

No. 667,435.

Patented Feb. 5, 1901.

W. FRIESE-GREENE & P. E. KNELL.
CARTRIDGE FIRED BY ELECTRICITY.

(Application filed Dec. 30, 1899.)

(No Model.)

Fig. 1.

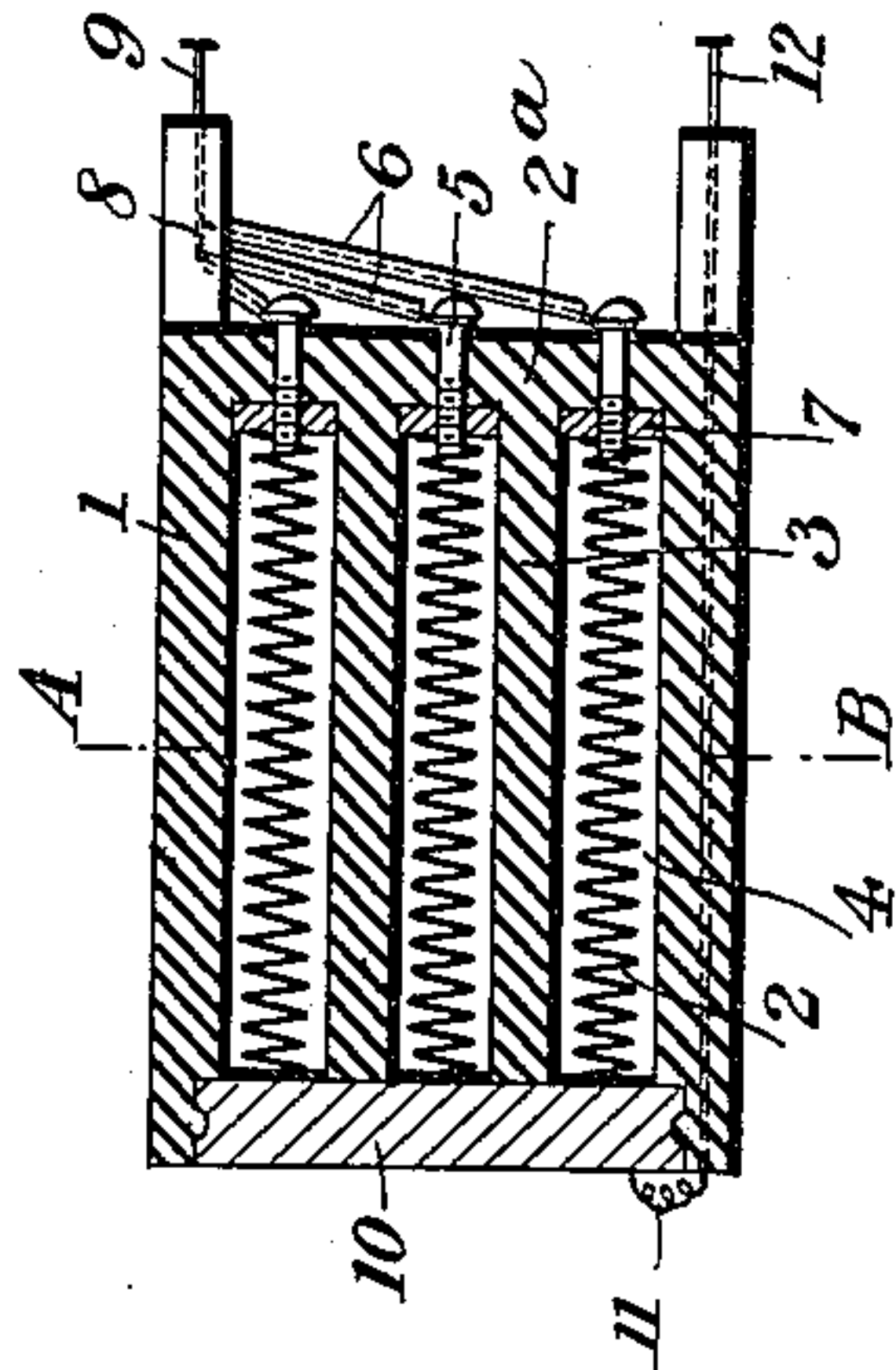


Fig. 2.

