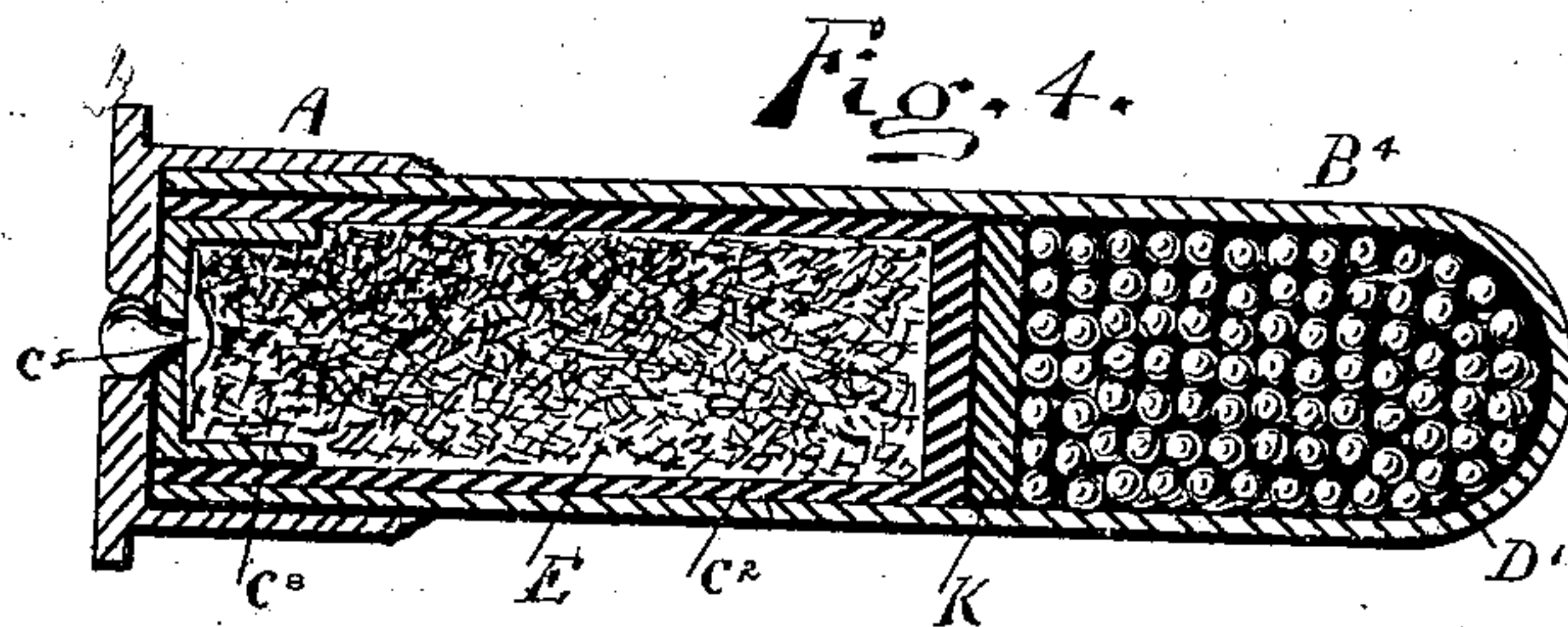
