No. 807,962. PATENTED DEC. 19, 1905.

G. W. PICKARD.

CARBON PLATE FOR PROTECTIVE DEVICES.

APPLICATION FILED APR. 14, 1904.

Fig. 1.

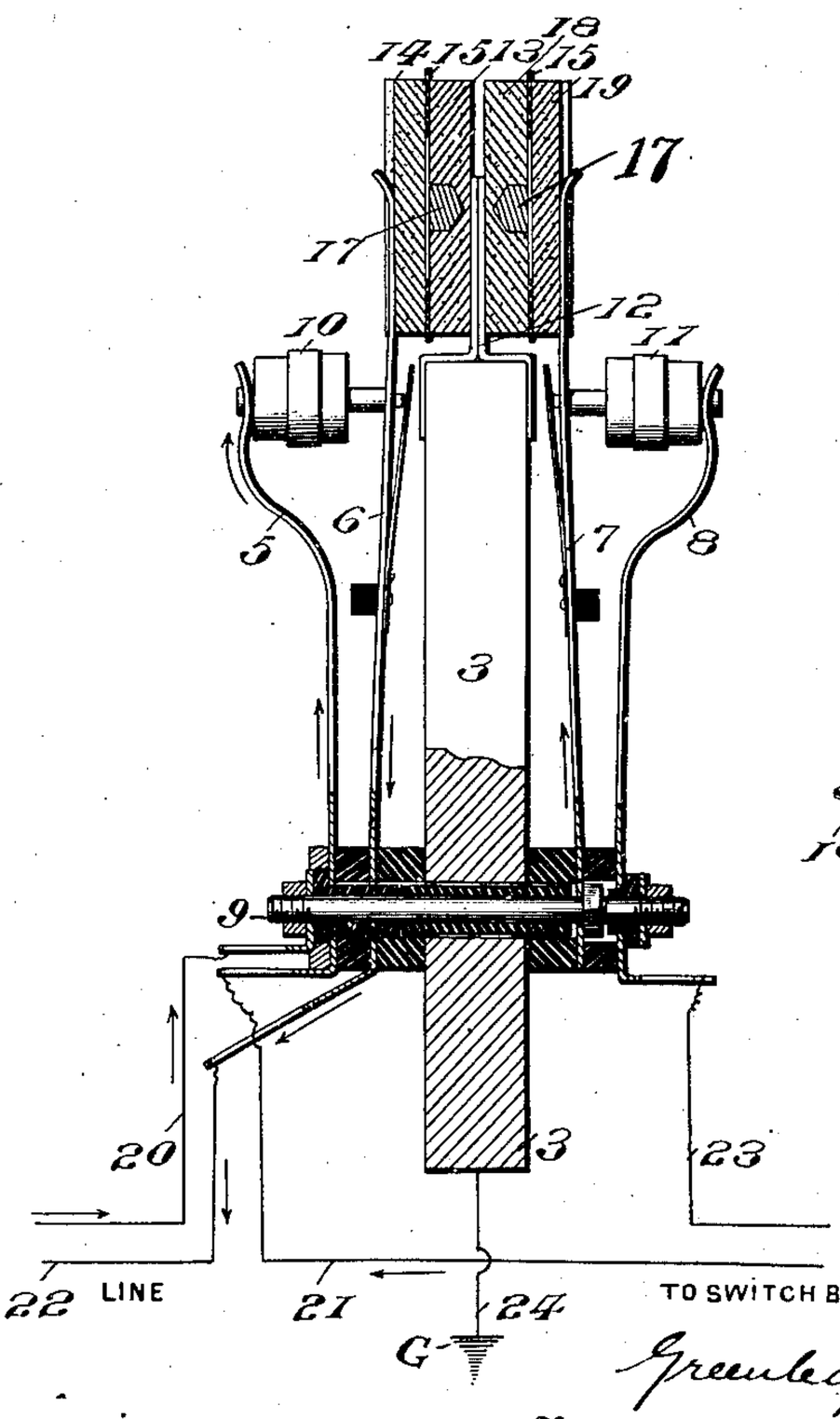
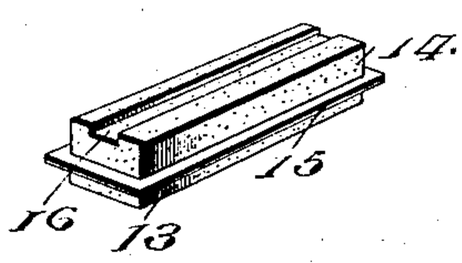


Fig. 2.



