(No Model.) 2 Sheets—Sheet 1.

C. LAMM.

MANUFACTURING EXPLOSIVE CHARGES.

No. 435,842. Patented Sept. 2, 1890.

Fig. 2.

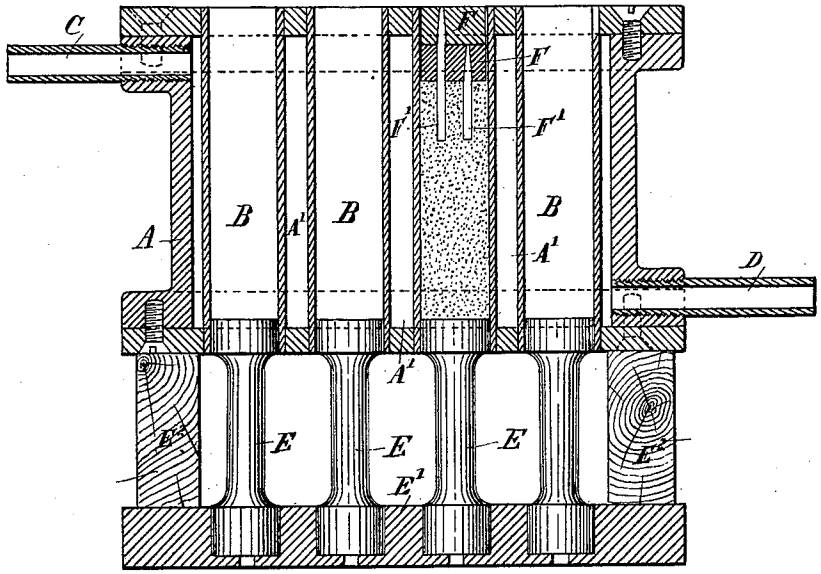
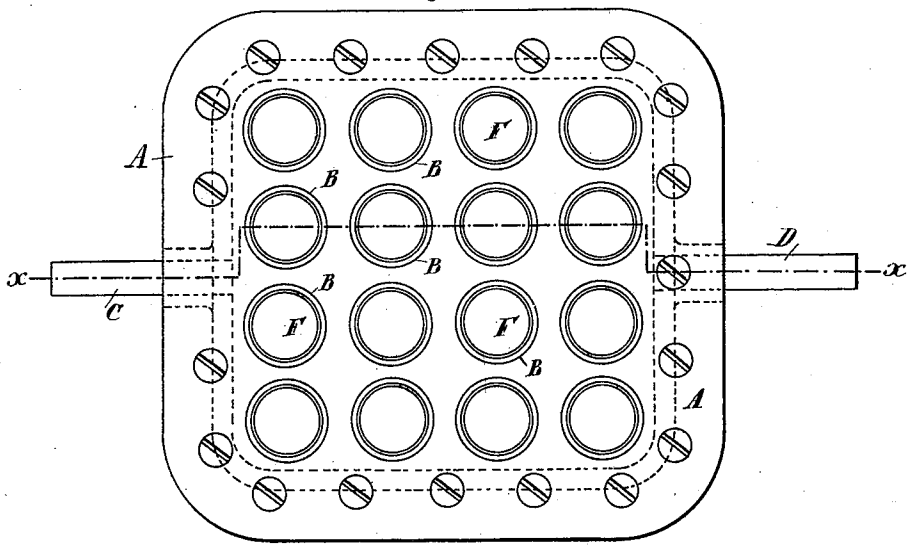


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

C. LAMM.

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Fig: 4.

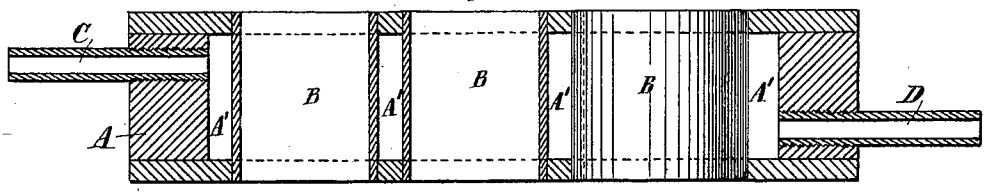


Fig: 5.