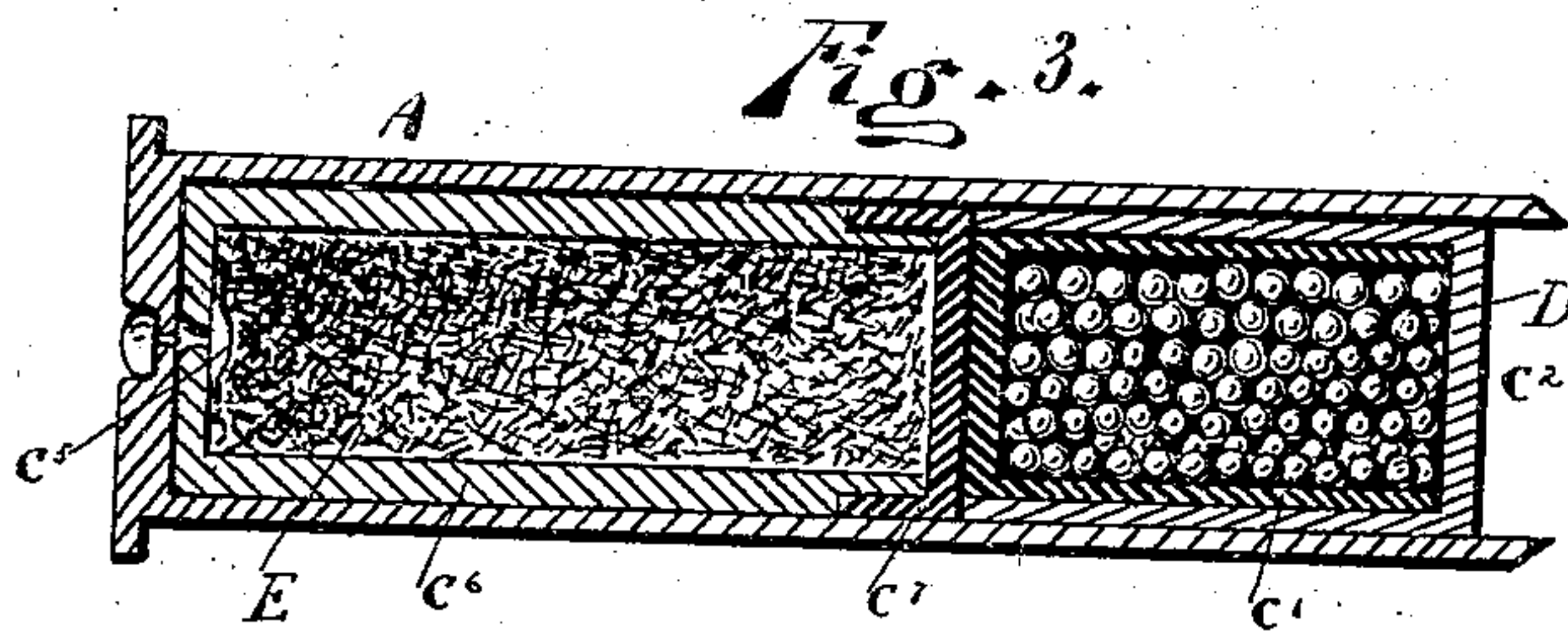
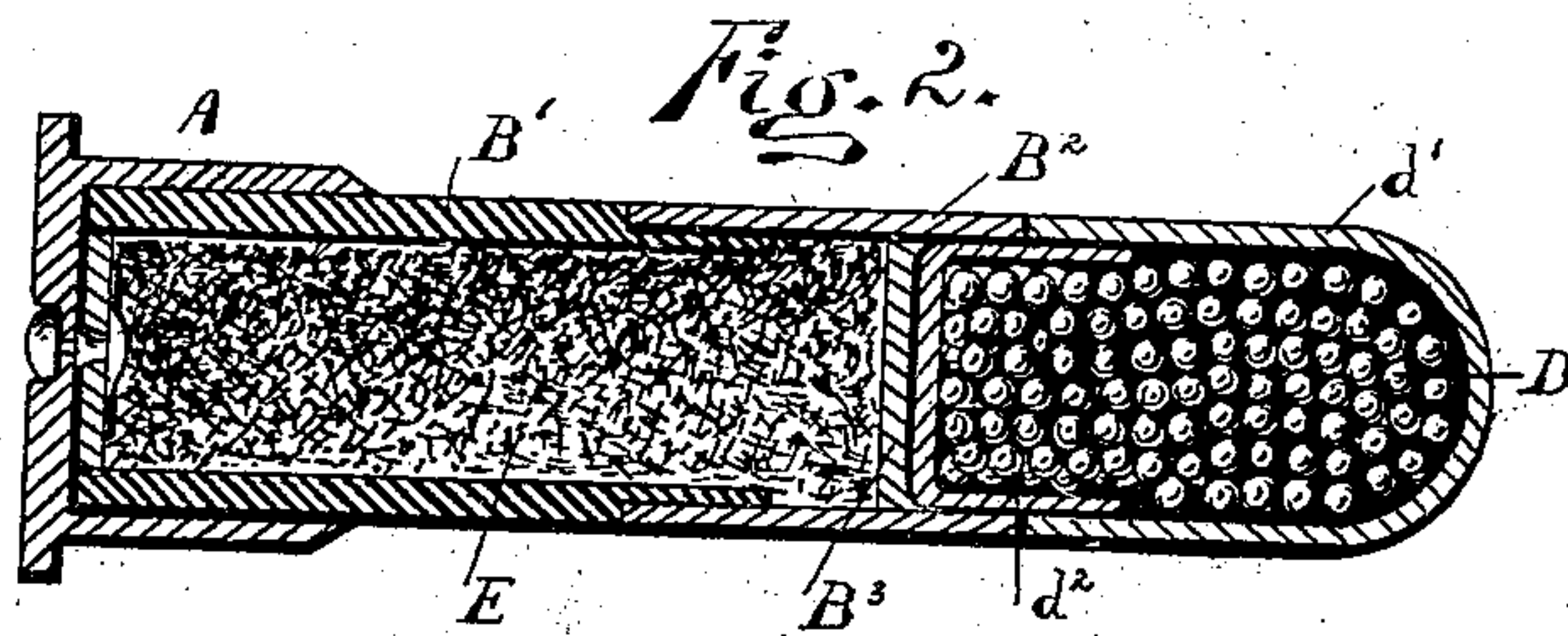
