

C. LAMM.
MOLD FOR EXPLOSIVE CHARGES.

No. 425,680.

Patented Apr. 15, 1890.

Fig. 2.

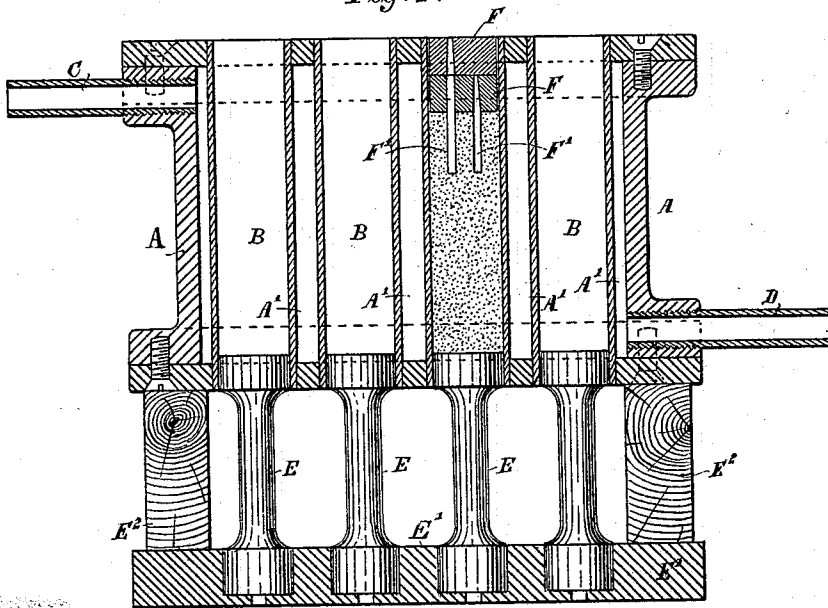
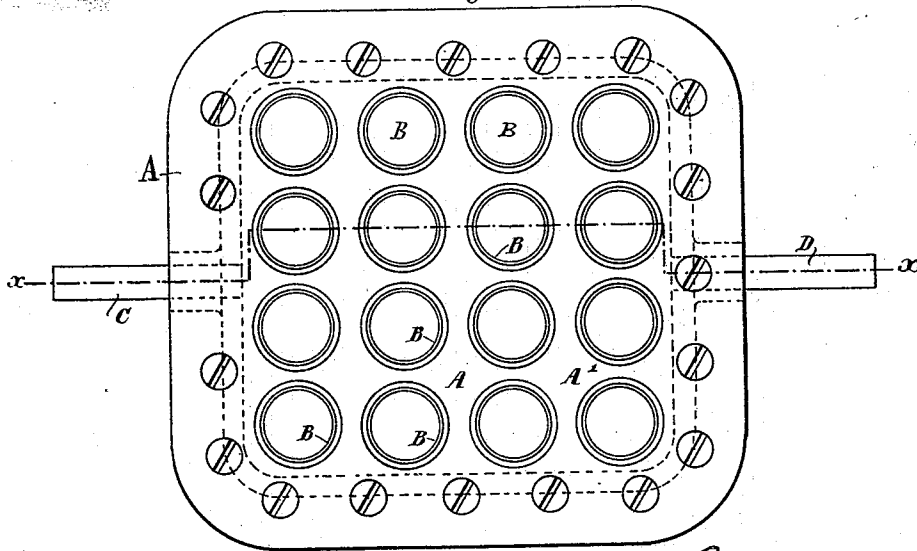


Fig. 1.



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Inventor:
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Attorney

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

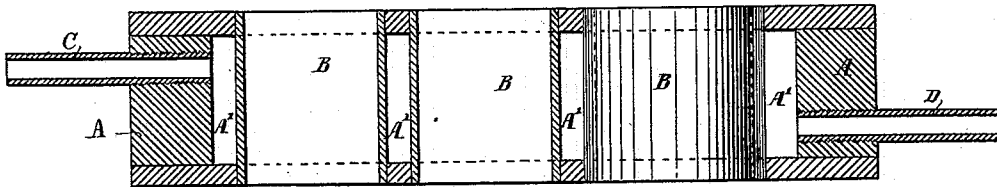


Fig. 5.