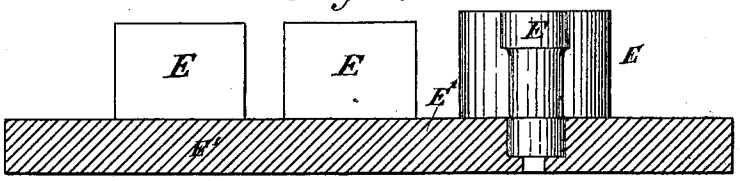
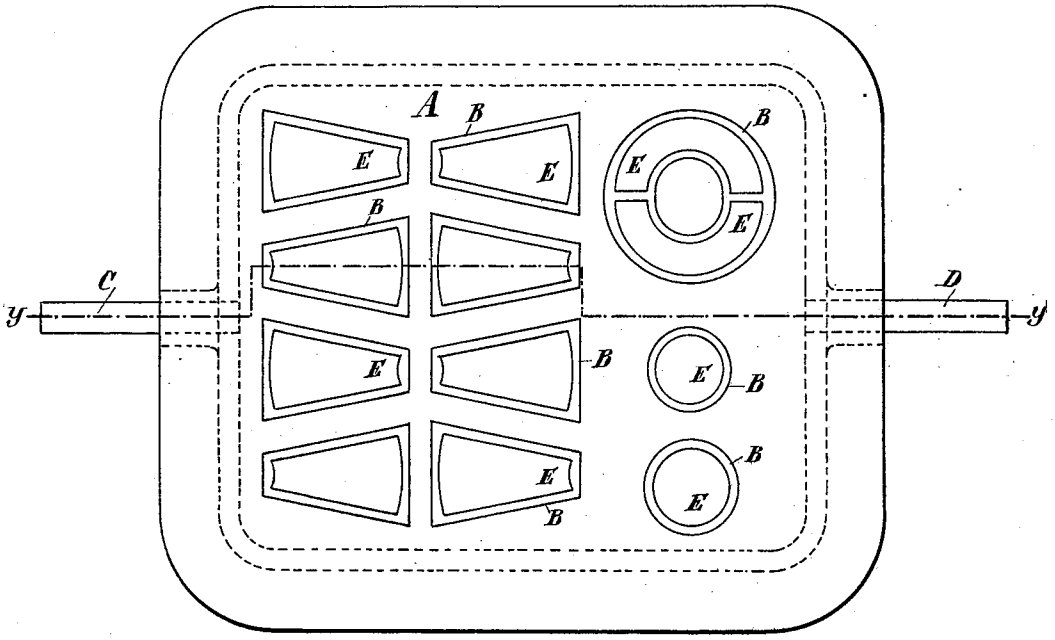


Fig: 3.



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UNITED STATES PATENT OFFICE.

CARL LAMM, OF STOCKHOLM, SWEDEN.

MANUFACTURING EXPLOSIVE CHARGES.

SPECIFICATION forming part of Letters Patent No. 435,842, dated September 2, 1890.

Application filed January 23, 1889. Serial No. 297,293. (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. 24,611/738; in Luxemburg December 18, 1888, No. 1,066; in Spain December 19, 1888, No. 9,064; in Switzerland January 7, 1889, No. 271; in Germany January 8, 1889, No. 48,282; in Norway May 28, 1889, No. 1,388, and in Austria-Hungary July 9, 1889, No. 51,580 and No. 30,169.

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 the Manufacture of Explosive Cartridges, (for which I have received patents in the following countries: 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, No. 24,611/738, dated December 18, 1888; Spain, No. 9,064, dated December 19, 1888; Luxemburg, No. 1,066, dated December 18 1888; Switzerland, No. 271, dated January 7, 1889; Germany, No. 48,282, dated January 8, 1889; Austria-Hungary, No. 51,580 and No. 30,169, dated July 9, 1889, and Norway, No. 1,388, dated May 28, 1889,) of which the following is a specification, reference being had to the accompanying drawings.

