A. L. O. FAUCHON-VILLEPLEE.

ELECTRIC APPARATUS FOR PROPELLING PROJECTILES.

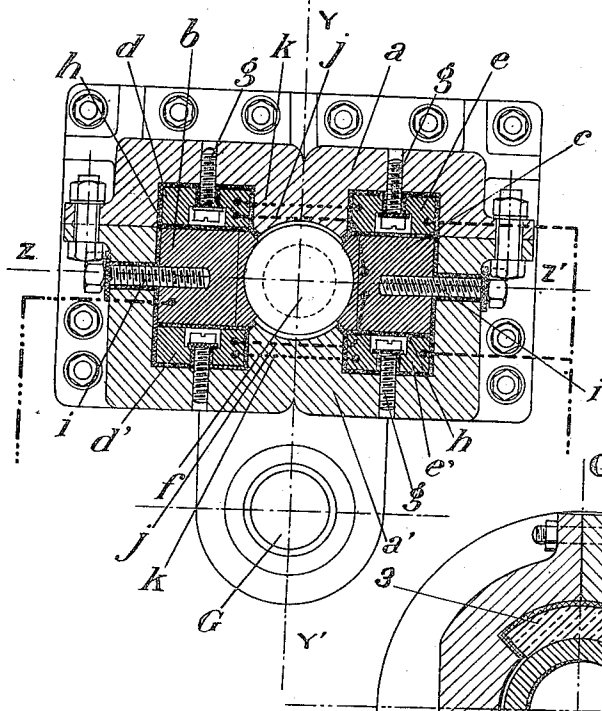
APPLICATION FILED APR. 1, 1919.

1,421,435.

Patented July 4, 1922.

4 SHEETS—SHEET 1.

Fig. 1



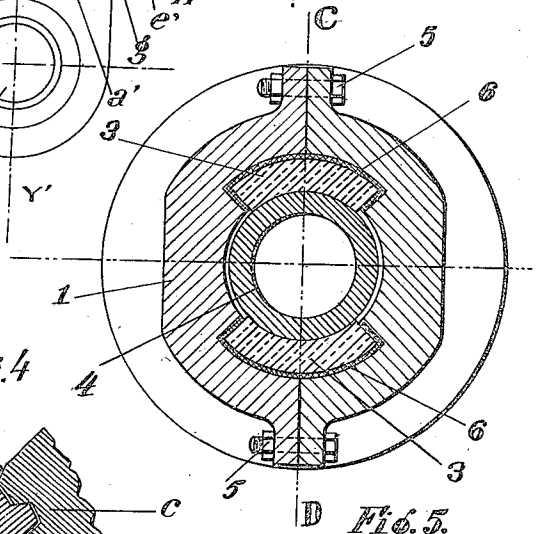
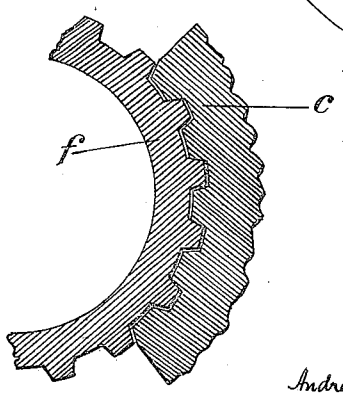


Fig. 5.

Fig. 4



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André Louis Octave Fauchon-Villeplee

