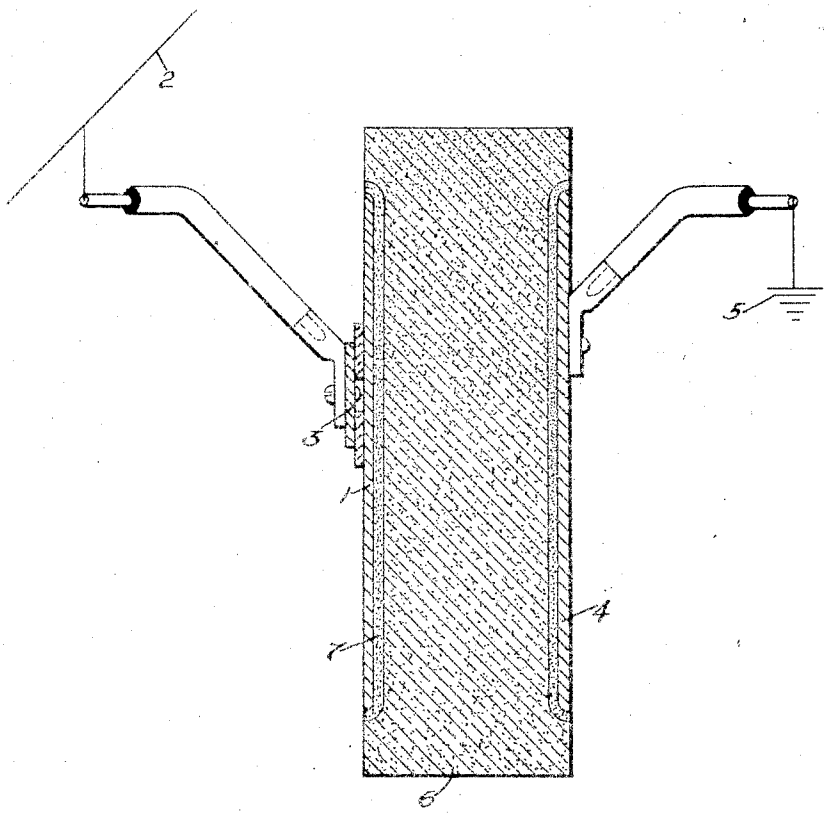
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C. T. ALLCUTT

LIGHTNING ARRESTER

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WITNESSES:
J. B. Merrill
F. A. Lind

INVENTOR
Chester T. Allcutt
BY
Wesley G. Carr
ATTORNEY.

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UNITED STATES PATENT OFFICE.

CHESTER T. ALLCUTT, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

LIGHTNING ARRESTER.

Application filed May 6, 1919. Serial No. 295,162.

To all whom it may concern:

Be it known that I, CHESTER T. ALLCUTT, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lightning Arresters, of which the following is a specification.

My invention relates to lightning arresters and it has particular relation to apparatus of the character designated wherein two electrodes composed of conducting material are spaced apart by means of a discharge block composed of particles of conducting and non-conducting materials.

The object of my invention is to provide an arrester of the character indicated wherein any discharge of current through the block caused by a voltage slightly above the normal will be allowed to pass to ground without, in any way, permanently affecting the arrester and wherein any excessive or prolonged discharge of current caused by a very high potential being impressed on the arrester will automatically increase the resistance thereof to a point which renders continuous flow of current through the established path impossible, thereby causing the discharge to seek a new path, provided the voltage is still above normal.

Heretofore, it has been suggested to place a block of carbon or similar refractory conducting material between two plate electrodes and to place a filler of lead peroxid between the carbon and the electrodes. The electrodes are each provided with an insulating film on the side adjacent the lead peroxid which prevents continuous passage of current therethrough when a difference of potential exists between the two electrodes.

By my invention, I provide an arrester in which the carbon block is replaced by a discharge block formed of particles of conducting material held in invariable but spaced relation by means of particles of non-conducting material, thereby eliminating the necessity of the insulating film and improving the protection afforded by the arrester.

In the accompanying drawing, I show an arrester provided with a conducting plate or electrode 1 connected to a supply circuit 2, through a spark gap 3, and a similar conducting plate or electrode 4 spaced therefrom and connected to ground at 5. The plates 1 and 4 are spaced apart by means of a discharge block 6 composed of intermingled particles of conducting and non-conducting material, the conducting particles, such for example as carborundum, being held in invariable, but spaced, relation by means of the non-conducting particles. Intermediate the conducting plates and the discharge block 6 are disposed layers 7 of lead peroxid or some similar material which is normally of low resistance and is converted by heat into a material of relatively high resistance.

In an arrester of this type, any small discharge of current of short duration caused by a slightly abnormal potential will pass through the lead peroxid and through the discharge blocks to ground without producing any appreciable increase in temperature thereof, on account of the cooling effect of the discharge block. However, should a large current pass through the arrester caused by a very high potential being impressed on the supply circuit to which it is connected, the discharge block will be heated at the point where the current passes through which will heat the lead peroxid adjacent thereto, thus changing it to a lower oxid of relatively great resistance. Also, a continuous passage of a small current through a localized path would have the same effect.