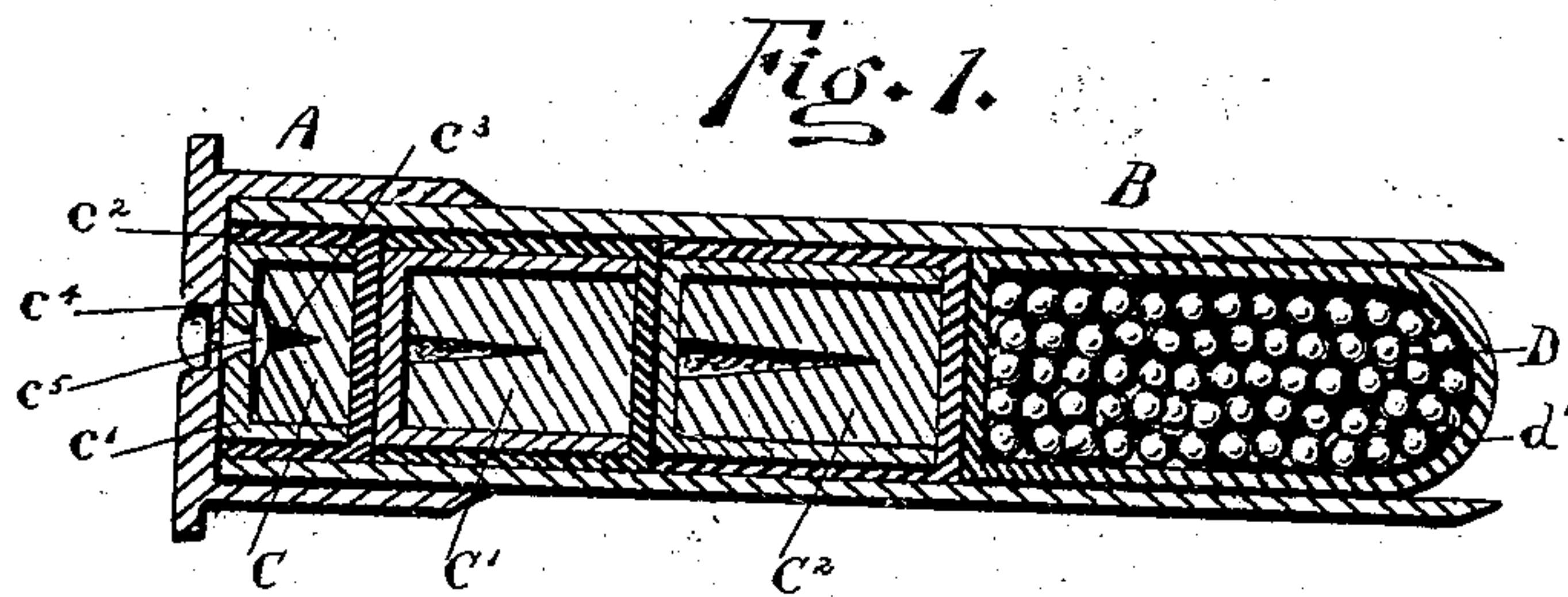