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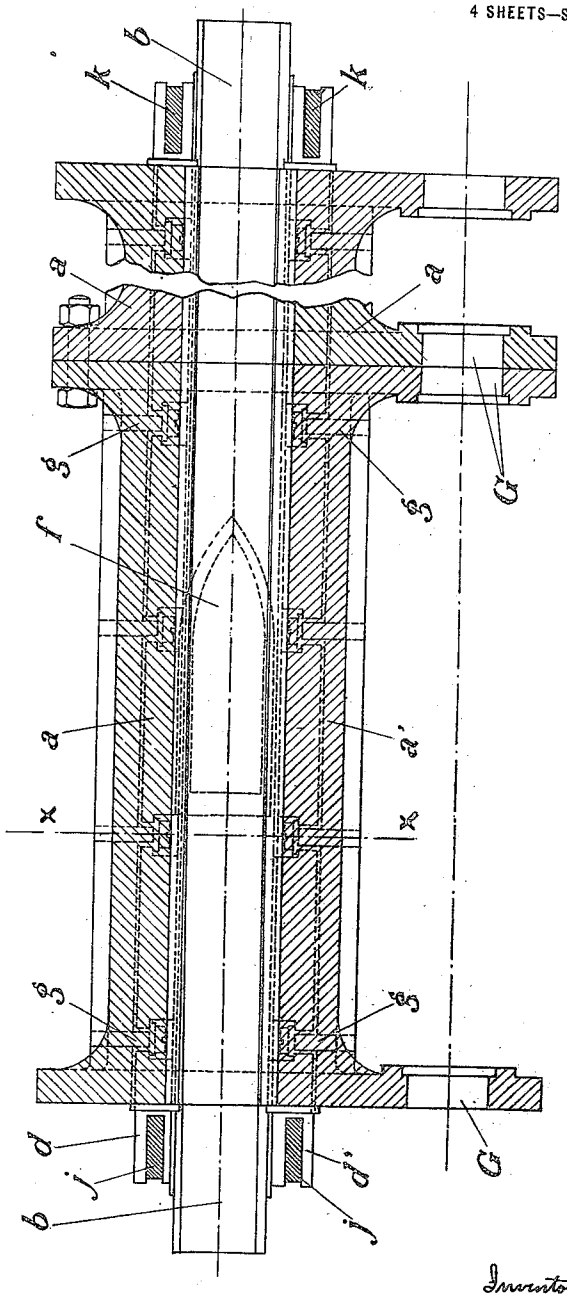


Fig. 2

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4 SHEETS—SHEET 3.

