No. 625,380. Patented May 23, 1899.

E. S. CLARK.

TAMPING PLUG AND PROCESS OF AND APPARATUS FOR MAKING SAME.

(Application filed Mar. 21, 1898.)

(No Model.)

FIG. 8.

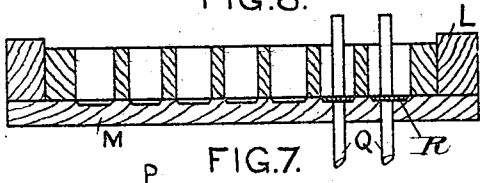


FIG. 7.

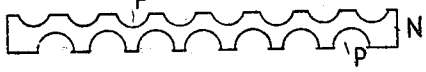


FIG. 9.

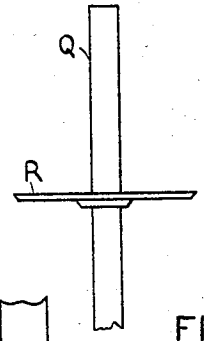


FIG. 2.

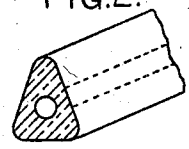


FIG. 3.

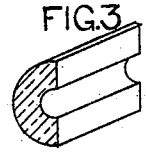


FIG. 6.

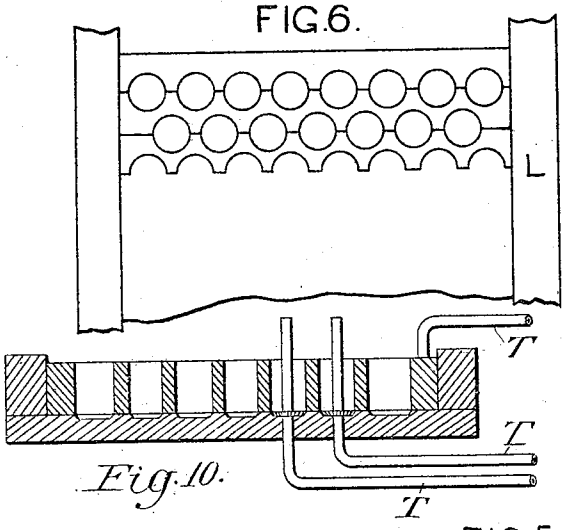


Fig. 10.

FIG. 1.

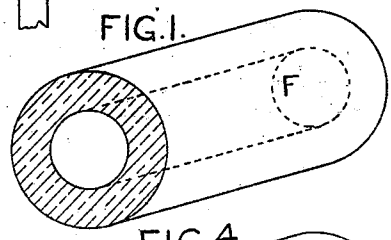


FIG. 4.

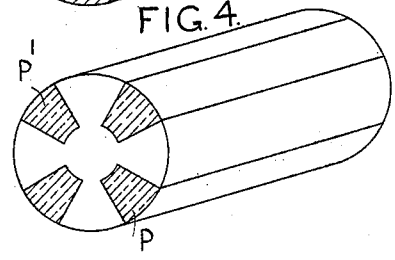
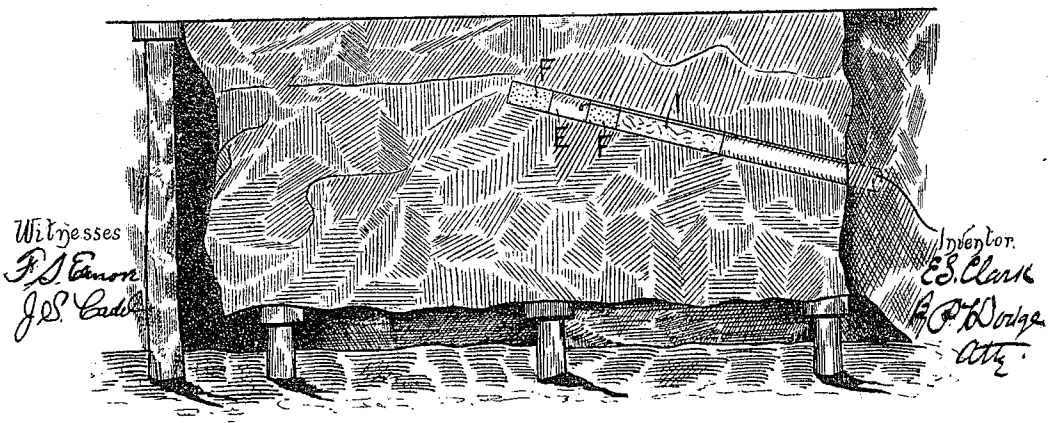


