

S. C. BRYANT.  
LIGHTNING ARRESTER.  
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1,296,362.

Patented Mar. 4, 1919.

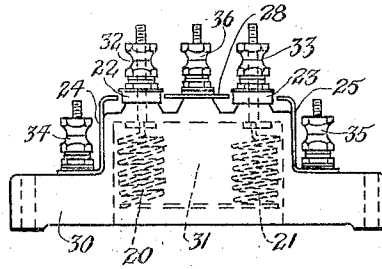


Fig. 1

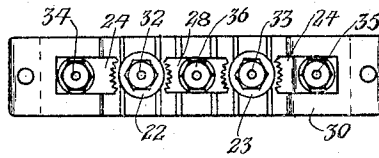


Fig. 2.

Fig. 3.

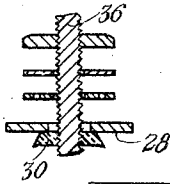


Fig. 4

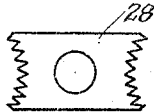


Fig. 5.

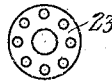


Fig. 6.

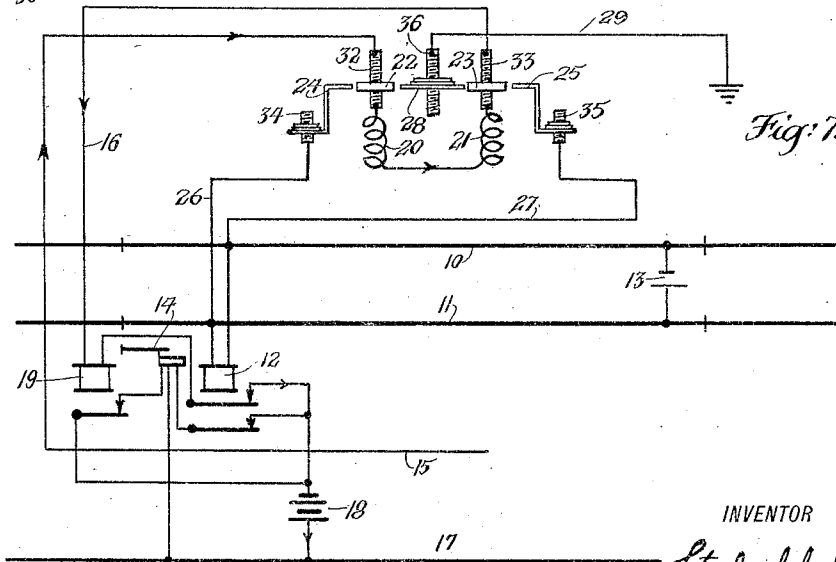
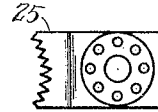


Fig. 7.

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## LIGHTNING-ARRESTER.

1,296,362.

Specification of Letters Patent.

Patented Mar. 4, 1919.

Application filed May 29, 1917. Serial No. 171,625.

*To all whom it may concern:*

Be it known that I, STANLEY CHARLES BRYANT, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Lightning-Arrester, of which the following is a specification.

My invention relates to lightning arresters for use with railway signaling systems, and the object thereof is to provide a lightning arresting device which will afford more effective protection to the signal controlling instruments located along the railway and adjacent the successive signals, than has heretofore been secured in prior lightning arresters as they have ordinarily been installed in railway signaling systems.

My invention consists in a lightning arrester in which the high tension oscillating currents or charges induced by a lightning discharge, or otherwise, and flowing along a line toward a signal controlling instrument or device, are diverted to and dissipated upon the railway rails adjacent the signal, or are conducted to the ground, or are neutralized in both said ways; and in a lightning arrester in which high tension charges present in the rails and due to any cause whatever are permitted to flow to the ground through a spark gap, or are equalized by providing for a flow of current from one rail to the other through one or more spark gaps, or are dissipated partly in one and partly in the other of said ways.