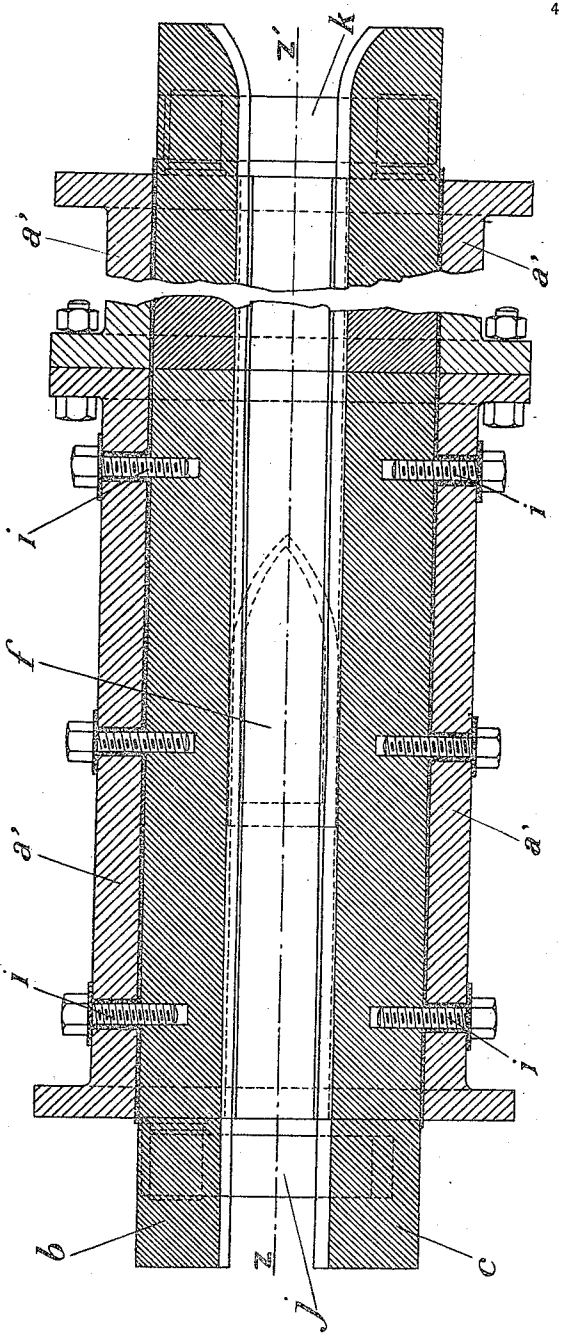


Fig. 3

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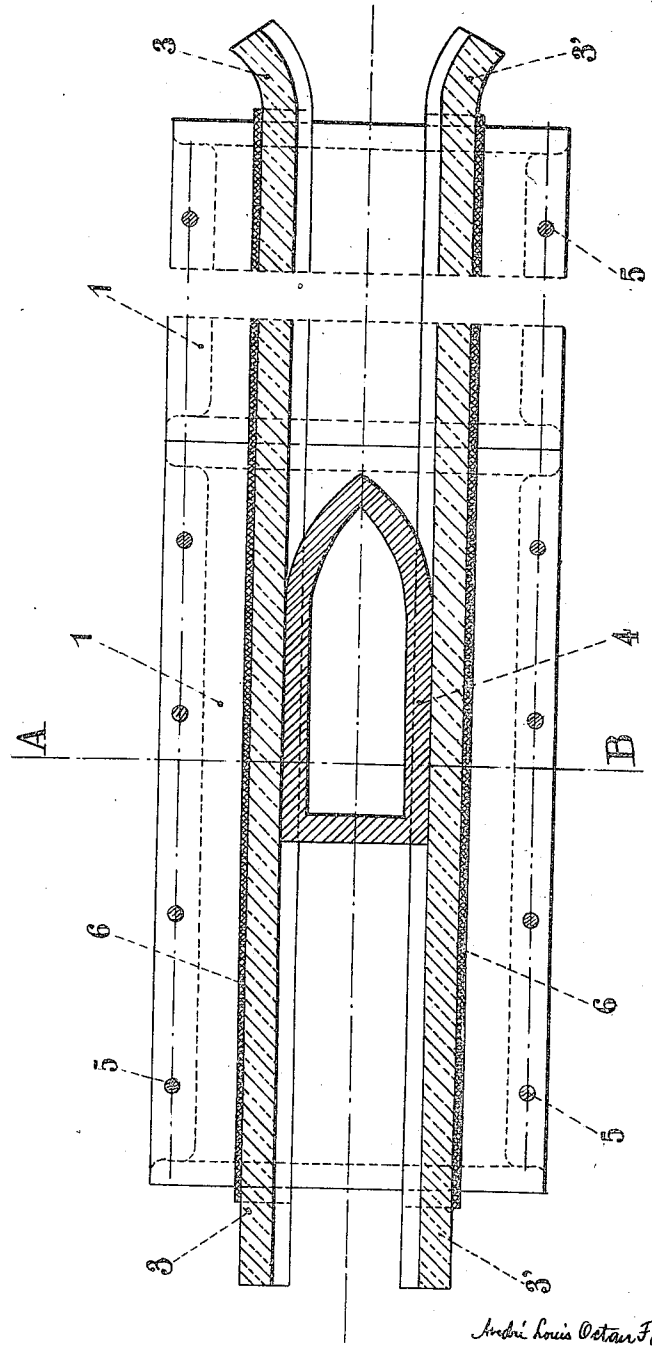
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4 SHEETS—SHEET 4.

Fig. 6.



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UNITED STATES PATENT OFFICE.

ANDRÉ LOUIS OCTAVE FAUCHON-VILLEPLEE, OF PARIS, FRANCE.

ELECTRIC APPARATUS FOR PROPELLING PROJECTILES.

1,421,435. Specification of Letters Patent. Patented July 4, 1922.

Application filed April 1, 1919. Serial No. 286,798.

