June 11, 1929. R. B. PRINDLE 1,716,931

ELECTRIC DISCHARGE DEVICE

Original Filed March 12, 1926

Fig. 1.

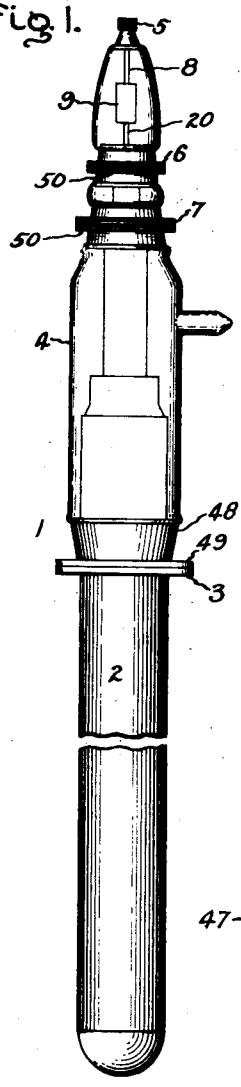
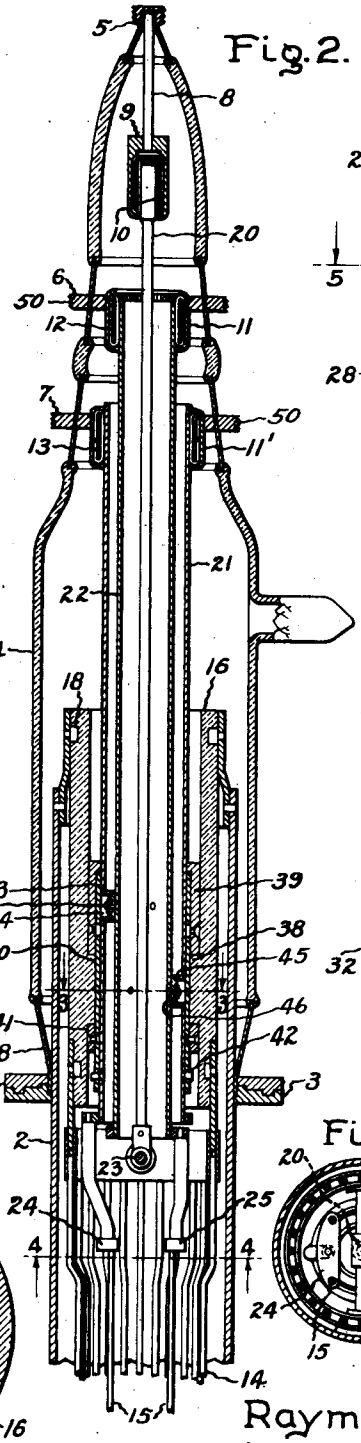


Fig. 2.



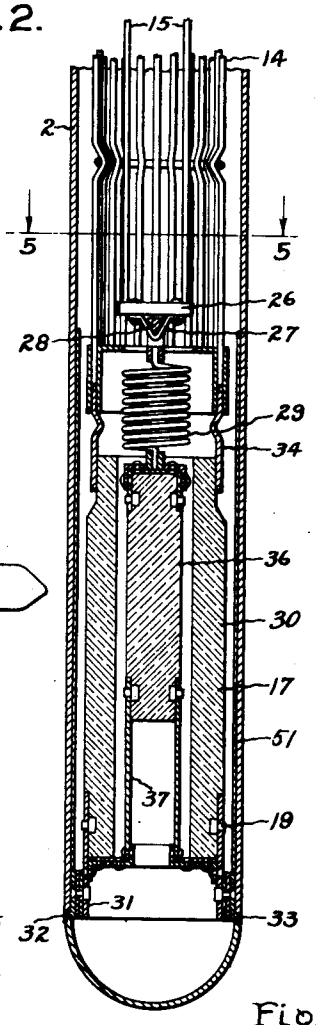


Fig. 3.

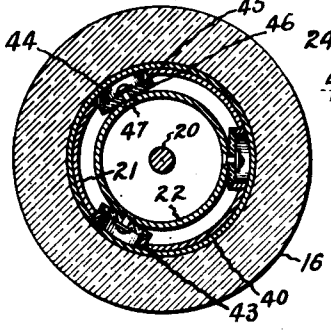


Fig. 4.

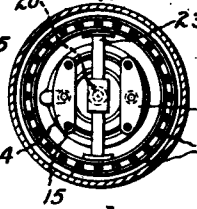
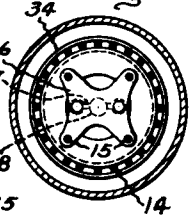


Fig. 5.



