(No Model.) 2 Sheets—Sheet 1.

J. T. WILLIAMS.

ELECTRO MAGNETIC TRANSMITTER.

No. 419,166. Patented Jan. 7, 1890.

Fig. 3.

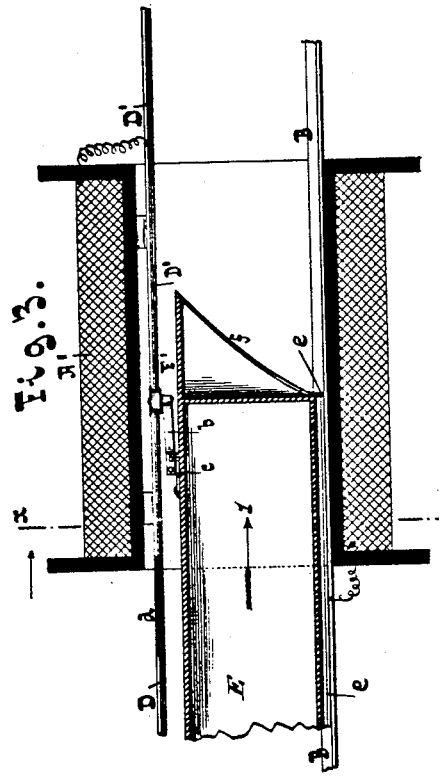


Fig. 4.

Fig. 2.

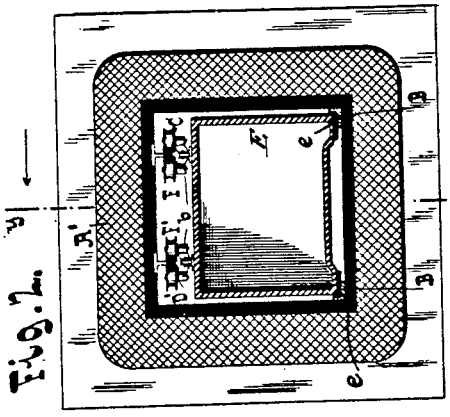
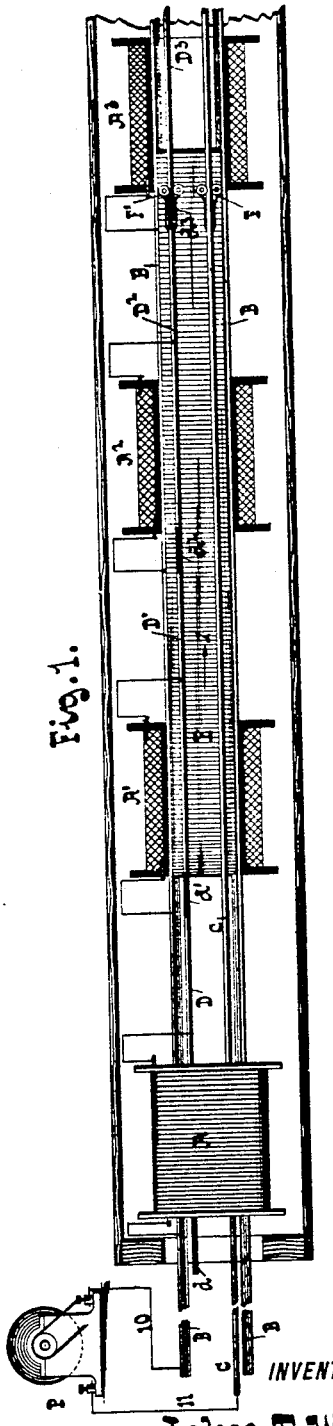


Fig. 1.



WITNESSES:

A. Faber du Faur Jr.

J. A. Rutherford.

INVENTOR.

John T. Williams

BY Van Santvoord & Hauff

ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

J. T. WILLIAMS.

ELECTRO MAGNETIC TRANSMITTER.

No. 419,166. Patented Jan. 7, 1890.