(No Model.)

H. MAXIM.
CARTRIDGE WITH AMORPHOUS EXPLOSIVE SHELL AND CHARGE.
No. 504,736. Patented Sept. 12, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF PITTSFIELD, MASSACHUSETTS.

CARTRIDGE WITH AMORPHOUS EXPLOSIVE SHELL AND CHARGE.

SPECIFICATION forming part of Letters Patent No. 504,736, dated September 12, 1893.

Application filed August 31, 1889. Serial No. 322,553. (No model.)

To all whom it may concern:

Be it known that I, HUDSON MAXIM, residing at Pittsfield, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Cartridges, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to cartridges for fire-arms.

The object of my invention is to generally improve cartridges, and specially to inclose the main explosive charge or charges in a coating, coatings, or casing of a solid colloidal explosive material, such as an amorphous explosive nitro-cellulose compound of gun cotton and nitro-glycerine, and to inclose the shot charge in a similar casing when desirable. By the use of this amorphous explosive colloid, the usual metal or paper casing of the cartridges is dispensed with and its place taken by an explosive material which not only adds to the explosive charge of the cartridge but, owing to its peculiar solid amorphous character is self-sustaining and is capable of carrying other explosive compounds, materials and shot, as is necessary for use in cartridges. This amorphous explosive colloid also serves as a means for providing an accelerating propelling charge by reason of its slowness in exploding in comparison with a granular powder on account of the reduced burning surface that is exposed to the flame of ignition.

In the drawings:—Figures 1, 2, 3 and 4 are central longitudinal sections of shot cartridges, provided with the invention, as will be hereinafter described.

It is to be remarked in passing, that the proportion of the parts as indicated in the drawings is exaggerated, it being understood that the explosive casing of a solid colloidal material may be a thin film or may have considerable thickness as may be found desirable under different circumstances.

Referring to the drawings it is to be understood that the improved cartridge is carried by or contained within a metallic shell A, which, as in Figs. 1, 2 and 4, may be a mere base cup, or, as in Fig. 3 may be of cylindrical form, sufficiently long to embrace the greater portion or the whole of the cartridge.

Irrespective of the metallic cup or cylinder A the cartridge consists of an exterior casing formed of an amorphous or non-crystalline explosive colloidal composition, which amorphous explosive is adapted to contain a charge or charges of an explosive propelling material and also a shot charge arranged in advance of the propelling charge as is customary.

The amorphous explosive colloidal compound is formed in the main of gun cotton or of gun cotton and nitro-glycerine, which becomes thoroughly gelatinized or a more or less plastic mass, and after certain volatile solvents are evaporated out becomes a solid explosive mass which is peculiarly amorphous, dense and horn-like.