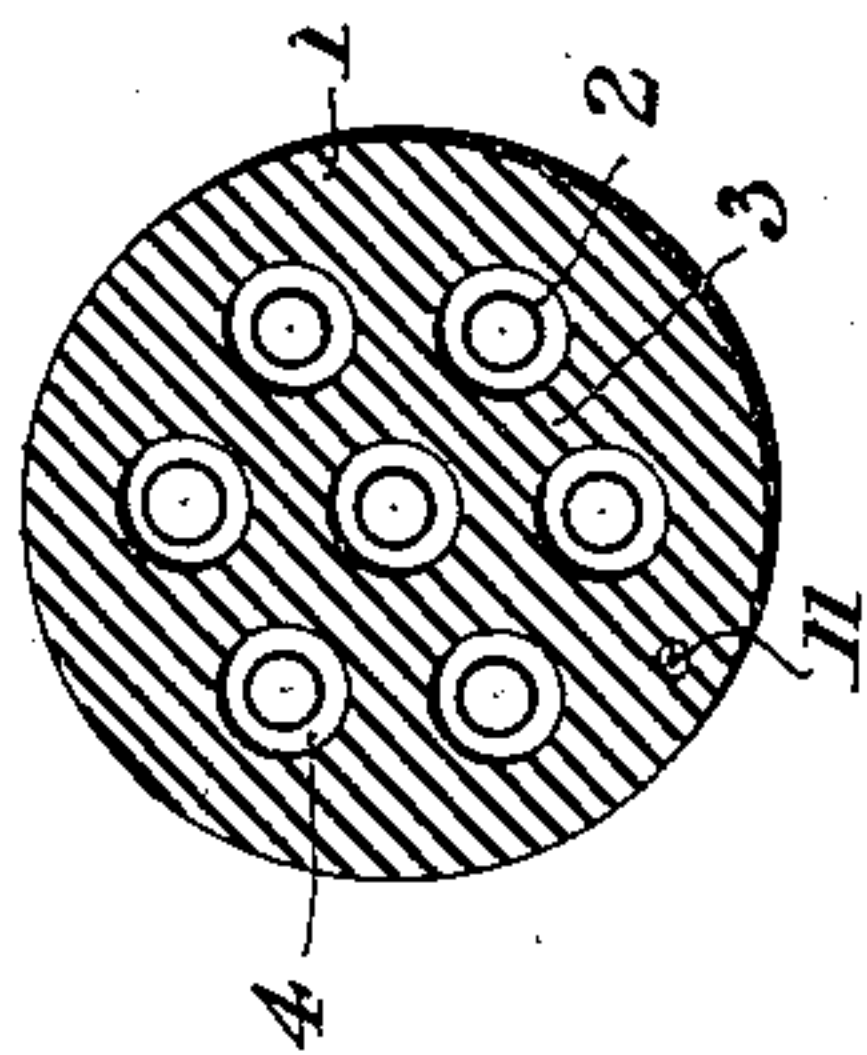


Fig. 3.

