Oct. 7, 1924. 1,510,731

P. P. WILLIAMS

LIGHTNING ARRESTER

Filed June 23, 1922

Fig. 3.

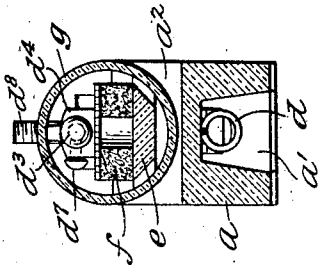


Fig. 1.

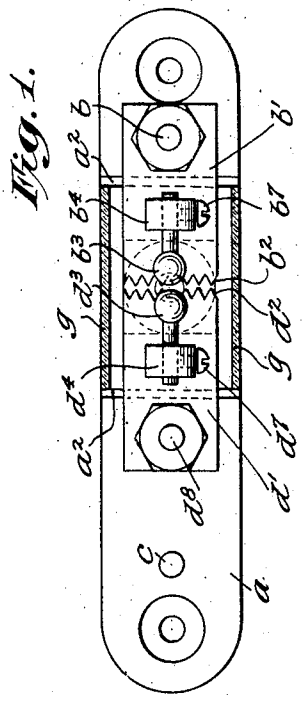
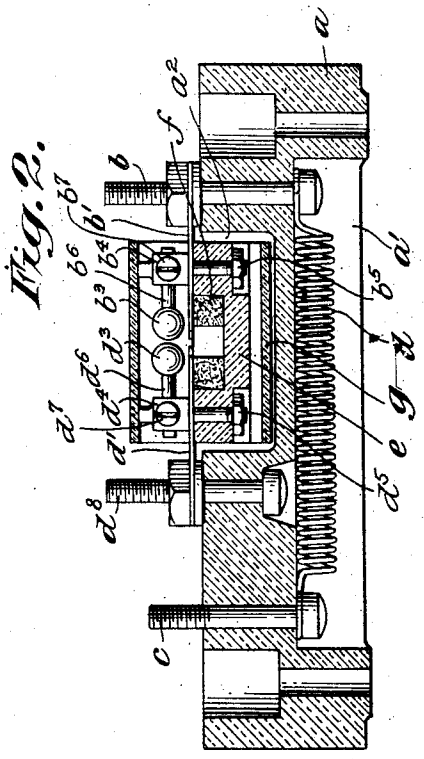


Fig. 2.



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UNITED STATES PATENT OFFICE.

PEARCE P. WILLIAMS, OF NUTLEY, NEW JERSEY.

LIGHTNING ARRESTER.

Application filed June 23, 1922. Serial No. 570,283.

To all whom it may concern:

Be it known that I, PEARCE P. WILLIAMS, a citizen of the United States, residing in Nutley, in the State of New Jersey, have invented certain new and useful Improvements in Lightning Arresters, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to a lightning arrester designed generally for use wherever lightning and low static discharges need to be grounded as a protection to the apparatus in circuit. More particularly, the arrester is designed primarily for use in radio sets.

It has been found in practice that static discharges vary in wave length and frequency and in other characteristics in such respects that the same elements may not be relied upon for their transmission to the ground and elements varying in resistance need to be provided so that such discharges may take different paths depending upon their characteristics. Further, such arresters as have been provided generally include an air gap formed with points which are very sensitive to discharges and are frequently flattened or fused in such manner as to make the arrester unfit for further protective service. This not only necessitates a frequent and careful inspection and constant replacement but gives rise to a dangerous condition since it exposes the apparatus. The principal object of the present invention is to provide in a device of the character described a spark gap formed by electrodes which are not liable to injury in the manner described with reference to the pointed gaps and yet which shall provide a path offering the resistance desired for proper protection of the apparatus in circuit. Still another object of the invention is to provide in combination with a spark gap formed with electrodes having extended discharge surfaces a second gap in parallel therewith in which points are provided as a path for static discharges having different characteristics from those which will follow the path afforded by the first named elements. More particularly, the invention seeks to provide in a lightning arrester, especially designed for radio work, an air gap in which spheres having an extended superficial discharge surface are mounted in spaced relationship to offer the desired degree of resistance and afford a path for static discharges without liability of injury as by flattening or fusing.

Other general objects of the invention have to do with manufacturing considerations such as simplicity of construction, interchangeability and standardization of parts, accessibility for introduction into circuits and, where desired, the inclusion of an additional path for discharges formed of a carborundum element of a resistance different from those provided by the spark gaps.

Reference is now to be had to the accompanying drawings for a detailed description of a simple embodiment of the invention which is shown merely by way of example and in which:

Figure 1 is a view in plan of the arrester, the glass cover being shown in section.

Figure 2 is a view in vertical section through the device illustrated in Figure 1.

Figure 3 is a view in transverse section thereof.