To all whom it may concern:

Be it known that I, ANDRÉ LOUIS OCTAVE FAUCHON-VILLEPLEE, citizen of the Republic of France, residing at 2 Rue Meissonier, Paris, in the Republic of France, have invented new and useful Improvements in Electric Apparatus for Propelling Projectiles, of which the following is a specification.

The invention relates to improvements in electric guns of the type described in my United States Patent No. 1,370,200, i. e. in which projectiles are expelled by the direct action of a direct electric current which flows through the whole or a part of the projectile and is subjected to a field of electric forces.

My copending application Ser. No. 286,799, filed April 1, 1919, relates to a gun construction based upon the above indicated principle and using a projectile provided with a plurality of wings and my present application relates to a gun construction based upon the same principle and using a projectile of circular cross section.

In the annexed drawings, given by way of example:

Fig. 1 is a cross section of the gun along the line x—x' Fig. 2, the projectile or shell being shown in end view.

Fig. 2 is a longitudinal section along the line Y—Y', Fig. 1.

Fig. 3 is a horizontal longitudinal section along the line Z—Z', Fig. 1.

Fig. 4 is a sectional detail showing the arrangement of the rifling and contacts.

Fig. 5 is a cross section along the line A—B, Fig. 6 of a modification.

Fig. 6 is a corresponding longitudinal section along the line C—D, Fig. 5.

As shown in Figs. 1 and 2, the gun is provided with a magnetic frame a, a^1 extending over the whole length of the gun and formed of a number of cast steel members, assembled by pairs and bolted end to end (Fig 2). The winding comprises two side rails b, c and electrically conductive bars d, d' and e, e' extending also over the whole length of the gun. The polar pieces of the magnetic frame are bored to a diameter slightly in excess of that of the shell f so that the latter cannot come in contact therewith. The shell f is guided with a slight friction between the rails b and c. The rails may be rifled as well as the shell so as to impart to the latter a rotary movement.

The bars d, d' and e, e' are wrapped up with bands of micanite or any other suitable substance by which they are insulated from the magnetic circuit and the rails. They are secured to the magnetic frame by means of insulated bolts g. The rails b and c are insulated on three sides by mica bands h and left uncovered on their inner side so as to insure a good contact with the shell. They are fixed to the magnetic frame by means of insulated screws i.

The rail c is connected at the breech end of the gun to the bars d, d' by connecting bars j and the bars d, d' are connected to the bars e, e' by means of connections k at the nozzle end of the gun.

The operation of the apparatus is as follows: If one of the poles of a suitable source of electric energy is connected to the rail b and the other pole to the bars e, e', it will be seen that as soon as the shell is inserted into the gun, an electric current starting from the positive pole of the source, which is connected for instance to the rail b, flows through the circuit comprising said rail, the shell f, the rail c, the connections j, the bars d, d' in parallel the connection k and bars e, e' also in parallel to the negative pole of the source.

The current flowing through said circuit will create in the magnetic frame a magnetic flux at right angles to the projectile. As the electric current at the same time flows through the shell in a direction at right angles to said lines of force, it will result that the projectile is thrown forwardly.

In order to obtain a good contact between the rails and the projectile, the latter is provided with helical projections which will slide in the grooves of the rails. The projections and grooves are arranged as shown in Fig. 4. They should be so cut that the shell will slide without any undue friction but preferably with a certain play as shown in the drawing. As soon as the projectile is set in motion, it is forced, owing to its momentum, against the walls of the grooves which impart to the projectile a movement of rotation. The contact is so much better as the speed of the projectile and the pitch of the helix are greater.

It will, of course, be advantageous to increase the number and depth of the grooves

so as to increase the area of contact and reduce the density of current through the contacting surfaces. The latter may be lubricated with graphite, plumbago or any other suitable substance.

The magnetic frame could also be omitted, the gun being then reduced mainly to windings. This arrangement may be considered as practicable in view of the considerable number of ampere-turns which is produced at the time of throwing out the shell, which allows to obtain through the shell an important density of lines of force in spite of the omission of the magnetic frame. Obviously the number of the winding bars of the inductors could be increased. Said bars could also be omitted, whereby the gun would be then reduced to two copper rails for the supply of current with or without a magnetic frame.