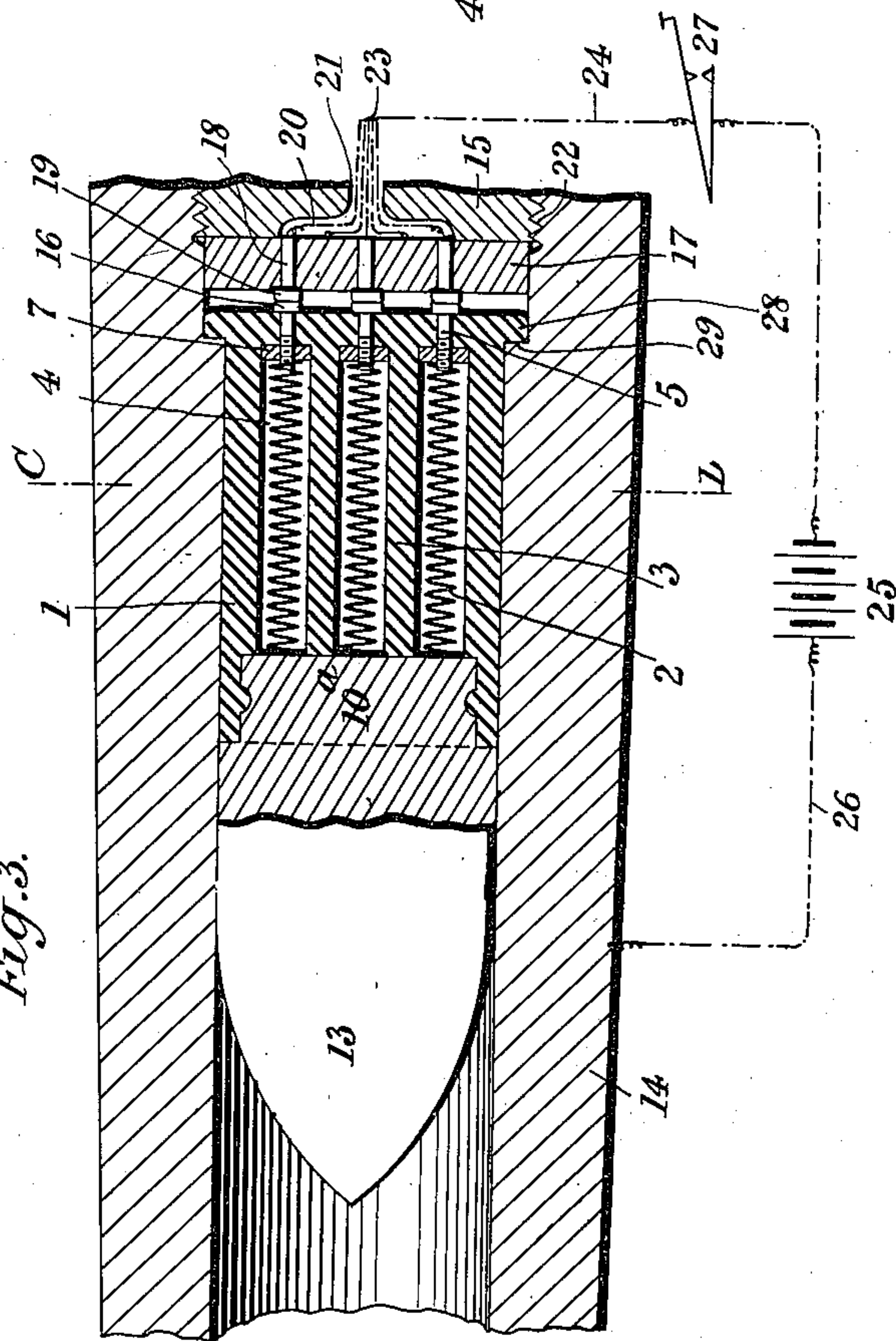
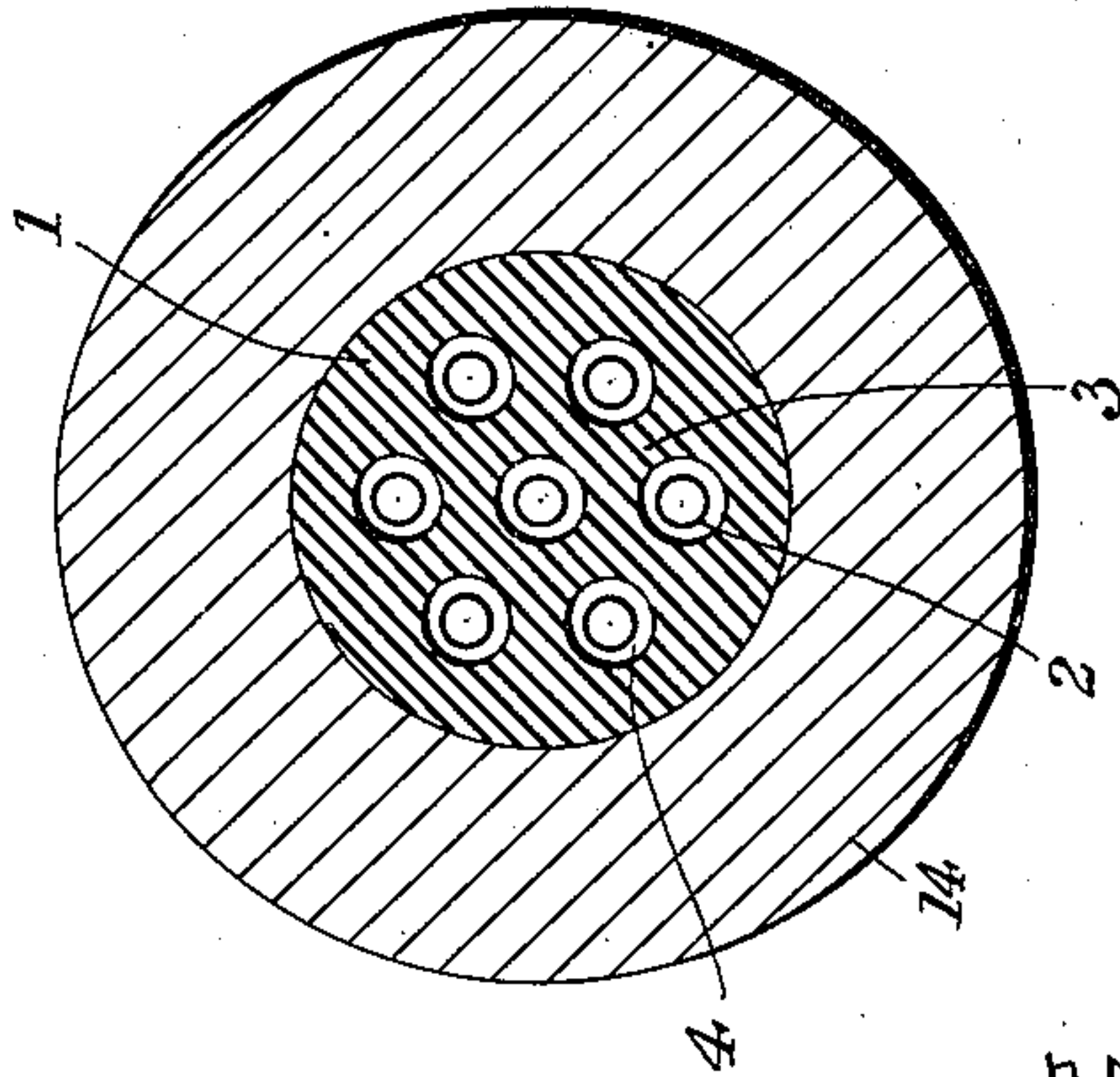


