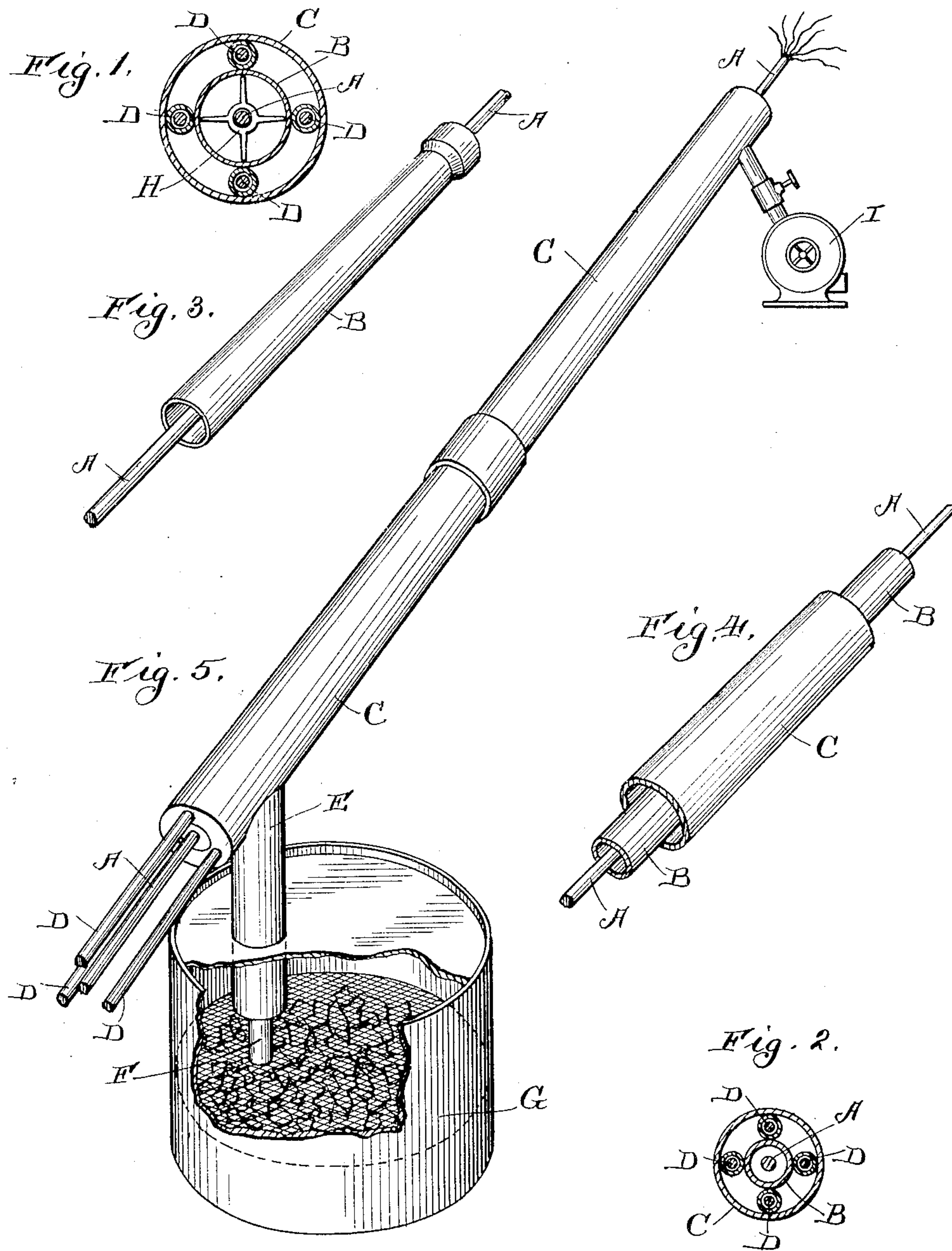


(No Model.)

A. J. ROBERTSON.
ART OF INSULATING ELECTRIC CONDUCTORS.

No. 580,584.

Patented Apr. 13, 1897.



Witnesses:
R. J. Jacker,
Chas. C. Hillman

Inventor:
Archibald J. Robertson

UNITED STATES PATENT OFFICE.

ARCHIBALD J. ROBERTSON, OF CHICAGO, ILLINOIS.