It will be readily understood by those skilled in the art that a discharge block of the character described will prevent any continuous discharge therethrough at normal voltage and that, if the discharge block contains any imperfection whereby a continuous path for current or a path of undesirable low resistance is provided through the block, the action of the lead peroxid will permanently seal this path, thereby restoring the arrester to its desired condition.

Also, a discharge block of the character described possesses the inherent property of being substantially non-conducting to currents of normal voltage, of relatively great resistivity to currents having a voltage slightly above normal, and of relatively small resistivity to currents having an excessive voltage. This fact aids in preventing any change in the lead peroxid when a current caused by a slightly abnormal voltage passes through the arrester and in caus-

ing a permanent change in the lead peroxid when a current caused by an excessively high voltage obtains.

While I have shown but one form of my invention and described in detail only one application of the same, it will be understood by those skilled in the art that it is not so limited but is susceptible of various minor changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or are specifically set forth in the appended claims.

I claim as my invention:

1. An electrical discharge device comprising a plurality of spaced conducting members, means disposed intermediate said members embodying intermingled particles of conducting and insulating material and a layer embodying a metal compound which becomes converted by heat into a compound of high resistance.

2. An electrical discharge device comprising a plurality of spaced conducting members, means disposed intermediate said members embodying a layer of intermingled particles of conducting and insulating material, the conducting particles being held in a substantially invariable relation but out of contact with each other and a layer embodying a conductive oxid which becomes converted by heat into a different oxid of higher electrical resistance.

3. An electrical discharge device comprising a plurality of spaced conducting members, means disposed intermediate said members embodying a layer of intermingled particles of conducting and insulating material, the conducting particles being held in a substantially invariable relation but out of contact with each other, and a layer of a metal compound of low heat conductivity and low electrical resistance which becomes converted by heat into a compound of different chemical composition and high electrical resistance.

4. An electrical discharge device comprising a plurality of spaced conducting members, means disposed intermediate said members embodying a layer of intermingled particles of conducting and insulating material, the conducting particles being held in a substantially invariable relation but out of contact with each other, and a layer of lead peroxid

5. A lightning arrester comprising two conducting plates each provided with a coating of lead peroxid and spaced apart by means of a block embodying a mixture of conducting and non-conducting particles, the conducting particles being held in invariable relation but out of contact with each other by the non-conducting particles.

6. A lightning arrester comprising two spaced conducting plates, one of which is connected to a source of electromotive force and the other of which is connected to ground, a body composed of intermingled particles of conducting and insulating material disposed intermediate said plates, and a layer of lead peroxid disposed intermediate each of said plates and said body of commingled particles.

7. An electrical discharge device comprising a plurality of spaced electrodes, means disposed intermediate said electrodes embodying a body of material the conductivity of which increases with an increase of voltage and a layer of conductive oxid which becomes converted by heat into a different oxid of higher electrical resistance.

8. An electrical discharge device comprising a plurality of spaced electrodes, means disposed intermediate said electrodes comprising a body of material the conductivity of which increases with an increase of voltage, and a layer of a metal compound which becomes converted by heat into a salt of high resistance.

9. An electrical discharge device comprising a plurality of spaced electrodes certain of which are connected to a supply circuit, means disposed intermediate said electrodes comprising a body of material which is substantially non-conductive at normal voltage of said supply circuit and the conductivity of which increases with an increase of voltage thereof and a layer of a metal compound which becomes converted by heat into a compound of high resistance disposed intermediate said body and said electrodes.

10. An electrical discharge device comprising a plurality of spaced electrodes certain of which are connected to a supply circuit, means disposed intermediate said electrodes comprising a body of material the conductivity of which increases with an increase of voltage of said circuit, and a layer of lead peroxid.

11. An electrical discharge device comprising a plurality of spaced electrodes one of which is connected to a supply circuit, means disposed intermediate said electrodes comprising a body of material which is substantially non-conductive at the normal voltage of said circuit and the conductivity of which increases with an increase of voltage thereof, and a layer of lead peroxid disposed intermediate said body and said electrodes.

12. A lightning arrester comprising two electrodes, one of which is connected to a supply circuit, a plurality of current paths extending therebetween the conductance of which is substantially nil at normal potential of said circuit and which varies in direct relation with excessive potentials impressed thereon and in inverse relation to the current passing through said arrester.

13. A lightning arrester comprising two electrodes, one of which is connected to a supply circuit, said electrodes being spaced apart by bodies composed of different kinds of material, the conductance of one of said materials varying directly with the voltage impressed on the circuit and the conductance of the other of said materials varying inversely with current passing through the arrester.

14. A lightning arrester comprising two electrodes, one of which is connected to a supply circuit, said electrodes being spaced apart by bodies composed of different kinds of material, the conductance of one of said materials being substantially nil at the normal potential of said supply circuit and varying in direct relation with the impressed potential thereof and the resistivity of the other of said materials being substantially nil for relatively small currents passing through said arrester and varying in direct relation with relatively large currents passing therethrough.

In testimony whereof, I have hereunto subscribed my name this 24th day of April, 1919.

CHESTER T. ALLCUTT.