

(No Model.)

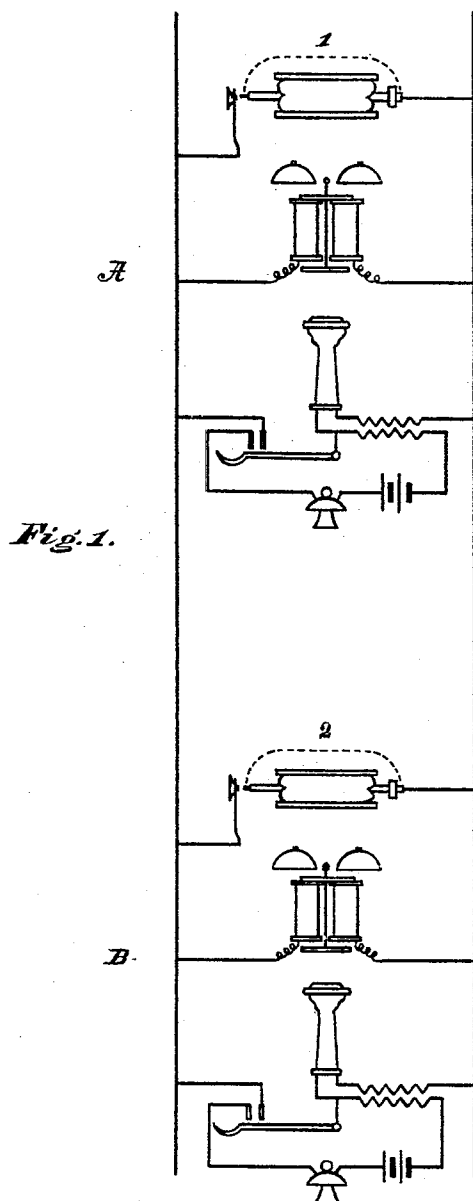
2 Sheets—Sheet 1.

J. J. CARTY.

SYSTEM FOR PROTECTING TELEPHONE APPARATUS FROM LIGHTNING.

No. 495,179.

Patented Apr. 11, 1893.



Witnesses.

E. C. Briggs.
J. C. Smith

Inventor.

John J. Carty
by Read Price
his atty

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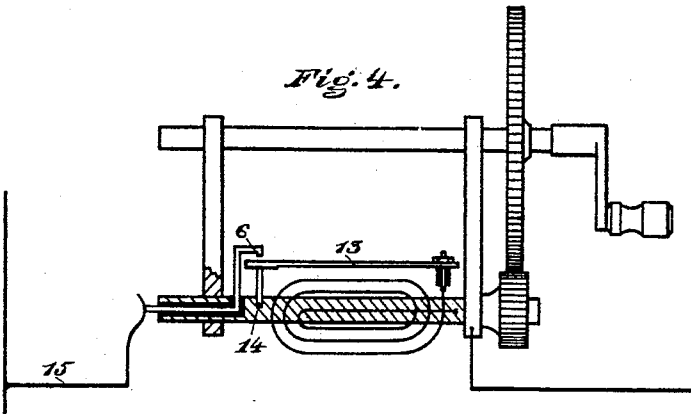
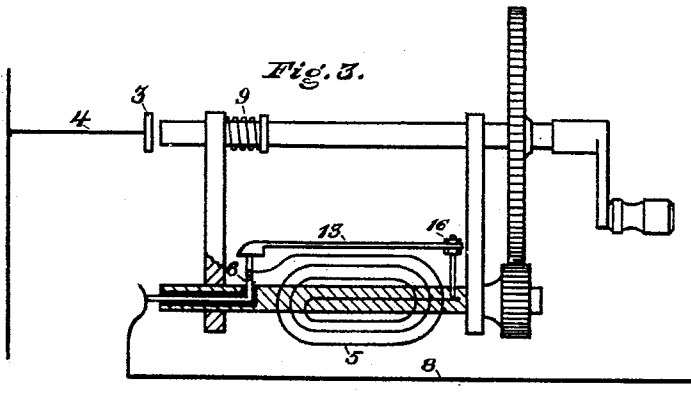
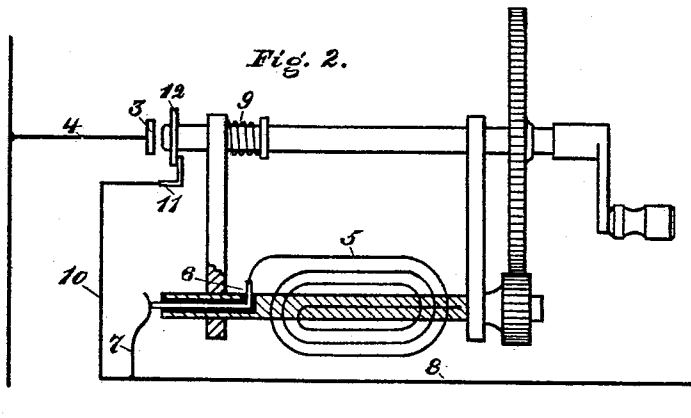
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SYSTEM FOR PROTECTING TELEPHONE APPARATUS FROM LIGHTNING.