From the above it will be appreciated that my invention involves the relationship of lightning arresting elements including a spark gap provided by terminals from one to the other of which a charge may jump, to various of the elements of a railway signaling system and to the railway track associated therewith; and my invention includes the arrangement of lightning arresting elements relative to the signal system and rails hereinafter explained at length and finally claimed, as well as also a lightning arrester *per se*, regarded as an assemblage of elements whereby a spark gap or gaps across which a discharge of electricity may take place, is provided.

With the above enumerated and other objects of invention in view, my invention consists in the improved lightning arrester illustrated in the accompanying drawing

and hereinafter described and claimed, and in such variations and modifications thereof as will be obvious to those skilled in the art to which my invention relates.

In the drawing accompanying and forming a part of this specification and wherein the preferred embodiment of my invention is illustrated:

Figure 1 is a view illustrating the base or block which supports the terminals, connectors and spark plates, and the choke coil of my improved lightning arrester, in side elevation;

Fig. 2 is a view showing the same in plan;

Figs. 3, 4, 5 and 6 are views showing various elements of the device illustrated in Figs. 1 and 2; and

Fig. 7 is a view in the nature of a diagram illustrating one method of connecting the terminals, spark plates, choke coil and other elements whereby spark gaps are provided, with the controlling circuit and insulated track section of a railway signaling system; the various elements of the system being shown conventionally, as will be appreciated.

Referring to the drawing, the reference numerals 10, 11, designate rails insulated from one another and from the ground, and insulated also from the rails upon each side of them, whereby an insulated track section is provided such as is in common use in railway signaling systems.

Current is supplied to the rails and to a track relay 12 by a track battery 13, which, upon being short circuited by the wheels and axle of a railway vehicle running onto the said rails, causes the relay to release its armature to thereby control the operation of a suitable signal 14, all as is common in railway signaling systems.

The track relay 12 controls a suitable signal operating and controlling circuit 15, 16, 17, which circuit includes a local battery 18 and a relay 19 in the embodiment of my invention illustrated; the details of which circuit, however, vary in signaling systems in common use; according to the character of the signal to be operated, and the positions which it is to be made to assume.

The circuit above referred to commonly extends to a considerable distance along the railway, and the object of my invention is to provide a lightning arrester located adjacent each signal and the purpose of which is

to protect the mechanism whereby the signal is controlled and operated from high frequency currents produced by lightning discharges and flowing toward the signal in question along the line or controlling circuit; whatever may be the characteristics of the circuit, or the particular features of construction and arrangement of the controlling devices included in the circuit; to which end my invention includes both the lightning arrester *per se* illustrated in Figs. 1 and 2, as well as also the arrangement of said arrester relative to the controlling circuit and insulated track section, or, as otherwise stated, the manner in which the various elements of the arrester are connected with the signal system considered in its entirety.

Included in the controlling circuit above traced is a reactance or choke coil preferably made in two sections 20, 21 for convenience in housing the same in the supporting base or block of the lightning arrester *per se*, and 22, 23 designate two spark plates associated with said circuit and located adjacent the ends of the said coil, as illustrated; which spark plates are preferably in the form of disks of hard carbon, although the details of material and construction of the spark plates are not involved in this present application.

The reference numerals 24, 25 designate two terminals made, preferably, of brass, and having a plurality of teeth, as shown, and which terminals are spaced apart from the spark plates above referred to whereby a spark gap is provided between each terminal and the spark plate adjacent thereto, and which terminals are connected one with one and the other with the other of the insulated rails 10, 11 through conductors 26, 27; and the reference numeral 28 designates a third similar terminal associated with the spark plates 22, 23 and spaced apart from each, whereby spark gaps are provided between said last mentioned terminal and each of said spark plates, said terminal being grounded through a ground connection 29 and the same being preferably located between the spark plates; all as illustrated in Fig. 7 of the drawing.

