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A. L. ATHERTON

LIGHTNING ARRESTER

Filed April 6, 1923

Fig. 1.

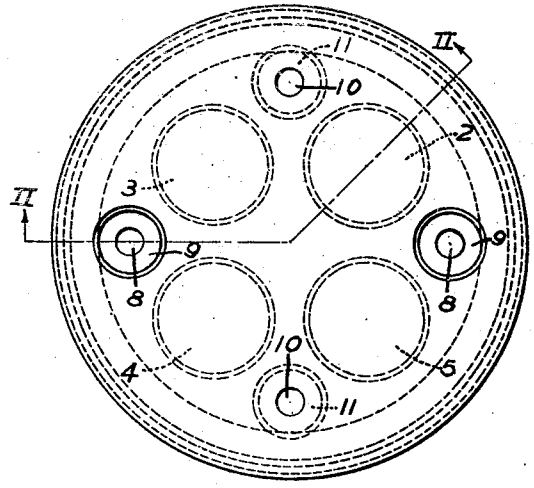


Fig. 2.

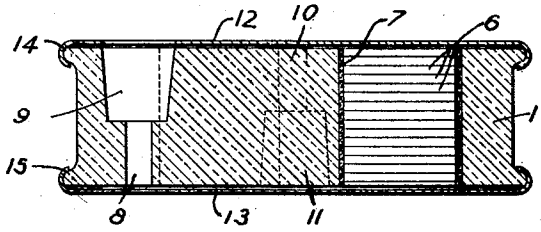
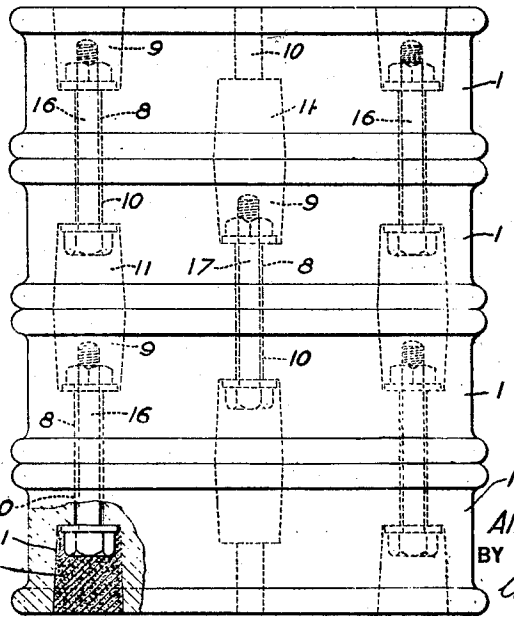


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALFRED L. ATHERTON, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

LIGHTNING ARRESTER.

Application filed April 6, 1923. Serial No. 630,270.

My invention relates to lightning arresters, especially to a new type of lightning arrester including suitably shaped bodies of high resistance material, such as plates, so placed as to provide a plurality of relatively short discharge gaps therebetween, the said gaps breaking down at a predetermined voltage.

More particularly, this invention relates to the manufacture of a practical structure embodying the principles of the said arrangement.

It is among the objects of this invention to provide a lightning arrester unit which shall have a relatively large discharge capacity, which shall be self-contained and so formed as to permit any desired number of such units to be readily assembled to provide any desired size of lightning arrester.

In practising my invention, I provide an insulating housing, preferably cylindrical, and generally consisting of porcelain or similar material. I provide a plurality of openings therein, usually arranged symmetrically with respect to the axis of the insulating housing within which the discharge members are placed. The said members are usually in the form of disks, spaced apart a small distance, 3 to 5 mils, either by mica or other spacers, or by ribs or projections integral with, or separated from, the said disks. Metallic cover members are secured to the ends of the housing, thus enclosing the discharge members and preventing accidental displacement thereof, at the same time serving as an electrical connection whereby the individual sets of discharge members may be connected in parallel.

There is further provided a series of countersunk openings, parallel to the discharge members and arranged in a circle along the outer edge of the insulating housing, some of said countersunk portions being on one of the ends of the housing and an equal number on the opposite end thereof. The latter openings serve as means for bolting a plurality of the units together to provide an integral structure.

In the accompanying drawings constituting a part hereof and in which like reference characters indicate like parts,

Figure 1 is a plan view of a unit made in accordance with my invention;

Fig. 2 is a vertical cross-sectional view thereof taken along the line 2—2 of Fig. 1, and

Fig. 3 is an elevational view of a plurality of units bolted together, a part of one of the units being shown in cross section.