FIG. 5.



Witnesses
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UNITED STATES PATENT OFFICE.

EDWIN S. CLARK, OF OAK ALYN, ENGLAND.

TAMPING-PLUG AND PROCESS OF AND APPARATUS FOR MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 625,380, dated May 23, 1899.

Application filed March 21, 1898. Serial No. 674,631. (No model.)

To all whom it may concern:

Be it known that I, EDWIN STANLEY CLARK, a subject of the Queen of Great Britain, residing at Oak Alyn, near Wrexham, in the county of Denbigh, England, have invented certain new and useful Improvements in the Manufacture of Blocks of Saline Material for Use in Explosives, (for which I have applied for a patent in England, No. 20,223, dated September 2, 1897,) of which the following is a specification.

This invention has for its object the manufacture of a device for increasing the force of an explosive and at the same time reducing or neutralizing the free acid products of nitrocellulose or glycerine compounds, the deleterious fumes and smoke of gunpowder and the like and extinguishing the flame and lessening the heat of the explosion.

The invention also relates to apparatus for manufacturing the same.

Referring to the drawings, Figure 1 is a cylinder of salt, hereinafter described, used in mining operations, open at both ends; Figs. 2, 3, and 4, slight modifications of design set forth in Fig. 1; Fig. 5, a section of a part of a coal-mine, showing a charge ready for firing; Fig. 6, a tray of molds and molding-bars; Fig. 7, bars separating the molds; Fig. 8, a longitudinal section showing molds and core-tubes; Fig. 9, an enlarged view of core-tube and mold-bottom; Fig. 10, a longitudinal section of the mold, showing the steam-pipes for heating the parts.

Referring first to Fig. 5, F F are cylinders, similar to that shown on a larger scale in Fig. 1, and which represents a cylinder used in a bore-hole about one and one-fourth inches in diameter. In such I form the cylinder with a hole through the center of about five-eighths of an inch in diameter. E is the charge of gunpowder. The fuse comes up through the holes in the cylinders, which are open at both ends and not plugged, and then through the clay filling in the usual manner. I is the clay filling. These cylinders or prisms, Figs. 1, 2, 3, and 4, are composed of all or any of the highly-hydrated salts of the alkali metals, especially sodium. Mono-carbonate of soda, or a mixture of this with mono-sulphate of soda, is preferred. The ordinary mono-carbonate of soda, commonly known in England as "soda crystals," is what I have hitherto used and found satisfactory; but it is often desirable to add a little sulphate of soda to it to make it harder and one to two per cent. of ferric oxide.

In a mine where there is gas or inflammable dust, or both, the charge is well shown in Fig. 5. In such mines I use an amount of salt equal to about two-thirds the weight of the explosive, a short length of it being put occasionally behind the explosive, the rest being preferably in front, sometimes in a granular as well as solid form at option. In some cases the length of cylinder used is reduced, and radiating prisms of the hydrated salt are embedded in the charge in cartridges, as set forth in Fig. 4, in which P′ are the prisms. As, however, these salts are liable to slowly give up their water to surrounding objects unless the charge is to be used very quickly, it is desirable to coat the pieces of the hydrated salt inserted with the explosive with a waterproof paper, india-rubber, or other waterproof material.