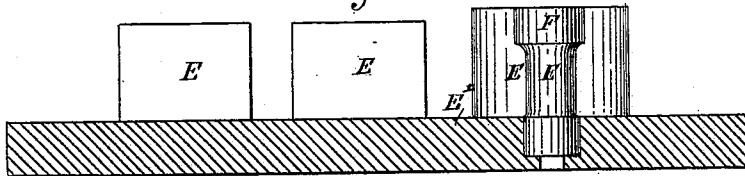
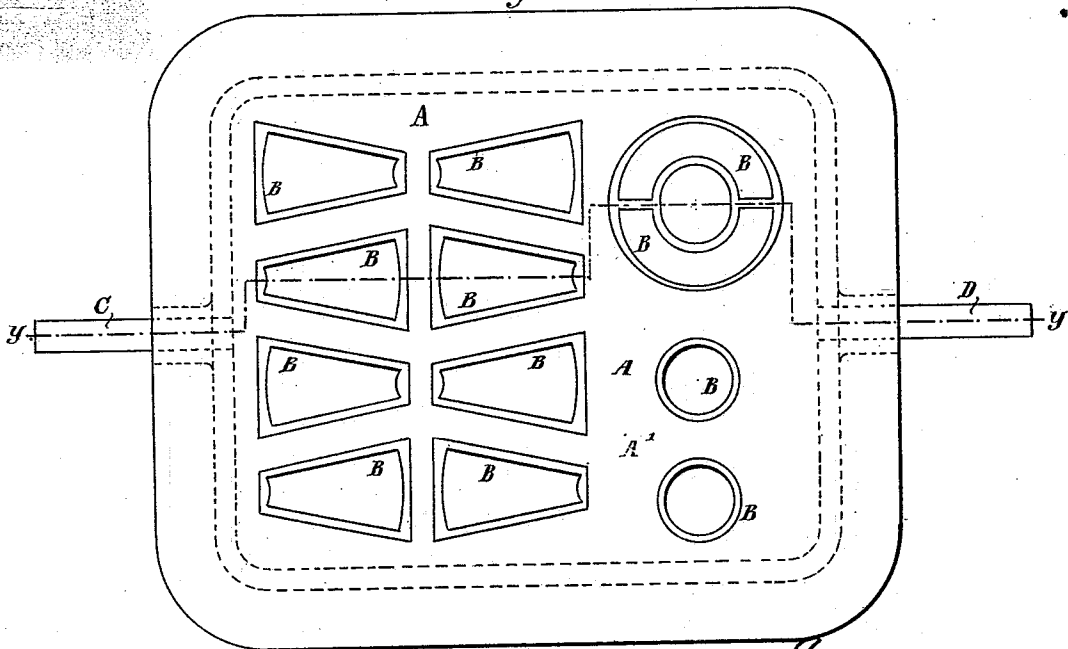


Fig. 3.



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UNITED STATES PATENT OFFICE.

CARL LAMM, OF STOCKHOLM, SWEDEN.

MOLD FOR EXPLOSIVE CHARGES.

SPECIFICATION forming part of Letters Patent No. 425,680, dated April 15, 1890.

Application filed November 26, 1889. Serial No. 331,657. (No model.) Patented in Sweden June 22, 1888, No. 1,591; in Belgium July 12, 1888, No. 82,539; in England August 15, 1888, No. 11,750; in France December 15, 1888, No. 194,785; in Italy December 18, 1888, No. 27,611/738; in Luxemburg December 18, 1888, No. 1,066; in Spain December 19, 1888, No. 9,064; and in Switzerland January 7, 1889, No. 271.

To all whom it may concern:

Be it known that I, CARL LAMM, manager of the Bellite Explosive Works, a subject of the King of Sweden, and a resident of Stockholm, Sweden, have invented new and useful Improvements in and relating to the Manufacture of Explosive Charges and Cartridges, (for which I have obtained patents in the following countries: Switzerland, No. 271, January 7, 1889; Great Britain, No. 11,750, dated August 15, 1888; Sweden, No. 1,591, dated June 22, 1888; Belgium, No. 82,539, dated July 12, 1888; France, No. 194,785, dated December 15, 1888; Italy, Nos. 27,611/738, dated December 18, 1888; Spain, No. 9,064, dated December 19, 1888; and Luxemburg, No. 1,066, dated December 18, 1888,) of which the following is a specification, reference be had to the accompanying drawings.

My invention relates to apparatus for the manufacture of explosive charges or cartridges.

In making an explosive charge or cartridge by means of apparatus constructed according to my said invention I take suitably-prepared pulverized explosive material, one or more of the ingredients of which are fusible, and I place the said material in suitable tubes, cells, or molds and subject it therein to the action of heat, thus causing the fusible particles of the mass contained in either of the said molds to melt and envelop the infusible particles thereof. The explosive material contained in the said molds is then cooled, thus forming solid blocks, charges, or cartridges of explosive material, which are then removed or ejected.

In the accompanying drawings I have shown how my said invention may be conveniently and advantageously carried into practice.