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

In carrying my said invention into practice I provide suitably-prepared pulverized partially-fusible explosive material or materials and place the said material or materials in suitable tubes, cells, or molds. The molds are then subjected to the action of heat, thus causing the fusible part of the mass of explosive material or materials contained in the said molds to melt and envelop the infusible particles of the same. The explosive material or materials contained in the said molds are then cooled, and the charges, cartridges, or blocks of explosive material thus formed are ejected from the latter.

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

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

Like letters indicate corresponding parts throughout the drawings.

A is the box, case, or frame of the apparatus. The box, case, or frame A is provided with any suitable number of tubes, cells or molds B. The tubes, cells, or molds B pass through the bottom and top covers of the box or case A, so as to form tight joints therein, and are open at both ends and slightly taper or larger at the upper ends than at the lower.

C D are pipes for the admission and escape of steam, hot air, water, or the like for heating the apparatus to and from a chamber or space A′, provided in the box or case A round the tubes, cells, or molds B. Pistons or plungers E, carried upon a plate or frame E′, are arranged to fit easily in the tubes, cells, or molds B and to close the lower extremities of the said tubes, cells, or molds B when the explosive material or materials are inserted into the latter. E^2 are supports for maintaining the said pistons or plungers E in position in the lower extremities of the molds B when the latter are being filled with explosive material or materials and subjected to the action of heat or cold. The upper extremities of the molds B are closed by means of loose covers F, provided with projections or pins F′ for forming the hole or holes in the explosive material or materials for the cap or caps. Any desired number of such holes can be formed in the explosive material by providing a corresponding number of the covers F, each provided with one projection or pin F′. The said covers F are placed one above the other, and the projections or pins upon the outer cover or covers project through holes provided in the inner cover or covers. By means of this arrangement, when the molding of the explosive material or materials forming the charge or cartridge is finished, the cover or covers F can be removed without damaging the said charge or cartridge, notwithstanding that the said cover or covers require to be rotated for this pur-

pose. When the explosive material or materials contained in the molds B have been partially melted by the action of the steam, hot air, water, or the like admitted to the chamber or space A′, cold water is admitted to the said chamber or space, and the said explosive material or materials are solidified or partially solidified. The pistons or plungers E are then pushed into the molds B by removing the supports E^2, which normally retain the said pistons or plungers in the lower extremities of the said molds. The charges or cartridges are then pushed out of or ejected from the molds by means of the said pistons or plungers E.

The operation of the apparatus is as follows—that is to say: The molds B are filled with prepared pulverized and partially-fusible explosive material or materials, and the loose covers F are placed in position, so that the projections or pins F′ will enter the said explosive material or materials and form the hole or holes for the cap or caps. Steam, hot air, water, or the like is then admitted to the chamber or space A′ in the box or case A round the molds B and allowed to circulate about the said molds, thereby heating the latter and causing the fusible part of the mass of explosive material or materials contained in them to melt and envelop the infusible particles of the same. The supply of steam is then cut off and cold water is admitted to the said space A′. This causes the said explosive materials in the said molds B to set or solidify, so that the contents of each mold forms a solid block, which can be forced out by the action of the plungers or pistons, as hereinbefore described. When the loose cover F is raised above the mold B, it is turned or rotated 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, the said covers are each rotated as soon as they are clear of the mold, and thus removed one by one without damaging the charge or cartridge.

Figs. 3 to 5 show a modification of my said invention wherein the molds B are formed of various shapes. It is evident, moreover, that the cells or molds may be made of any suitable form in order to manufacture charges or cartridges of any desired shape or blocks of explosive material to be afterward put together, so as to form large blocks for certain blasting operations.

What I claim is—

The method of manufacturing explosive charges or cartridges, consisting in first introducing pulverized partially-fusible explosive material into molds surrounded by a heating-chamber, then passing a heating medium through said chamber to melt the contents of the mold, then passing cold water through said chamber to solidify the explosive material, and finally ejecting the charges or cartridges from the molds, substantially as described.

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

CARL LAMM.

Witnesses:
NERE A. ELFWING,
N. I. LUNDBORG.