nitro-glycerine which are not explosive, because they contain but a small quantity of it, may be exploded in my cartridges—as, for example, a mixture of chalk with fifteen or twenty per cent. of nitro-glycerine does not explode with percussion-caps which are used to explode nitro-glycerine powders, but loading with the same composition the compartment A of one

of my cartridges, especially that of Figs. 1 and 2, and the compartment B with some very powerful powder, as, for instance, the "giant," the composition of chalk will explode entirely, if the cartridge is used as has been explained above.

I claim as my invention—

The improved cartridge for blasting or other similar purposes here described, consisting in an ordinary paper cartridge, having various interior compartments, loaded with two different mining-powders, which are pyronome in grains, or another powder of this class, inexplosive for percussion, and "giant" or another powder explosive by percussion, constructed and operating substantially as and for the purpose specified.

PRUDENCIO CASTELLANOS.

Witnesses:

M. J. AGUIRRE,

I. DE URIOSTE.