Figure 1 is a plan, and Fig. 2 a vertical longitudinal section, on the line xx , Fig. 1, showing one form of my improved apparatus. Fig. 3 is a plan of another form or modification of the said invention. Fig. 4 is a vertical longitudinal section on the line yy of Fig. 3, the movable bottom or plate of the box or case hereinafter described being removed. Fig. 5 is a front elevation, partly in longitudi-

nal section, showing the said movable bottom or plate and the pistons or plungers hereinafter described.

Like letters indicate corresponding parts throughout the drawings.

A is the box, case, or frame of the apparatus, which is provided with any suitable number of molds B. The said molds B extend through the bottom and top covers of the box or case A, in which they are fitted, so as to form tight joints therein. They are open at both ends, and are preferably formed slightly tapering—that is to say, slightly larger in diameter at the upper than at the lower end.

C D are pipes for the admission to and escape from the chamber or space A' around the molds B in the box or case A of steam, hot air, water, or the like for heating the apparatus.

E E are pistons or plungers supported upon a plate or frame E' and made to fit easily into and close the lower extremities of the molds B.

E² E² are blocks or supports for maintaining the plate or frame E' in such a position relatively to the box or case A that the said pistons or plungers E will be situated in the lower extremities of the molds B, as shown, while the latter are being filled with explosive material and subjected to the action of heat or cold, as hereinafter specified.

The upper extremities of the molds B are closed by means of loose covers F, provided with projections or pins F' for forming in the explosive material the holes for the caps or primers. Any desired number of such holes can be formed in each block or charge of explosive material by providing a corresponding number of the covers F, each provided with one projection or pin F'. When more than one hole is to be formed in each block, the said covers are placed one above another and the projections or pins upon the outer cover or covers project through holes provided in the inner cover or covers. By this arrangement when the molding of the explosive material forming the charge or cartridge is finished, the cover or covers F can be removed from the said charge or cartridge without damaging it, notwithstanding that

the said cover or covers require to be rotated for this purpose. To perform this operation, each of the covers F is rotated upon or about the axis of its pin or projection F' as soon as it is raised, in the manner hereinafter described, so as to be clear of the tube B, and the said pin or projection is thereby loosened in the explosive material.

The operation of the apparatus is as follows—that is to say, the molds B are filled with the prepared pulverized and partially-fusible explosive material, which is pressed down firmly therein, and the loose covers F are placed in position, so that the projections or pins F' will enter the said explosive material and form the holes for the caps or primers. Steam, hot air, hot water, or other heating medium is then admitted through the pipe C to the chamber or space A' in the box or case A and allowed to circulate around the molds B, thereby heating the latter and causing the fusible particles of the mass of explosive material to melt and envelop the infusible particles of the same. The supply of steam or other heating medium is then cut off and cold water is admitted to the said space A'. This causes the explosive material in the said molds B to set or solidify, so that the contents of each mold forms a solid block, charge, or cartridge, which can be forced out by the action of the plungers or pistons E. For this purpose the blocks E², which normally retain the said pistons or plungers in the lower extremities of the said molds, are removed and the pistons or plungers E are then pushed into the said molds B, and the charges or cartridges are thus pushed out or ejected. When the loose cover F is raised above the mold B, it is turned or rotated, as hereinbefore mentioned, before removal, in order to loosen or free the pin or projection F' in the explosive material. When two or more covers F are employed, each cover is rotated as soon

as it is clear of the mold, and the said covers are thus removed one by one without damaging the charge or cartridge.

Figs. 3 to 5 show a modification of my apparatus, wherein the cells or molds B are formed of various shapes.

It is evident that the cells or molds may be adapted for the manufacture of charges or cartridges of any desired shape, or for the manufacture of blocks of explosive material, to be afterward put together to form large charges for certain blasting operations.

What I claim is—

1. The herein-described cartridge apparatus, consisting of the open-ended tubes or molds B, having loose covers F inserted in their upper ends, the frame or case A, having a heating-chamber A' immediately surrounding said molds, the pistons or plungers E, inserted in the lower ends of the molds, the plate E', supporting said plungers, and the removable blocks E², located between the case A and plate E', substantially as described.

2. The herein-described cartridge apparatus, consisting of the open-ended tubes or molds B, the loose mold-covers F, having pins F' projecting into the molds, the case A, having a heating-chamber A' immediately surrounding the molds and provided with pipes C D for the admission and escape of the heating medium, the pistons or plungers E, inserted in the lower ends of the molds, the plate E', supporting said plungers, and the removable blocks E² between the case A and plate E', substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CARL LAMM.

Witnesses:

PERCY WOODWARD,
A. W. HEATH.