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UNITED STATES PATENT OFFICE.

RAYMOND B. PRINDLE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC DISCHARGE DEVICE.

Application filed March 12, 1926, Serial No. 94,333. Renewed November 3, 1928.

My present invention relates to improvements in space current devices and more particularly to such devices which are adapted for the control of large amounts of power.

In my copending application, Serial No. 754,225, filed December 5, 1924, and entitled "Terminal for Space Current Device", I have shown an electric discharge device of the power type, having terminals for the electrodes coaxially arranged and in the normal sequence of their potential gradation.

According to my present invention which constitutes an improvement over that shown in my application referred to above I provide each of the coaxial terminals of the space current device with spring contacts which are adapted to slidably engage the electrode leads. In this manner, the assembly of the superstructure carrying the terminals, with the cup-like anode and the electrode leads, is greatly simplified and facilitated without in any manner interfering with the efficiency of operation of the device. It is likewise a very simple matter, with the arrangement shown, to dismount the discharge device if it is desired to do so. In the latter event it is only necessary to break the soft soldered joint by which the superstructure of the discharge device is connected to the anode flange, after which the superstructure may be bodily slid off the electrode leads and thus provide access to the interior of the discharge device.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation will best be understood from reference to the following specification, taken in connection with the accompanying drawing, in which Fig. 1 shows an elevation of one type of power, space current device embodying the features of my invention; Fig. 2 shows a cross section of the device depicted in Fig. 1. In order to illustrate clearly the details of the device Fig. 2 is shown in two portions; Figs. 3, 4 and 5 are cross sections taken on the lines 3—3, 4—4, and 5—5 indicated in Fig. 2.

Referring to the drawing, I have indicated at 1 a space current device comprising an evacuated envelope composed of a hollow copper anode 2, provided with a recessed anode flange 3, to which a glass sleeve or superstructure 4, carrying a plurality of coaxially arranged copper terminals 5, 6 and 7 is sealed. The terminals are spaced from one another in the normal sequence of their potential gradation, as set forth in my copending application above specified. Terminal 5 is rigidly connected with a conducting rod 8 which is provided at one end thereof with a metallic cap 9 adapted to hold in position a flat spring contact member 10. Terminals 6 and 7 are likewise provided with metallic retaining bands or rings 11 and 11′, adapted to hold flat spring contact members 12 and 13 respectively.

Grid 14 and cathode 15 of the discharge device are carried by a supporting system which comprises upper and lower quartz insulators 16 and 17 respectively. The insulators are detachably mounted on anode 2 by means of bayonet joint connections 18 and 19 located adjacent opposite ends of the anode. A lead 20 for the grid electrode 14, and a pair of hollow cylindrical leads 21 and 22 for the cathode, are concentrically disposed within the insulator 16, the lower end of the grid lead being rigidly supported on the grid by means of an arm 23 attached at opposite ends thereof to the grid structure, as indicated in Fig. 4.

Cathode 15 comprises a plurality of wires, in the present instance four, which are connected at their upper ends to a pair of metallic sectors 24 and 25, and at their lower ends to a single conducting member 26, provided on its lower surface with a strap 27 adapted to be engaged in a point contact by a conical projection 28, held under tension by a spring 29 which is mounted on the lower insulator 17.

Lower insulator 17 comprises an outer hollow cylindrical member 30 rigidly connected at one end to anode 2 by means of a plurality of molybdenum rings 31, the outer one of which is provided with a flange 32 which may be soldered to a recessed portion 33 of the anode. The other end of insulator 17 is provided with a molybdenum sleeve 34 which is adapted to support grid 14. A quartz insulator 36 is concentrically arranged within the hollow member 30. One end of insulator 36 is permanently secured to a corresponding end of member 30 by means of metallic connections 37, clearly indicated in Fig. 2. The opposite end of insulator 36

is connected to the spring tension member 29.

In order to hold the cathode leads 21 and 22 rigidly in position, I provide a ledge or abutment 38 on the interior surface of the insulator 16. On the upper surface of the ledge 38, a flanged metallic locking ring 39 is seated and is permanently connected with a metallic sleeve 40 in any suitable manner. A ring 41, connected to the sleeve 40 engages the lower surface of ledge 38. Sleeve 40 is thus held rigidly in position within the insulator 16.