Figs. 5 and 6 show a construction of that type comprising a magnetic frame. As shown in said figures, the apparatus is composed of a magnetic frame 1 extending over the whole length of the gun and two conducting bars 3 and 3′ insulated from the magnetic circuit by means of suitable linings 6 and extending also over the whole length of the gun.

The projectile 4 is in contact with the bars 3 and 3′ but has no contact with the polar pieces of the magnetic circuit. Said magnetic frame may be formed by steel blocks each of which may be cast in one piece or preferably formed by two parts connected at intervals by bolts 5, the blocks or sections being bolted one to the other, end to end, and mounted, if desired, on a suitably arranged girder frame.

The operation of the said apparatus is as follows:

When an electric current is supplied from the positive pole of the electric source through the rail 3, the projectile 4 and the rail 3′, back to the negative pole, it will be seen that said current flows through an electric circuit which creates in the magnetic frame a flux of forces at right angles to the projectile. As the electric current which flows through the projectile is at right angles to said lines of force, the projectile is thrown out forwardly.

This winding arrangement allows of decreasing in a considerable measure, the self induction at the time of firing the shot and increasing the same progressively as the projectile progresses through the gun, since the circuit traversed by the electric current is increased in proportion to said progression.

It is obvious that in the above apparatus the projectile may be hollow or solid, rifled or smooth and made of a magnetic or a nonmagnetic material. They may be provided with outer sheaths or bands for the purpose of obtaining a better contact. They may even be covered with highly fusible alloys for instance by mere tinning so that they will slide in said alloys which will be temporarily liquefied by the flowing current and act thus as a lubricant.

All the different embodiments above mentioned may be realized whatever be the type of arm considered: rifle, machine-gun, gun, etc.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. An electric gun comprising in combinaton a wnding adapted to create a field of electric force extending over the whole length of the gun, and two diametrically opposed rails adapted to supply the projectile with an electric current and guide the same in a direction at right angles to the field of force, the rails having guiding surfaces which are so curved that a projectile having a circular cross section may be received therebetween.

2. An electric gun comprising in combination: means providing a magnetic circuit extending over the whole length of the gun, a winding adapted to create a field of electric force extending also over the whole length of the gun and rails adapted to supply an electric current to a projectile and guide the same in a direction at right angles to the field of force, the inner surfaces of the rails and the surface of the projectile being covered with an easily fusible alloy.

3. An electric gun comprising in combination: a magnetic frame extending over the whole length of the gun and composed of sections bolted end to end, a winding adapted to create a field of electric force extending also over the whole length of the gun, electrically conductive rails supported in said magnetic frame and insulated therefrom and adapted to convey an electric current through a projectile in a direction at right angles to said field and to guide the said projectile so that it will move in a direction at right angles to the field and means for supplying an electric current to said rails.

4. An electric gun comprising in combination: a magnetic frame extending over the whole length of the gun and composed of sections bolted end to end, each section being itself composed of two parts divided along a longitudinal plane and bolted to each other, a winding adapted to create a field of electric force extending also over the whole length of the gun, electrically conductive rails supported in said magnetic frame and insulated therefrom, said rails being adapted to convey an electric current through a projectile in a direction at right angles to said field and to guide the said projectile so that it will move in a direction at right angles

to the field and means for supplying an electric current to said rails.

5. An electric gun comprising in combination: a magnetic frame composed of sections bolted end to end and provided with polar extension, electrically conductive rails adapted to create a magnetic field and supported in said magnetic frame and insulated therefrom, said rails being adapted to convey an electric current through a projectile in a direction at right angles to said field and to guide the said projectile so that it will move in a direction at right angles to the field; electrically conductive bars arranged within the magnetic frame about the polar extensions of the same and adapted to form energizing means therefor, the said rails being located between said bars and means for supplying an electric current to the rails and the bars.

In testimony whereof I have signed my name to this specification.

ANDRÉ LOUIS OCTAVE FAUCHON-VILLEPLEE.