ART OF INSULATING ELECTRIC CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 580,584, dated April 13, 1897.

Application filed September 6, 1895. Serial No. 561,682. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD J. ROBERTSON, a subject of the Queen of Great Britain, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in the Art of Insulating Electric Conductors, of which the following is a specification.

My invention relates in a general way to the art of insulating electric conductors and whereby electric transmission by long-distance trunk-lines for heavy electric currents is made possible and furnish a simple and efficient method of construction whereby the entire electric force which is generated at the dynamo may be delivered to the point of consumption without loss or resistance. To accomplish this purpose, it is necessary to avoid atmospheric or earth contact with the electric conductors by carrying them in an air-tight chamber or pipe, which chamber must be walled by insulating material, and in order to accomplish my purpose I use piping constructed of any good insulating material and suspend the conductors at or near the center of the pipe and use insulating material to make joints. Where the conductor enters this pipe leading from the dynamo the pipe is sealed around the conductor and is made air-tight the entire length of the line. When the construction of the line is complete and ready for operation, the chamber of course is still filled with air, although well insulated from earth contact. I then exhaust the air from the chamber by any usual means for that purpose and continue the exhaust until the air is entirely eliminated, which will of course take but a short time, the pipe being sealed at the power plant and air-tight throughout the line. By this means it is obvious that there are no atmospheric conditions present, but instead thereof there is a partial vacuum continuously surrounding the conductor. When a suitable vacuum-pressure is produced, the exhaust-fan is adjusted to a certain speed and kept in motion continuously while the current is being used, and when not being used by turning a cock in the conductor from the chamber to the exhaust-fan the chamber is sealed at both ends from any external influence, thereby producing what might properly be called "pneumatic" electric transmission. There is noth-

ing so thoroughly dead to all the rest of nature as a vacuum—nothing so absolutely void of moisture. Nothing except calcium oxid (unslaked lime) approximates it in absorbing ability. It is therefore obvious that this conductor, situated in this vacuum-chamber, is absolutely dead to every influence in nature except the impulse given it by the action of the dynamo, and it being thus dead distance is annihilated so far as the transmission of sound, speech, or electric current is concerned, from the fact that the entire conductor is acted upon at the same instant, regardless of distance, and instead of offering resistance to the transmission of electric force when the conductor is not overloaded there is a new impetus given in the direction of transmission by the action of the exhaust-fan, which will require little force to drive it, its office being simply to maintain a given vacuum in the pipe, which should always be preserved.

Exhausting the air one time in the life of a transmission-line is all that is necessary, except when repairs would render it necessary to open the chamber, when the air would be eliminated as in the first instance. Supplementing this conductor may be reduced to a minimum, if not entirely avoided, in many cases.

In very long distances, where great capacity of transmission and strength of line is required, I surround the insulated chamber with iron or wood pipes of greater diameter. Ordinary gas or sewer pipes would serve the purpose well, in which I carry the feed-wires, if they are necessary. The air is also exhausted from this chamber, and each of these feed-wires is carried in insulating-tubes and connected with the main conductor. These insulated tubes are also connected with the main insulated pipe, which carries the main conductor, the air being exhausted from them at the same time and by the same device used for the main pipe, and the outer chamber is exhausted by the same device and at the same time also. By this construction and the arrangement of the main conductor, which conductor is cut off from every influence except that imparted to it by the dynamo or electric generator, it becomes evident that when the latent electric force which it contains is im-

pinged upon by an active current from any electric generator that entire force would be instantly transmitted without resistance or loss to any distance. When the conditions require it or when the line of transmission is conducted underground or through a very moist region, I locate an air-tight chamber somewhere in the power plant and connect that chamber with the pipes or chambers which contain the conductors, making this chamber and said pipes one air-tight inclosure. In this chamber I place the necessary amount of unslaked lime, which is held in said chamber by a perforated inside cover to hold the rock-lime from being lifted by the force of the exhaust. By this simple addition to the already complete protection to the electric conductors the vacuum-chambers are continuously permeated by a property from the greatest absorbent in chemistry, (unslaked lime.)