Inventor

Witnesses

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UNITED STATES PATENT OFFICE.

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CARBON PLATE FOR PROTECTIVE DEVICES.

No. 807,962. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed April 14, 1904. Serial No. 203,159.

To all whom it may concern:

Be it known that I, GREENLEAF WHITTIER PICKARD, residing at Amesbury, in the county of Essex and State of Massachusetts, have invented certain Improvements in Carbon Plates for Protective Devices, of which the following is a specification.

The standard protectors used for the protection of central-office and substation telephone apparatus comprise open-space cut-outs, by way of which trespassing high-pressure currents are diverted from the protected apparatus and passed to earth. In case of lightning discharges or momentary crosses with high-pressure circuits, such as electric light or power circuits, the high-pressure current or charge passes to earth by a disruptive discharge across the open space or air-gap, while in case of continued crosses the cut-out establishes a continuous short circuit across the air-gap to ground. The resistance offered by the open space prevents the passage to ground of the relatively low-pressure telephone talking and ringing currents.

The open-space arresters or protectors now generally used consist of two carbon terminal blocks or electrodes separated by a mica plate or sheet, against the opposite faces of which the blocks bear, one terminal block being connected to one of the telephone-line conductors and the other to ground. The mica plate is cut away or left open at its middle, thereby forming a narrow open space or air-gap between the adjacent faces of the terminal blocks. Said adjacent faces are roughened, and at least one of them is provided with an inserted globule of fusible metal, which is rubbed down flush with the surface of the block. In case of continued arcing across the open space the globule fuses and bridges the open space, thereby establishing a permanent short circuit to ground.

While the cut-out above described efficiently serves its purpose, it has one serious disadvantage. The rough carbon surfaces are disintegrated by arcing or spark discharges between the carbons and to a lesser degree by mechanical vibration. The fine carbon particles thus loosened deposit across the open space or air-gap separating the blocks, thereby establishing a permanent ground or a path by which the normal current of the line may leak to earth. The transmission of telephonic current is consequently interfered with and the deposits have to be periodically removed to maintain the conditions necessary for efficient operation. Frequent visits by employees for removing these deposits, and thereby clearing the lines from grounds at cable-terminals, substations, central offices, and other points upon the lines where these protectors are used involve heavy maintenance expense. Other materials, such as aluminium, tried in place of the carbon blocks have not proved equal in efficiency to the latter. It is therefore desirable to improve the carbon blocks in such manner as to avoid the difficulties and expense referred to above. This object is accomplished in accordance with my present invention by impregnating the porous carbon blocks with a suitable binding material or agent which binds the fine particles thereof together and prevents disintegration by arcing or mechanical vibration without in other respects detracting from the efficiency of the carbon blocks.

According to the preferred method of treatment the carbon blocks are immersed for thirty minutes in a solution of one and four-tenths pounds of rosin in one gallon of turpentine. During the immersion the solution is maintained at a temperature of from 150° to 160° Fahrenheit to render it highly fluid and enable the porous blocks to readily absorb the same. The blocks are then removed from the solution, drained of the liquid, and thoroughly dried in air at a temperature of from 150° to 160° Fahrenheit for twenty-four hours, thereby evaporating the turpentine and leaving the rosin as the binding material. After the drying the faces of the blocks are ground in the usual way to remove the film or covering of rosin and to present a rough carbon surface. The blocks are finally washed in water to remove fine carbon particles from the surface thereof and then dried.

It is to be understood that the invention is not limited to the preferred method described above, as other suitable binding materials may be used and the procedure varied in other respects, the principal feature being the production of porous conducting-blocks of carbon or analogous material charged or impregnated with a binding material or agent. The invention therefore comprises the article

as well as the process of manufacturing the same.