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CARTRIDGE FIRED BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 667,435, dated February 5, 1901.

Application filed December 30, 1899. Serial No. 742,160. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM FRIESE-GREENE, of 39 King's road, Chelsea, London, and PERCY EDWIN KNELL, of 8 Pope's road, Brixton, London, England, have invented certain new and useful Improvements in Cartridges to be Fired by Electricity, of which the following is a specification.

This invention has reference to cartridges to be fired by electricity and either for large or small guns or for blasting or other purposes where great and sudden power is required.

A characteristic feature of the invention is that no explosive, in the ordinary sense of the term, is employed.

According to this invention we employ as the charge some metal which upon the passage of electricity through an electric circuit of which it forms part becomes vaporized either instantaneously or more or less quickly, as may be required, according to the object to be attained—say, on the one hand, for a gun-cartridge or, on the other hand, for a blasting-cartridge. As materials suitable for the purpose we may mention magnesium, lead, and lead or tin alloys, and they may be employed in the form of twisted wire, shavings, or otherwise. The said material at the time of firing constitutes part of the electric circuit.

In some cases we may inclose compressed air or gas within the cartridge in addition to the charge above described in order to increase the force developed.

In the accompanying drawings, Figure 1 is a longitudinal central section of a blasting-cartridge constructed according to our invention. Fig. 2 is a cross-section on the line A B of Fig. 1. Fig. 3 is a longitudinal central section of a gun-cartridge in position in a gun, only so much of the latter being shown as is necessary to show the application of our invention. Fig. 4 is a cross-section on the line C D of Fig. 3.