No. 495,179.

Patented Apr. 11, 1893.



Witnesses.

E. C. Grigg.
J. B. Spaulth

Inventor.

John J. Carty
by Read & Price
his attys

UNITED STATES PATENT OFFICE.

JOHN JOSEPH CARTY, OF NEW YORK, N. Y., ASSIGNOR TO THE METROPOLITAN TELEPHONE AND TELEGRAPH COMPANY OF NEW YORK CITY.

SYSTEM FOR PROTECTING TELEPHONE APPARATUS FROM LIGHTNING.

SPECIFICATION forming part of Letters Patent No. 495,179, dated April 11, 1893.

Application filed August 5, 1892. Serial No. 442,243. (No model.)

To all whom it may concern:

Be it known that I, JOHN JOSEPH CARTY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Systems for Protecting Telephone Apparatus from Lightning; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to protect telephonic apparatus against damage by lightning.

The invention is particularly applicable to systems involving my system for bridging bells, as described in a patent issued to me March 31, 1891, No. 449,106. In systems of this character the calling and speaking apparatus are placed in multiple arc branches across the circuit connecting a series of two or more communicating stations. It often occurs in such systems during a thunder-storm that the lightning selecting the path of least inductive resistance will burn out the generator armature or injure the speaking apparatus. The branches in which the generator and speaking apparatus are placed are normally open, but the path through the generator or speaking apparatus being of low impedance comparatively to the bell path, offers a more ready path for the discharge of lightning, resulting in an injury to the apparatus contained therein. This results from the structure of this apparatus and is especially the case with the generator, in which lightning will frequently traverse the armature coil for a short distance or jump directly from one terminal to the armature core, and thence proceed from the frame work and through the usual break to the other side of the circuit.

In carrying out my invention I provide a shunt around the generator armature of low inductance and therefore offering a freer path for the lightning discharge than the coils of the armature or any other part of the station outfit, and provide means automatically thrown into operation by the generator for

opening this shunt when the generator is used for signaling. My invention therefore comprises a system in which the bridging bell method is adopted, having the armatures of the generators normally shunted by a path of low inductive resistance, the generators being provided with means for automatically opening the shunt when called into action.

Other features of my invention will be more specifically pointed out in the claims accompanying this specification.

My system differs widely from systems in which the calling apparatus of two or more stations is arranged in series relation to the connecting circuit; in the latter, generators are sometimes used provided with a normally closed shunt to reduce the ohmic resistance of the circuit. In such systems the line must be at all times closed through the generator, and a lightning discharge must traverse the entire station outfit in series, and the only function of the shunt is to lower the ohmic resistance of the circuit. In my system, however, the ohmic resistance of the circuit is unaffected by the generator shunt, as the branch in which the generator is located is a normally open branch.

In the accompanying drawings illustrating my invention, Figure 1 is a diagram illustrating a system equipped according to the bridging bell system provided with my present improvement. Fig. 2 is a view of a generator, partially shown in diagram, adapted for use in carrying out my invention. Fig. 3 is a similar view of a modified form of generator; and Fig. 4 is a view of another modification.