Figure 1 is an enlarged cross-sectional view of the main conductor, a spoked device to hold it in the center of the insulated vacuum-chamber, also the insulated pipe forming said chamber and the outer covering or pipe and the feed-wires. Fig. 2 is also a cross-sectional view showing all the parts and positions except the device for holding the conductor in the center of the vacuum-pipe. Fig. 3 is a perspective view showing the main conductor and insulated pipe which forms the vacuum-chamber and the main conductor in position. Fig. 4 is a perspective view of the main conductor in position, the insulated pipe and the outer pipe also in position. Fig. 5 is a perspective view of my device, showing the outside pipe with closed end, also the main conductor and feed-wires leading from the dynamo to their respective chambers and sealed where they enter the end of said pipe. It also shows two pipes extending downward and entering a lime-chamber, the inside pipe leading from the main insulated chamber which carries the main conductor and the other pipe leading from the outer pipe-chamber. It also shows the exhaust-fan at the extreme end of the line.

Like letters represent like parts in the accompanying drawings, which form a part hereof.

A is a main conductor.

B is an insulated pipe or vacuum chamber.

C is an outer pipe.

D is a feed-wire.

E is a conducting-pipe from a lime-chamber to the outer pipe.

F is a conducting-pipe from a lime-chamber to the insulated chamber which carries the main conductor.

G is a lime-chamber.

H is a support for the main conductor.

I is an exhaust-fan.

Having thus described my invention, what I claim as new and original, and desire to secure by Letters Patent, is—

1. In electric transmission in the combina-

tion of conductor A, insulated pipe B, pipe C, feed-wire D, pipe E, pipe F, chamber G, support H, exhaust I, said wires attached to and leading from an electric generator, substantially as described.

2. An electric transmitter in the combination of conductor A, insulated pipe B, pipe C, feed-wire D, pipe E, pipe F, lime-chamber G, exhaust I, said conductors connected with an electric generator and leading to the end of the trunk-line and point of distribution, substantially as described.

3. An electric transmitter in the combination of conductor A, pipe B, pipe C, feed-wire D, pipe E, pipe F, chamber G, support H, exhaust-fan I; conductor A and feed-wires D connected with an electric generator, substantially as described.

4. The combination of a hollow conduit or pipe, having located centrally and longitudinally therein an electric conductor, a pipe or tube around said conduit, and made so as to form a closed chamber with feed-wires interposed between said pipes, and means for exhausting the air therefrom, substantially as described.

5. In an electric transmitter, the combination of the pipe or conduit B, with the electric conductor A, located therein, the securing device H, to hold said conductor out of contact with the conduit, the pipe C, surrounding the pipe or conduit B, and constructed to form a closed chamber, the feed-wires D, located between said pipes, the closed vessel G, containing unslaked lime, and having the pipes E, and F, uniting the pipe C, and conduit B, respectively, with said vessel, substantially as described.

6. In an electric transmitter, the combination of the pipe or conduit B, with the electric conductor A, located therein, the securing device H, to hold said conductor out of contact with the conduit, the pipe C, surrounding the pipe or conduit B, and constructed to form a closed chamber, the feed-wires D, located between said pipes, the closed vessel G, containing the unslaked lime, and having the pipes E, and F, uniting the pipe C, and conduit B, respectively with said vessel, and a device connected to the pipes B, and C, and adapted to exhaust the air therefrom, substantially as described.

7. The combination with a pipe or conduit, having a closed chamber, with an electric conductor located therein, a vessel communicating with said chamber, unslaked lime in said vessel, and means for exhausting the air therefrom communicating with the closed chamber of the pipe or conduit, substantially as described.

8. The combination of a hollow pipe or conduit, with an electric conductor located therein, a pipe or tube surrounding said conduit, and made so as to form a closed chamber, feed-wires interposed between said pipes, and means for drying and exhausting the air from each of said pipes, substantially as described.

9. The herein-described method of insulating electrical conductors, consisting first in hermetically inclosing an electric conductor in a hollow conduit and then exhausting and
5 drying the air in said conduit, substantially as described.

10. The herein-described method of insulating electrical conductors, consisting first in hermetically inclosing an electric conductor

in a hollow conduit, then drying the air in 10
said conduit by means of unslaked lime, and
of exhausting the air in said conduit, substantially as described.

ARCHIBALD J. ROBERTSON.

Witnesses:

LAURA COLLINS,
R. A. McMULLAN.