A cylindrical insulating housing 1 of baked porcelain is provided with flanges on the ends thereof and a series of openings 2, 3, 4 and 5 arranged in a circle about the axis of the housing 1. A series of disks or plates 6 of high resistance material, spaced apart slightly by any suitable means and usually held together in their proper positions by insulating cement 7, is placed in each of the said openings and they serve as the discharge members of the lightning arrester. A series of openings 8, arranged in a circle concentric with the openings 2, 3, 4 and 5 and spaced along the outer edge of the housing 1, is provided with countersunk portions 9 adjacent to one end of the housing. A similar series of openings 10 has countersunk portions 11 adjacent to the opposite end of the said housing.

Cover members 12 and 13 of copper or other suitable material have their edges 14 and 15, respectively, crimped over the annular flanges of the insulating housing to securely hold the same in place. The cover members, in addition to serving as means for holding the discharge members 6 in position, serve as an electrical connection whereby the sets of discharge members are connected in parallel relation.

Units of this character may be assembled by placing two such units with openings 8 and 10 in alinement, passing bolts 16 therethrough, and securing the same in place. If more than two units are to be utilized in a lightning arrester, other units are placed adjacent to the first assembled units and bolts 17 passed through openings 8 and 10 and secured in position.

I generally pour a cement 18 of suitable character into one of the countersunk openings to completely enclose the end of the bolt, and allow the same to set. The cement holds the bolts in place and allows the nuts to be threaded thereon with less difficulty. I have found that, with my new structure, there is sometimes a tendency for a discharge to flashover between bolts 16 and 17 across the countersunk portions 9 and 11, and, to obviate this, the cement 18 is made

insulating, thus effectively preventing flash-over, in addition to holding the bolts in position.

It will be noted that my invention provides a compact unit having a multiplicity of discharge members of predetermined capacity, so that each unit may be designed for any desired voltage. In order to produce a lightning arrester for any desired voltage, it is only necessary to assemble the necessary number of such units by bolting the same together. The construction of each unit is relatively simple and it is very rugged. In order to repair the same, it is merely necessary to remove one or both of the cover members, remove the disks from the housing and replace the member.

Although I have described by invention, setting forth a specific example of the construction thereof, it is apparent that my invention is not limited to the details shown and described. For instance, I may omit the insulating cement 18 and, if desired, replace the metal bolts 16 and 17 by non-metallic material. The number and arrangement of the openings in the housing is not essential and any other suitable arrangement may be used in place thereof. These and various other changes may be made in my invention within the scope thereof.

I claim as my invention:

1. A parallel-connected disk-pile structure comprising a plurality of piles of superposed prepared disks, a supporting body member having a plurality of perforations for receiving the respective piles of disks, and a metallic plate member secured to each end of said body member and constituting the sole retaining means for restraining the disks of all of the enclosed piles against longitudinal displacement and for electrically connecting the several piles in parallel.

2. A serially connected disk-pile structure comprising a self-supporting, substantially rigid stack of superposed units, each unit comprising a plurality of piles of superposed prepared disks, a supporting body member having a plurality of perforations for receiving the respective piles of disks, and a metallic plate member secured to each end of said body member and constituting the sole retaining means for restraining the disks of all of the enclosed piles against longitudinal displacement and for electrically connecting the several piles in parallel, the body members of the several units having a plurality of bolt-holes, some countersunk on one end and some countersunk on the other end, and bolts in said countersunk bolt-holes for securing the units together.

3. A lightning arrester comprising a plurality of units each including an insulating housing having a plurality of openings therein, a column of resistance members in each of said openings, a plurality of countersunk openings in said housing and bolts in said countersunk openings for securing adjacent pairs of said units together.

4. A lightning arrester comprising a series of discharge units disposed upon each other, each unit comprising a body of insulating material provided with end surfaces conforming to the surfaces of the adjacent units and having a plurality of perforations extending between said end surfaces, parallel columns of discharge members disposed in said perforations, two sets of bolt connections, offset with respect to each other, for connecting each unit to the units disposed on both ends thereof, respectively, and conducting plates enclosing the end surfaces of each of said units and in electrical contact with the ends of said columns, said plates having openings registering with said sets of bolt connections.

5. A lightning arrester comprising a series of discharge units disposed upon each other, each unit comprising a body of insulating material provided with end surfaces conforming to the surfaces of the adjacent units and having a plurality of perforations extending between said end surfaces, parallel columns of resistance discs, constituting a series of minute gaps, disposed in said perforations, two sets of bolt connections offset with respect to each other for connecting each unit to the units disposed on both ends thereof, respectively, and conducting plates enclosing the end surfaces of each of said units and in electrical contact with the end terminals of said disc columns, said plates having openings registering with both of said sets of bolt connections.

In testimony whereof, I have hereunto subscribed my name this 29th day of March, 1923.

ALFRED L. ATHERTON.