Referring first to Fig. 1, A and B represent two stations, each provided with a generator, a bell, and speaking apparatus, arranged in independent multiple arc branches across a connecting circuit. Although but two stations are shown it will be understood that any desired number might be used. The bell branch, as will be understood from a perusal of my patent aforesaid, is made of high inductive resistance preferably by providing the bell magnets with a large number of convolutions of fine wire, but the talking apparatus including the receiver and transmitter, and the generator branches are normally open,

the former being closed when the telephone is removed from its hook and the latter when the generator is called into operation. It is found in practice that the generator is often
 5 injured by the lightning jumping the break in its branch and the talking branch is sometimes similarly affected. In order to avoid these difficulties I provide a shunt of low inductance, as indicated at 1, 2, in Fig. 1, around
 10 the generator armature, so that in case of the line being struck by lightning an easy path of discharge across the break in the generator branch would be afforded through this path 1 or 2, and I further provide that this
 15 shunt shall be automatically disconnected when the generator is brought into service in calling. Various means may be resorted to for accomplishing these ends. For example, in Fig. 2 is shown a type of generator frequently
 20 used in telephonic service, in which the generator branch is completed by an inward thrust of the armature shaft when ringing. Such inward thrust brings a contact on the shaft into engagement with a co-operating
 25 contact 3 and closes the armature of the generator upon line over the path 4, 3, the frame of the machine, armature coils 5, insulated contact 6, contact spring 7, and wire 8. Upon discontinuing the use of the generator
 30 the shaft is restored to its normal position by a spring 9. In adapting this type of generator for use in my system I provide a shunt 10 terminating in the contact spring 11, which engages a co-operating contact 12 on the generator
 35 shaft when the latter is in its normal condition. This shunt forms a path of low inductive resistance around the armature coils and permits an easy discharge of lightning from one side of the circuit to the other
 40 through the break at 3, thus protecting the generator and other branches of the station outfit from damage. It will thus be seen that in a system equipped in this manner no extraordinary action upon the part of the operator
 45 or subscriber is needed to insure the safety of the apparatus. In a normal state a path of easy travel for lightning is afforded, and in signaling only the ordinary procedure is required.

50 In Fig. 3 the circuit-controlling device for establishing the shunt is mounted on the armature shaft, being controlled by a spring 13 which normally makes contact with the insulated
 55 pin 6, but is drawn away by centrifugal force upon the operation of the generator to open the shunt. One terminal of the armature coil is connected with the frame and the other with the pin 6, and the spring 13 carrying the shunting contact is electrically
 60 connected with the armature core. The circuit in calling is by way of wire 4, contact 3, frame, post 16, (spring 13 being thrown away by centrifugal force) armature coil 5, pin 6, and wire 8. In Fig. 4 is shown a generator in
 65 which the only act necessary upon the part of an operator in calling is to turn the crank shaft. In this case the shunt is controlled by

centrifugal action similarly to the case illustrated in Fig. 3, and a front and back contact are provided so as to maintain the integrity
 70 of the shunt in a condition of quiescence of the apparatus and to throw the generator into closed relation to the line and break the shunt upon operation of the crank shaft. The shunt
 75 in this case is established by simply mounting a pin 14 upon the armature with which a contact mounted on the end of spring 13 bears when the generator is not in use, and the pin 6 is formed into or provided with a
 80 back contact against which the contact mounted on spring 13 may be thrown by centrifugal force when the generator is in use. The spring 13 is connected with one end of the armature coil and the other is connected
 85 with the core of the armature. When the generator is in use the circuit is from one side of the line by way of wire 15, pin 6, spring 13, armature coil and the frame of the machine to the other side of the line. When
 90 the apparatus is not in use the armature coil is shunted through the core and pin 14, and the generator is cut out of circuit by the action of spring 13, leaving a break between the contact carried by this spring and the contact
 95 connected with pin 6 through which the lightning discharge will pass.

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

1. A signaling system comprising a circuit
 100 including two or more stations, each station being provided with a call bell bridging the circuit and generators in open multiple arc branches of the circuit, a shunt of low inductance around each generator armature,
 105 and a circuit controller automatically operated upon use of the generator to open the shunt and close the generator upon the line circuit, for the purpose described.

2. A telephonic system comprising a circuit
 110 including two or more stations, calling and talking apparatus at said stations, and a calling generator at each station normally forming a shunt of low inductance around said apparatus, said generator being provided
 115 with an automatic circuit-controller operative upon use of the generator to open the shunt and close the generator upon the line circuit, for the purpose described.

3. A signaling system comprising a circuit
 120 including two or more stations, each station being provided with a high resistance call bell bridging the circuit and generators in open multiple arc branches of the circuit, a shunt of low resistance around each generator
 125 armature, and a centrifugal circuit breaker mounted on the armature and normally closing said shunt, for the purpose described.

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

JOHN JOSEPH CARTY.

Witnesses:

EDWARD H. LYON,
 PAUL D. HONEYMAN.