The metallic sleeve 40 is detachably connected to cathode lead 21 by means of bayonet joints 42. Lead 21 is provided at different points on its circumference with circular openings 43, as clearly indicated in Figs. 2 and 3. Seated in each opening is a cup-shaped spacing and supporting member 44, each member comprising a cylindrical portion 45 and a circular bottom or base portion 46, the latter portion being composed of a plurality of thin superimposed sheets of insulation, such as mica, permanently connected to the lead 22 by means of rivets 47 or other suitable means. As thus arranged lead 22 is insulated from and supported on lead 21, while the latter is rigidly connected to sleeve 40 thus providing a structure in which leads 21 and 22 are held against relative movement with respect to one another, and with respect to the insulator 16.

The lower portion of the superstructure 4 comprises a metallic seal 48 which is provided with a terminal 49. When the elements of the discharge device comprising the anode, grid and cathode, have been assembled, the electrode leads 20, 21 and 22 will extend upwardly and beyond insulator 16. Superstructure 4 may now be slid over the ends of the electrode leads and terminal 49 connected to the anode flange by any suitable means, such as soft solder.

The various terminals for the electrodes may be provided with screw threaded portions, as indicated at 50 or, if desired, with projecting lugs, not shown, to which sources of electromotive force may be connected. I have also found it expedient to place a thin molybdenum shield 51 within the lower end of the device in order to protect the insulator and the grid supporting means associated therewith from the action of copper vapor which may be given off from the anode. Various changes and modifications may be made in the device without departing from the scope of my invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In combination, an electric device comprising a container, said container including a pair of spaced insulated terminals mounted thereon, each of said terminals being provided with a contact member, an electrode mounted in said container, and a pair of substantially rigid leads connected to said electrode and adapted to slidably engage said terminals.

2. In combination, an electric device comprising a container, said container comprising a plurality of terminals coaxially arranged, and in insulating relation to one another, each of said terminals being provided with a spring contact, a filamentary electrode mounted in said container, and a pair of substantially rigid leads connected to said electrode, each of said leads being adapted to slidably engage one of said terminals.

3. In combination, an electric device comprising a container, said container comprising a plurality of coaxial, insulated terminals, a pair of electrodes mounted in said container, a plurality of substantially rigid, concentrically arranged leads, connected to said electrodes, said leads being adapted to slidably engage said terminals.

4. In combination, an electric device comprising a container, said container comprising an insulated terminal, an electrode mounted in said container, a substantially rigid lead connected to said electrode and adapted to slidably engage said terminal.

5. In combination, an electric device comprising a receptacle and a filamentary electrode, a pair of substantially rigid leads mounted in the receptacle and connected to said electrode, said leads being concentrically arranged with respect to one another, and a pair of terminals mounted on said receptacle and adapted to engage said leads.

6. In combination, an electric device comprising a receptacle and a plurality of electrodes, a plurality of substantially rigid leads mounted in the receptacle and connected to said electrodes, said leads being concentrically arranged with respect to one another, and a plurality of terminals mounted on said receptacle and adapted to engage said leads.

7. In combination, an electric discharge device comprising a hollow anode, a hollow insulator adjacent one end of the anode and connected thereto, a filamentary cathode, a pair of leads concentrically arranged with respect to one another and connected to said cathode, and means for supporting said leads on said insulator.

8. In combination, an electric discharge device comprising a hollow anode, a hollow insulator connected to the anode adjacent one end thereof, a filamentary cathode cooperating with the anode, a pair of cathode leads concentrically arranged with respect to one another and extending through the insulator, means for locking said leads against relative movement with respect to one another, and means for supporting the leads on said insulator.

9. An electric device comprising a filamentary electrode, means for supporting said

electrode within said device, said means comprising a hollow insulator, a pair of concentrically arranged leads connected to said insulator, means for supporting one of said leads on the other of said leads and means for supporting both of said leads on said insulator.

10. In an electric discharge device comprising a plurality of electrodes, means whereby an electromotive force may be supplied to said electrodes, said means including a pair of concentrically arranged leads and means cooperating with said leads for preventing relative movement thereof and for supporting one of said leads on the other of said leads.

11. In combination, a hollow anode, a hollow insulator mounted in said anode adjacent one end thereof, a second insulator concentrically arranged within the hollow insulator, means for supporting said second insulator within the hollow insulator, and spring means mounted on one end of the second insulator for supporting a filamentary cathode.

In witness whereof, I have hereunto set my hand this 10th day of March, 1926.

RAYMOND B. PRINDLE.