The action of my material is as follows: The heat of the explosion liberates the water of crystallization, which is converted into steam by the heat of the explosion, thus adding to the explosive force by the addition of this superheated steam. Secondly, the sulphurous and nitrous fumes liberated by the explosion are taken up by the alkali of the salt, a proportionate quantity of carbonic acid being liberated. Thus the deleterious effects of the sulphurous and nitrous acids are obviated. The salt, too, has a remarkable effect in lessening the amount of smoke, it being almost unperceivable when compared with a similar weight of the same explosive fired off without my salt.

The mode of and apparatus for making the cylinders are set forth in Figs. 6 to 9. In these, L is a framework or tray; M, bottom bars thereof, forming a grid or tray; N, (depicted clearly in Fig. 7,) a series of bars filling up the space above the grid M. T T and T are pipes leading from any source of steam-supply, whereby steam can be admitted into the bars and the framework; P, semicircular holes cut out of these bars. These semicircles come together between each pair of bars, forming circular molds. Q (shown in larger size in Fig. 9) is a tube passing through the grid

at the bottom and having a plate R, brazed or otherwise fixed rigidly thereon, entirely filling up the bottom of the mold-holes P. The space P, surrounding the tube Q, is filled full of broken hydrated mono-carbonate of soda crystals and one or two per cent. of ferric oxide and with one or two per cent. monosulphate of soda added to harden the mass and cause the broken crystals to set together. A hot solution of mono-carbonate of soda or of sulphate of soda, or a mixture of the two, is poured in, and the trays are then rapidly cooled in any convenient manner. When they are thoroughly cold, steam or other heat is momentarily applied to the interior of tubes Q and to the bars P, which are made hollow for this purpose. The tubes Q, with their surrounding cylinders of salt, can now be lifted out and the salt-cylinders removed from them and left on a board to dry and harden. They are now ready for use.

I claim—

1. A tamping-block comprising fragments of a crystallized hydrated salt having a similar crystallized salt filling the interstices, and uniting said fragments, substantially as described.

2. As a new article of manufacture, a tamping-block consisting of a perforated cylinder of solid hydrated salt, substantially as described.

3. As a new article of manufacture, a tamping-plug of crystallized hydrated salt of such cross-section that when placed in a bore-hole there shall be free longitudinal passage-way for the products of combustion.

4. As a new article of manufacture, a tamping-plug consisting of a solid mass of crystallized hydrated salt having a longitudinal hole through the same of about five-eighths of an inch in diameter, whereby the flame and products of combustion are enabled to pass into the mass instead of blowing it out substantially as described.

5. A tamping-plug comprising a mass of crushed crystals of a mono-carbonate of an alkali metal, having a similar salt uniting the same, substantially as described.

6. The process of manufacturing tamping-plugs of solid crystallized masses of hydrated salt, which consists in pressing crushed crystals of the hydrated salt into molds, filling the interstices with a hot saturated solution of the said salt, allowing it to cool, and then heating the mold temporarily, whereby a film of the salt nearest the mold is fused and admits of the discharge of the block.

7. The improved apparatus for making tamping-plugs, which consists in a mold of interior contour corresponding with the exterior contour of the plug required, and a tube or tubes passing entirely through the mold parallel with the axis of the same, substantially as described.

8. The apparatus for manufacturing perforated plugs comprising a frame L, a series of bars N having semicircular grooves P, and tubes Q, substantially as described.

9. In apparatus for manufacturing tamping-plugs the combination with a mold, of means for heating the same on the outside, a tube passing through the mold and means for heating the same in a similar manner, substantially as described.

In witness whereof I have hereunto signed my name, this 14th day of February, 1898, in the presence of two subscribing witnesses.

EDWIN S. CLARK.

Witnesses:
H. P. SHOOBRIDGE,
JOHN MCLACHLAN.