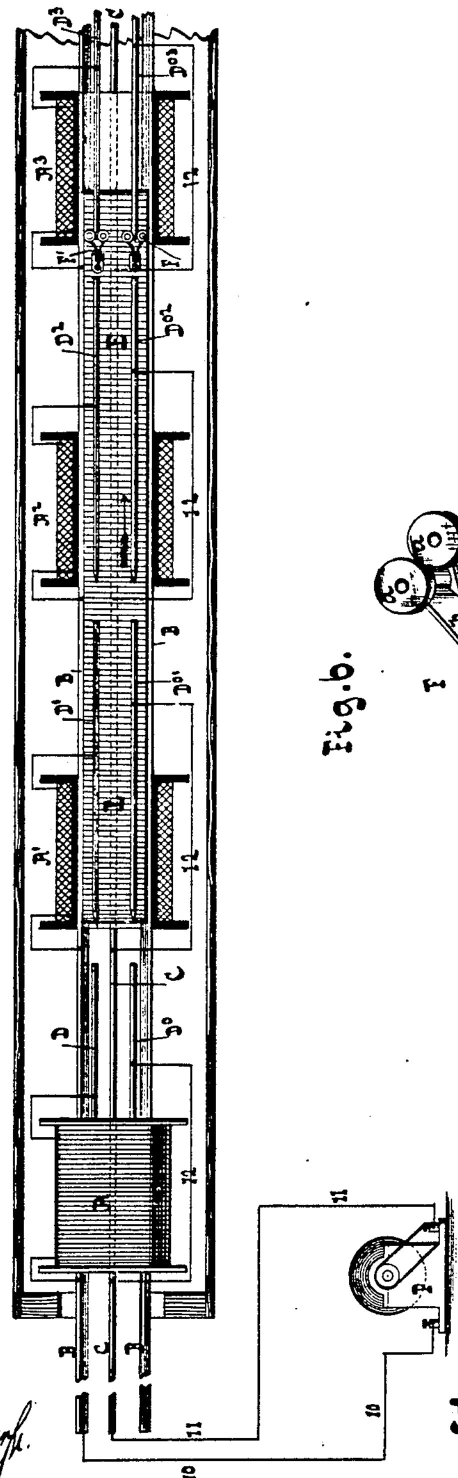


Fig. 5.

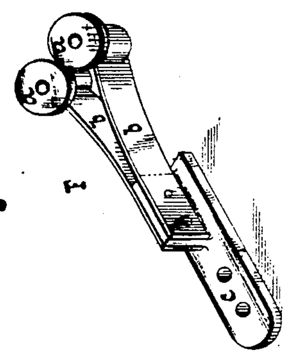


Fig. 6.

WITNESSES:

A. Faber du Faur Jr.
William Miller

INVENTOR
John T. Williams
BY
Van Santvoord & Hauff
ATTORNEYS

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN THOMAS WILLIAMS, OF MOUNT VERNON, ASSIGNOR TO THE INTERNATIONAL PORTELECTRIC COMPANY, OF NEW YORK, N. Y.

ELECTRO-MAGNETIC TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 419,166, dated January 7, 1890.

Application filed March 9, 1889. Serial No. 302,668. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMAS WILLIAMS, a citizen of the United States, residing at Mount Vernon, in the county of Westchester and State of New York, have invented new and useful Improvements in Electro-Magnetic Transmitters, (Portelectric,) of which the following is a specification.

This invention relates to certain improvements in electro-magnetic transmitters, as pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a sectional plan view of an apparatus embodying my invention. Fig. 2 is a transverse section of one of the helices in the plane *x x*, Fig. 3, on a larger scale than the previous figure. Fig. 3 is a vertical section in the plane *y y*, Fig. 2. Fig. 4 is a sectional side view of a detail part. Fig. 5 is a sectional plan view of a modification on the same scale as Fig. 1. Fig. 6 is a perspective view of a pair of contact-wheels detached, on a larger scale than the previous figures.

Similar letters indicate corresponding parts.

In the drawings, the letters A A′ A^2 A^3 designate helices which are wound upon spools of wood or other suitable non-conducting material. The several helices are firmly mounted at suitable intervals apart upon a suitable bed, and through the same extends a track or guide B, which is made of any suitable material—such, for instance, as brass.

In the example illustrated in the drawings the spools upon which the helices are wound are rectangular in cross-section, and the track consists of two rails secured to the inner bottom surfaces of the spools. However, the helices can be made circular in cross-section and the track made tubular, or in the form of a trough or in any other form suitable for the purpose. Through the spools of the helices extends an electric conductor C, which is insulated from the track B and from the helices and secured to the latter by hangers or other suitable means, as indicated in Fig. 2. Each helix is likewise provided with a contact-piece D D′ D^2 D^3, respectively, (see Fig. 1), which may be in the form of cylindrical metallic rods, or they may be flat or in any other convenient form and secured to the spools by hangers or other suitable means. One end of the wire of each helix connects with the track B and the other end with the contact-piece of said helix, and the track B is connected by a wire 10 with one pole of a dynamo P, or other source or generator of electricity, while the conductor C connects by a wire 11 with the opposite pole of the dynamo.

The carriage E, fitted to the track and to which motion is to be imparted by the axial magnetism of the successive helices, is made of soft or laminated iron or steel, and is provided with contacts F F′ for closing the circuits through the several helices, one of said contacts engaging the conductor C and the other the several contact-pieces D D′ D^2 D^3.

In the example illustrated in the drawings (see particularly Fig. 6) each of the contacts F F′ consists of two wheels *a a*, which are continually pressed toward each other by springs *b b*, that are attached at one end to the bearings of the said wheels and at their opposite ends to a base *c* on the top of the carriage. The faces of the contact-wheels are shaped to suit the contact-pieces D D′, &c., and the conductors C. It is evident that one contact-wheel running in contact with the contact-pieces D D′, &c., and one running in contact with the conductor C would, under ordinary circumstances, suffice to make the contact; but I prefer to use two wheels, which are pressed against the contact-pieces or the conductor by the action of the springs *b b*, in order to insure a good contact at all times. The springs *b b* are made as spring-arms, which are fixed at one end and free at their opposite ends, where they carry the contact-wheels *a a*. The elasticity of the spring-arms *b b* is such that their free ends press the contact-wheels toward each other, and as the axes of the wheels are approximately vertical the wheels rotate in a horizontal plane, or substantially so, and thereby grip the oppo-

site surfaces of the conductors. The contact-wheels F and F′ are in metallic connection with each other by the top of the carriage; but they could be connected by a wire or a metal plate, or else mounted upon a common metallic base.