Referring to Fig. 1, the amorphous explosive casing is in the form of a tube B, long enough to embrace and contain one or more separate propelling charges as C, C' and C², and also a shot charge D. In this form of the structure, the propelling charge or charges are contained by a box, casing or capsule, composed of this colloidal explosive nitro-compound before referred to, which may be formed in two parts c', c², one part contained within the other as is usual with capsules so as to contain and entirely surround the main body of the propelling charge, which, in the present instance is composed of the amorphous explosive material. The different charges C, C', and C² are of varying size and are provided with a central recess to increase the surface of the propelling charge that may be attacked by the flame of combustion. A small igniting charge c⁴ preferably of gun cotton, is placed opposite the base of the capsule shown as containing the charge C which base is perforated or made very thin at the front c⁵ opposite the primer in the shell A. The propelling charge section C thus consists of a body of the colloidal nitro-cellulose or similar amorphous explosive and a small igniting charge inclosed within the casing. The other sections C', C², are similar in a general way to the section C, but may be of different degrees of explosive energy, and of more or less rapid combustion, so that the entire cartridge charge may be made up of sections, each of which shall be composed of a solid amorphous explosive material and accelerated or retarded combustion

may be effected. The shot charge D is incased or inclosed in a thin film d' of the amorphous explosive material.

In Fig. 2, the tube B' is made to join with the tube B^2 to form a containing covering for the general smokeless powder charge E. The shot charge D is inclosed in cups d' and d^2 forming a capsule. The dividing partition B^3 may be a mere wad, or may be integral with the tube B^2 , but all the charge inclosing shells or films will be of the nitro-compounds, explosive when fired under pressure.

In Fig. 3, the granulated charge E is inclosed in the cellulose casing or capsule formed of cup c^6 and the small cover c^7 , each composed of the solid colloidal explosive. The shot charge D is contained in a capsule similar to that forming the covering of charge section C in Fig. 1. The small ignition charge c^5 preferably gun-cotton, is inclosed within the casing.

In Fig. 4, the smokeless powder charge E is contained in a capsule of the explosive nitro-compound, composed of cup c^2 and inclosed base cup c' , and this explosive charge is inclosed with shot charge D' and wad K in the colloidal nitro-cellulose cover or tube B^4 . It will thus be seen that the entire charge of the cartridge, except the projectile and gas check, may be made explosive, and combustion of sections of the charge may be accelerated or delayed. The nitro-compound may be easy or difficult of ignition by varying the quantity of nitro-glycerine used, or by making the gun cotton of a higher grade of nitration. The material is non-explosive except under high temperature and pressure, will not detonate, and is substantially waterproof.

The charge sections and cases may be made and sold separately, as is done with shot cartridges of usual construction.

I am aware that it has been proposed heretofore to employ a celluloid casing or collodion film as a surrounding medium for a cartridge charge, but such casing or film was simply a waterproof combustible covering, capable of ignition and substantially entirely consumed. My amorphous explosive compound differs therefrom in that it is itself an explosive; that is to say, it is an amorphous material, containing oxygen for the support of its own combustion, while the combustible materials

of the old cartridges must be burned in an atmosphere containing oxygen to support its combustion. And such cartridge cases designed to be consumed in the gun, have not in themselves been explosive, but have depended on the oxygen contained in the products of combustion of the contained charge of an explosive compound and from this cause have been inefficient and inoperative.

What I claim is—

1. The herein described cartridge charge consisting of an exterior envelope or casing formed of an amorphous explosive compound, and an interior explosive, the explosive envelope forming an explosive addition to said interior explosive.

2. The herein described cartridge charge consisting of an exterior envelope or casing formed of an amorphous explosive compound, and an interior explosive of a different explosive quality from the envelope, the explosive envelope forming an explosive addition to said interior explosive whereby an accelerating explosive action is effected.

3. The herein described cartridge formed of an envelope or casing composed of an amorphous explosive compound, a contained propelling explosive charge and a projectile, the explosive envelope forming an explosive addition to the contained charge.

4. The herein described cartridge charge consisting of a capsule or casing formed of an amorphous explosive compound, a contained explosive charge, and also an igniting charge.

5. In a cartridge, the combination with the primer of an explosive capsule formed of an amorphous explosive compound arranged adjacent to the primer, and a contained igniting charge, substantially as described.

6. In a cartridge the combination of the exterior explosive envelope formed of an amorphous explosive compound, an interior explosive contained within the envelope, and a metallic shell or cup carrying the envelope, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HUDSON MAXIM.

Witnesses:

PHILIP MAURO,
W. A. BARTLETT.