Referring to Figs. 1 and 2, 1 is the case of the cartridge. It is made of insulating material, such as vulcanized fiber. 2 is the charge, consisting of a number (seven are shown) of twisted strips or wires of magnesium or other suitable material arranged longitudinally in the cartridge and insulated

from one another by partitions 3 of insulating material. These partitions are most conveniently made by forming the cartridge-case of a solid block of insulating material and molding or boring therein holes 4, into each of which a length of magnesium wire is inserted, leaving space for connection with each of said lengths. Each length of magnesium wire is electrically connected at its rear or inner end to a screw-threaded stud 5, which extends through the base 2^a of the cartridge to the rear of the latter, where it is connected electrically to one end of an insulated conducting-wire 6. A small plate 7, into which each stud 5 is screwed, is inserted in the inner end of each hole 4 and serves to hold the said stud in position. All the insulated wires 6 are connected at their other ends at a common junction 8 to a common terminal 9. The outer ends of the magnesium wires 2 are electrically connected to a common metal plate or disk 10, which serves to close in the outer ends of the holes 4 in the cartridge-case. A wire 11, electrically connected at one end to the plate 10, is led through the insulating material of the cartridge-case, to the rear end of the latter, where the said wire terminates in a terminal 12. To explode the cartridge, the two poles of an electric battery are connected, respectively through the terminals 9 12, with the two ends of the charge, so that when the circuit is completed the current passes through the charge and vaporizes it.

In the gun-cartridge shown in Figs. 3 and 4 the construction of the case and the arrangement of the charge are substantially the same as in the cartridge shown in the preceding figures; but the plate 10 of the said previous figures is replaced by an equivalent part 10^a, which constitutes the base of a projectile 13. 14 represents the breech end of the gun. 15 represents the breech block or equivalent part. In this case the studs 5 are not connected to wires, such as 6, but end in contact-heads 16. 17 is a plate or disk adapted to slide freely in the breech end of the gun. It carries a number of insulated studs 18, which are formed with contact-heads 19, projecting from the outer or front face of the plate 17 and each adapted to make electrical

contact with one of the studs 5 in the base of the cartridge. Each stud 18 is electrically connected at its rear end to an insulated conducting-wire 20, which is led through a perforation 21 in the breech-block 15. The breech-block is screw-threaded and engages with screw-threads 22, formed in the breech of the gun, so that when the breech-block is screwed home an effective electrical contact will be made between the contacts 16 and 19. The wires 20 are connected at a common point 23 to a common wire 24, forming part of the circuit of an electric battery 25. The circuit is completed from the contacts 16 through the magnesium wires 2, the base 10^a of the projectile 13, and the projectile itself through the metal of the breech end 14, whence the current is conveyed by means of a wire 26 back to the battery 25. 27 represents an electric firing-key. To prevent the cartridge moving forward in such a manner as to break the contact between the parts 16 and 19, the base of the cartridge is made with a flange 28, which engages with a shoulder 29 in the breech of the gun.

When a more or less gradual (in contradistinction to a sudden) vaporization is desired, the wires or lengths 2 in the same cartridge may be made of different resistances to the passage of a current of electricity, and this can conveniently be effected by making these of different thicknesses.

What we claim, and desire to secure by Letters Patent, is—

1. In a cartridge to be fired by electricity a charge consisting solely of a metal which is vaporizable more or less quickly by the passage therethrough of a current of electricity whereby explosive energy is generated, substantially as set forth.

2. In a cartridge to be fired by electricity

the combination of a case of insulating material, a length of metal within said case, said metal being vaporizable more or less quickly by the passage of electricity therethrough, and means at separate parts of said case for making electric contact with said vaporizable metal at the respective ends thereof whereby on the passage of a current of electricity through said metal explosive energy is generated, substantially as set forth.

3. In a cartridge to be fired by electricity, the combination of a case of insulating material, lengths of metal vaporizable more or less quickly by the passage of a current of electricity therethrough, said lengths being insulated from one another and forming the charge in said case, a common terminal or contact piece connected to one end of all the said lengths, and a common terminal or contact piece connected at one common point to all the said lengths, substantially as set forth.

4. In a cartridge to be fired by electricity the combination of a case of insulating material, lengths of metal vaporizable more or less quickly by the passage of a current of electricity therethrough, said lengths offering different resistance to said passage, being insulated from one another and forming the charge in said case, a common terminal or contact piece connected to one end of all of said lengths and a common terminal or contact piece connected at one common point to all the said lengths, substantially as set forth.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

WILLIAM FRIESE-GREENE.
PERCY EDWIN KNELL.

Witnesses:

JOHN C. NEWBURN,
GEORGE C. BACON.