In the accompanying drawings, Figure 1 shows an elevation, partly in section, of a protection outfit of the type employed in telephone equipments. Fig. 2 is a perspective view of two carbon blocks and their separating mica plate.

Referring to the drawings, 3 is a metal or other conducting support to which four spring-blades 5, 6, 7, and 8 are secured by a bolt 9. The blades are insulated from each other and from the support by interposed blocks of insulation. 10 and 11 are heating-coil appliances of well-known construction adapted to open the circuit upon the continued passage thereover of current of excessive strength. The protective device 10 is held between blades 5 and 6 and the device 11 between blades 7 and 8. 12 is a double bracket or plate secured to the upper end of the grounded conducting-support 3 and projecting vertically beyond the same.

Two carbon blocks 13 and 14, impregnated with a binding material in the manner described and separated by an insulating sheet or plate of mica 15, are tightly clamped together between the bracket 12 and the upper end of spring-blade 6, said blade lying in a groove 16 in block 14. The mica plate 15 has an opening in its middle, thereby providing between the adjacent rough surfaces of the carbon blocks an open space or air-gap. A globule 17 of a suitable fusible alloy is inserted in a recess in the inner face of block 13 and rubbed down flush with said face in substantial accord with the patent of A. C. White, No 438,788, October 21, 1890. Carbon blocks 18 and 19, similarly arranged, are clamped between the bracket 12 and the upper end of spring-blade 7.

Assuming the protective appliance to be employed for the protection of switchboard apparatus, the circuit connections are as follows: One line conductor 20 is connected with the bolt 9, which holds the several spring-blades in place, and the circuit continues from said bolt to spring-blade 7, thence through the heating-coil device 11 and spring-blade 8 and wire 23 to the switchboard apparatus, returning by conductor 21 to spring-blade 5, and thence by heating-coil device 10 and spring-blade 6 to the complementary line conductor 22. The bar 3, to which the metallic bracket 12 is attached, is grounded at G by a conductor 24. A high-pressure current or discharge such as that of a stroke of lightning or a discharge accruing from a cross with a high-voltage light or power circuit conductor coming in, for example, over conductor 20 will pass by bolt 9 to spring-blade 7 to carbon block 19 and from the latter will disruptively discharge across the open space to carbon block 18, passing from the latter to ground by way of bracket 12 and conductor 24. In case this discharge should be followed by a persisting arc the globule 17 will be fused, thereby bridging the space between blocks 19 and 18 and establishing a permanent short circuit to ground.

With carbon blocks heretofore commonly used it has been necessary to periodically remove from the open space between the blocks deposits of fine carbon particles or dust loosened from the carbon blocks by arcing of the current or by mechanical vibration, as already described. It has been found that such deposits are avoided by using the herein-described carbon blocks impregnated with a binding material.

I do not claim herein the cut-out or electrical protective device formed in part of one or more of the terminal blocks or electrodes, as said protective device forms the subject-matter of a divisional application filed December 21, 1904, Serial No. 237,851.

What is claimed is--

1. A terminal or electrode for electrical protective devices, consisting of a block of porous conducting material impregnated with a binding material.

2. A terminal or electrode for electrical protective devices, consisting of a porous carbon block impregnated with a binding material.

3. The herein-described process of making a terminal or electrode for electrical protective devices, consisting in immersing a block of porous conducting material in a liquefied binding material, and then drying the block to harden or set said binding material.

4. The herein-described process of making a terminal or electrode for electrical protective devices, consisting in immersing a porous carbon block in a liquefied binding material, and then drying the block to harden or set said binding material.

5. The herein-described process of making a terminal or electrode for electrical protective devices, consisting in immersing a porous carbon block in a liquefied binding material then drying the block to harden or set the binding material, and then removing the binding material from one face of the block to leave a rough carbon surface.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of April, 1904.

GREENLEAF WHITTIER PICKARD.

Witnesses:
GEO. WILLIS PIERCE,
JOSEPH A. GATELY.