The base a of the arrester may be of any suitable form and of insulating material, such as porcelain and carries binding posts b and c one of which b may be connected to the aerial and the other of which c may be connected to the instruments or other equipment in circuit. In radio practice a choke coil d may be connected to these posts and be nested in a recess a' provided in the under-face of the base a. A third binding post d^8 is also mounted in the base and connected to ground, the invention having to do primarily with the means for establishing resistance paths for static discharges between the post b and the ground post d^8 to the end that such discharges and lightning may find their way to the ground rather than to the instruments in circuit from the binding post c. It has been found that such static discharges vary in characteristics in such manner as to make the conventional form of spark gap unsuitable for all conditions and liable to such permanent derangement as to expose the instruments to later injury. In accordance with the present invention electrodes b', d', are connected to the binding posts b, d^8, respectively, and are formed as plates so disposed

with respect to one another as to provide a spark gap with opposed points b^2, d^2, respectively, leaving an air gap across which discharges of certain characteristics may jump. This type of spark gap has been employed heretofore but it has been found that points of this form are usually flattened or actually welded by static discharges of certain characteristics and when so deranged the instruments may be exposed to subsequent discharges. This gives rise to a constant necessity for inspection and replacement and the ever present liability of derangement before such inspection and replacement. It is the principal object of the present invention to avoid such a condition by providing in an arrester for the purpose described an alternative path for such discharges which will take care of such discharges as might injure an air gap formed by such electrodes b', d'. Such an alternative path is illustrated in the preferred embodiment as including two spaced spheres b^3, d^3, which constitute electrodes connected with the plates b', d', respectively. In the interest of cheapness in manufacture and facility of assembly and adjustment it is proposed to mount the spheres b^3, d^3, on posts b^4, d^4, respectively, which are in contact with the electrodes b', d', and are secured removably within a suitable insulating block e of fiber or the like by nuts b^5, d^5, respectively. In the upper ends of the posts b^4, d^4, are slidably mounted shanks b^6, d^6, on which the spheres b^3, d^3 are carried, these spheres being secured in adjusted position by means of set screws b^7, d^7, respectively, carried in the posts b^4, d^4. By this mounting, it is evident that the parts may be readily assembled in the first instance and adjustment of the air gap between the spheres b^3, d^3, made to a nicety. The path provided by the electrodes b^3, d^3, is in parallel with the path afforded by the spark gap formed by the points b^2, d^2, and it is evident that lightning or static discharges transmitted from the aerial to the post b may traverse either one or the other of the spark gaps depending upon the frequency, wave length and other characteristics. It has been found in practice that such discharges as would ordinarily derange spark points such as b^2, d^2, will take such a path as is established by the spheres b^3, d^3, the superficial discharge surface of which is so much greater as to permit the discharge to traverse the air gap therebetween without injuring the spheres. Contrariwise, the two gaps are so designed that discharges which will not injure the points b^2, d^2, may take that path.

If desired, it is practicable to incorporate in the improved arrester a third path which may be formed by the interposition of carborundum f between the plates b', d'. In the interest of cheapness of manufacture, compactness and accessibility, the improved arrester in its preferred form includes a carborundum annulus f which is mounted within a recess provided therefor in the insulating block e directly under and in contact with the two electrodes b', d'. It is preferred to have this annulus f so mounted with respect to the electrodes b', d', as to place the latter under some stress and thereby insure an intimate contact. The annular form of the disk insures a path of adequate length for the discharges and the resistance properties of the carborundum, as well known, are such as to take care of many static discharges. The path thus provided is in parallel with the paths afforded by the spark points b^2, d^2.

All of the elements described in connection with the arresting function are associated and combined so as to form a unit which may be applied to or removed from the base a of the arrester as a whole and without disturbing the binding posts b, c, d^8. For convenience, support is afforded to such a unit through the electrodes b', d'. The upper face of the base a is recessed as at a^2 to receive the insulating block e on which all of the units are carried and when the electrodes b', d', are connected with the binding posts b, d^8, respectively, which pass through such electrodes the block e with all of its units thereon is suspended within the space a^2. As a protection to the elements they may all be enclosed, after assembly, but before mounting of the block e, within a glass tube g which fits thereover and yet affords ready inspection by reason of its transparency.

From the description given it will be apparent that all electrical conditions are provided for by the alternative paths within such ranges as to permit the grounding of lightning and static discharges through appropriate elements which themselves will not be deranged ordinarily. Of course, in the case of a direct hit the elements may be destroyed although the instruments would be adequately protected. If destroyed, however, a new unit may be inserted in the original base by merely removing the block e and its associated elements. The parts are all of simple and inexpensive construction and may be readily assembled, inspected, repaired or replaced. The unit is compact and lends itself to convenient mounting. A relatively large superficial area of the sparking spheres b^3, d^3, insures long life thereof and protection to the instruments even in the case of a breakdown of the other resistance elements.

It is to be understood that modifications of the details of construction of the unit may be made without departing from the spirit of the invention so long as the condi-

tions provided for herein are met by means which are equivalent to those disclosed and claimed.

What I claim is:

1. In an arrester of the character described, terminals including a ground terminal, resistance elements interposed between the ground terminal and one of the remaining terminals and including two paths of electrodes connected, respectively, with said last named terminals and spaced apart, respectively, to provide air gaps, one pair of said electrodes having spark points at the gap and the other pair of said electrodes having spark spheres at the gap and a carborundum element connected with said electrodes and forming an alternative path for static discharge.

2. In an arrester for the purpose described, in combination, terminals including a ground terminal, resistance elements interposed between the ground terminal and one of the remaining terminals and comprising electrodes connected with said last named terminals, spark spheres mounted on said electrodes and spaced apart to form an air gap and a carborundum element connected with said electrodes and forming an alternative path for static discharges.

3. As an article of manufacture, a lightning arrester having an insulating base, terminals mounted in the base including a ground terminal, resistance elements forming alternative paths in parallel between the ground terminal and one of the remaining terminals, an insulating block on which said resistance elements are carried, said base of the arrester being provided with a recess to receive the block and means to support the block removably within said recess.

This specification signed this 22nd day of June A. D. 1922.

PEARCE P. WILLIAMS.