The contact-pieces D D′ D^2 D^3 must be insulated from each other, and this object may be attained by inserting between them sections *d d′* d^2, &c., of a non-conducting material for the purpose of forming a continuous and even surface for the contact-wheels to run on. The joints may be made by having a socket in one section and a corresponding tongue in the other, or by screw-nipples and threaded sockets.

When the carriage E is caused to enter one of the helices in the direction indicated by arrow 1, Fig. 1—say, for instance, the helix A′—the contact-wheel F′ of the carriage engages with the contact-piece D′ of the said helix, and a circuit is closed through wire 11, conductor C, contact-wheel F′ through the helix A′, track B, and wire 10, back to the dynamo, whereby the helix A′ is vitalized, and by the axial magnetism the carriage E is moved forward on the track. As soon as the contact-wheel F′ goes out of contact with the contact-piece D′ the circuit through helix A′ is broken, the length of the contact-piece being such that this takes place a trifle before the carriage reaches a central position with regard to the helix; but before the carriage reaches this position the contact-wheel F′ engages the contact D^2 of the next succeeding helix A^2, and this helix becomes vitalized and begins its propelling action upon the carriage before the propelling action of the preceding helix A′ has ceased, which takes place as soon as the carriage reaches a central position with regard to the helix. By these means the propelling action of the successive helices upon the carriage never stops and the carriage moves forward without interruption. If the center of the carriage passes the center of a helix before the circuit through this helix is opened, such helix has a tendency to draw the carriage backward.

In order to prevent the carriage from being heated by the friction on the track, I attach to these surfaces of the carriage, which come into contact with the track or guide, plates *e*, constructed of mica or other good non-conductor of heat. This also serves to insulate the carriage from the track.

To reduce the friction between the carriage and the track to a minimum, I form the end of the carriage with an inclined head *f*. The pressure of air on this head tends to lift the carriage from the rail, so that the full weight of the carriage does not come to bear upon the same, the angle of said incline being varied as required.

In the example shown in Fig. 5 I have shown two sets of detached conductors D D′ D^2 D^3 and D^0 $D^{0\prime}$ D^{02} D^{03}, the continuous conductor C and track B being the same as in the example shown in Fig. 1. The conductors D D^0 are secured in the helix A, the conductors D′ and $D^{0\prime}$ in the helix A′, and so on, and the continuous conductor C is connected by wires 12 with the conductors D^0 $D^{0\prime}$ D^{02} D^{03}, while the ends of the successive helices connect with the track B and with the successive conductors D D′ D^2 D^3, precisely in the same manner as in Fig. 1. The contacts F F′ of the carriage E engage the detached conductors D D^0 D′ $D^{0\prime}$, and so on.

In the position which the carriage occupies in Fig. 5 a circuit is closed from the electric generator through wire 10, track B, helix A^3, contact D^3, contacts F′ F, conductor D^{03}, conductor C, and wire 11, back to the battery.

From this description it will be seen that in my electro-magnetic transmitter all the conductors required for the operation extend through the interior of the helices, so that they require comparatively little space and can be readily protected against atmospheric influences. Furthermore, by the distribution of the various conductors in the manner hereinbefore described, I am enabled to vitalize the successive helices at the proper moments, so that the same never have a tendency to draw the carriage back or retard its forward motion.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a series of helices A A′ A^2 A^3, a track or guide B, which extends through the helices and forms a continuous conductor, and a core or carriage E, supported by and moving on said track or guide, of a continuous conductor C, extending through said helices, a series of conductors D D′ D^2 D^3, which are insulated from each other and extend through the successive helices, a contact F, secured to the core or carriage and engaging the conductor C, a contact F′, secured to the carriage in metallic connection with the contact F and made to engage the successive conductors D D′ D^2 D^3, connections between the ends of the helices, the track B, and the conductors D D′ D^2 D^3, and connections between the electric generator, the track B, and the conductor C, substantially as described.

2. The combination, with the helices, the track, the conductors extending through the helices, the electric generator, and the connections between the helices, conductors, and electric generator, of a carriage and pairs of spring-arms, each pair secured at one end to the carriage and pressing toward each other at their free ends, and contact-wheels carried by the free ends of the springs, rotating in an approximately horizontal plane, and by the spring-arms pressed toward each other to grip the opposite sides of the conductors, substantially as described.

3. A carriage having spring-arms secured

at one end and pressing toward each other at their opposite free ends, and provided at their free ends with contact-wheels mounted on approximately vertical axes to rotate in a substantially-horizontal plane to grip the opposite sides of electrical conductors, substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

JOHN THOMAS WILLIAMS. [L. S.]

Witnesses:

J. VAN SANTVOORD,

W. HAUFF.