While the elements which form the lightning arrester *per se* shown conventionally in Fig. 7 may be supported in proper position relative to one another in any way so long as the end in view is attained, I prefer to support them upon a supporting base or block 30 made of porcelain or equivalent insulating material as shown in Figs. 1 and 2; which block is provided with a recess or cavity as shown at 31, and within which recess the sections 20, 21 of the choke coil are located, as shown in dotted lines in Fig. 1. Suitable connectors 32, 33 are associated with the spark plates 22, 23 and carried by the supporting base, whereby the choke coil

may be included in the controlling circuit hereinbefore referred to; the two terminals 24, 25 are secured to said base through connectors 34, 35 with which the conductors 26, 27 are connected as shown; and the ground conductor is connected with the third terminal 28 carried by said base and located between the spark plates through and by means of a connector 36.

Such being the structural features of my improved lightning arrester, and the arrangement of the said features and elements relative to the signaling system to be protected thereby, the operation thereof is as follows:

Should an oscillating high frequency and high potential current be set up in the controlling line by a lightning discharge or otherwise, said current will be prevented from flowing to the signal controlling elements of the system by the reactance or choking effect of the choke coil, and will jump the spark gaps provided at the spark plates. The static charge thus diverted from the controlling circuit or line may pass through the terminals 24, 25, and become dissipated or equalized upon the rails 10, 11, which have considerable capacity as will be appreciated; or may pass to the terminal 28 and to the ground through the ground connection connected therewith; or may divide between the two paths provided for the flow of static electricity from the line provided in my lightning arrester, as will be appreciated. Again, should a static charge appear or be established by any agency upon the rail sections 10, 11 (which frequently occurs in practice and is liable to cause injury to the track relay), the same will flow through the conductors 26, 27 and jump across such spark gaps as it may encounter between the terminals 24, 25 and the grounded terminal 28, and pass therethrough to the ground; or may jump the plurality of spark gaps in series provided in my device between one of the rail sections and the other, thus becoming equalized upon the rails and dissipated without passing to the ground; or may divide between the two paths thus provided and be in part equalized and in part conducted to the ground, as will be understood from Fig. 7 of the drawing.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In a lightning arrester for railway signaling systems, a controlling circuit; a choke coil included in said circuit; an insulated track section; a spark plate associated with said circuit and located adjacent said coil; and two terminals adjacent and spaced apart from said plate whereby two spark gaps are provided, one of said terminals being grounded and the other being connected with said track section.

2. In a lightning arrester for railway signaling systems, a controlling circuit; a choke coil included in said circuit; two insulated rails; two spark plates associated with said circuit and located adjacent the ends of said coil; two terminals spaced apart from said plates whereby spark gaps are provided between said terminals and said plates, and which terminals are connected one with each of the rails aforesaid; and a ground connection including a spark gap across which a discharge of electricity may take place from said circuit.

3. In a lightning arrester for railway signaling systems, a controlling circuit; a choke coil included in said circuit; two insulated rails; two spark plates associated with said circuit and located adjacent the ends of said coil; two terminals spaced apart from said plates whereby a spark gap is provided between each terminal and the plate adjacent thereto, and which terminals are connected one with each of the rails aforesaid; and a third grounded terminal located between and spaced apart from said plates whereby a spark gap is provided between each plate and said third terminal.

4. In a lightning arrester for railway signaling systems; a supporting base formed from non-conducting material and having a recess; a choke coil located within said recess; two connectors carried by said base

whereby said coil may be included in a circuit; two spark plates associated one with each of said connectors; a terminal carried by said base and located between and spaced apart from said plates whereby a spark gap is provided between said terminal and each of said plates; and two other terminals carried by said base and spaced apart from said plates whereby a spark gap is provided between each of said plates and one of said last mentioned terminals.

5. In a lightning arrester for railway signaling systems, a controlling circuit; a choke coil included in said circuit; two insulated rails; means for providing two spark gaps, one adjacent each end of said coil; and two conductors, one leading from one of said rails to one of said spark gaps and the other from the other rail to the other spark gap.

6. In a lightning arrester for railway signaling systems, a controlling circuit; a choke coil included in said circuit; two insulated rails; means for providing two spark gaps, one adjacent each end of said coil; two conductors, one leading from one of said rails to one of said spark gaps and the other from the other rail to the other spark gap; a ground connection; and means for providing a spark gap between each end of said coil and said ground connection.

STANLEY CHARLES BRYANT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."