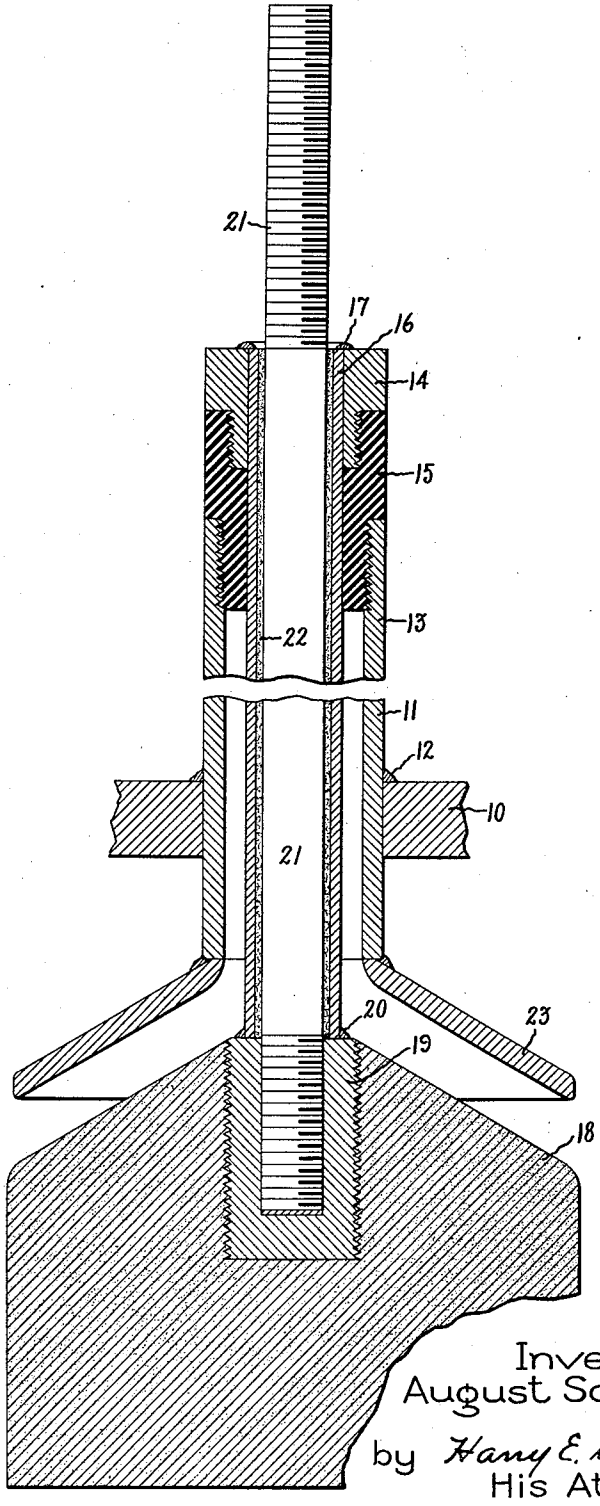
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ELECTRODE SUPPORT

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ELECTRODE SUPPORT

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5 Claims. (Cl. 250—27.5)

My invention relates to electrode supports, and particularly to an improved anode supporting structure for electric discharge devices such as mercury arc rectifiers of the metal tank type.

It is common practice to mount an electrode, such as the anode of an electric discharge device, in insulated relation with respect to the metal tank or vessel enclosing the electrodes of the device. Means for making an external electrical connection with the anode is brought out through the support in some manner which provides a vacuum-tight seal. The operation of these devices, particularly with increasingly high currents, has multiplied the difficulties involved in maintaining the electrode supported in insulated relation with respect to the tank and with a vacuum-tight seal. The difficulties arise partly because of the combination of severe thermal, mechanical and electrical conditions imposed on the structure in operation. In accordance with the teachings of the present invention, I provide an improved anode supporting structure for an electric discharge device in which both the generation of heat and the transmission of heat to the seal is minimized.

It is an object of my invention to provide a new and improved electrode support.

It is another object of my invention to provide a new and improved support suitable for mounting the anode of an electric discharge device in insulated and vacuum-tight relation with respect to a metal container.

It is another object of my invention to provide an improved anode supporting structure in which the connection with the anode stud is maintained at atmospheric pressure throughout its length so that the electrical connection is not made through the seal.

Further objects and advantages of my invention will become apparent as the following description proceeds, reference being had to the accompanying drawing in which the single figure is a schematic representation of the embodiment of my invention.

Referring now to the drawing, 10 designates a fragment of a metal plate forming one wall of the container of an electric discharge device (not shown). The member 10 is apertured to receive a sleeve 11 which is welded in vacuum-tight relation to the plate 10, as indicated at 12. A sleeve 13, which may be formed separately from the sleeve 11 if desired, and secured thereto in vacuum-tight relation, and a sleeve 14 are joined by a member of insulating material 15, such as Mycalex. The connections between the sleeves 13 and 14 and the sealing member 15 are vacuum-tight and may be made by molding the insulating material between the sleeve 13 and 14. A cylindrical tube 16 of steel or other suitable material fitted within the sleeve 14 is welded thereto in vacuum-tight relation, as illustrated at 17. The tube extends into the container of the discharge device within the sleeves 13 and 10 and terminates below the lower end of the sleeve 11 to provide a support for the anode tip 18 which, as illustrated, comprises a body of graphite or similar material. The connection between the anode and the sleeve 17 is made by means of a metal insert 19 which is screwed or otherwise secured within the anode body. The lower end of the sleeve is welded in vacuum-tight relation to the end of the insert 19 as illustrated at 20. The insert 19 may be locked to the anode by any suitable means (not shown) if desired, although if the discharge device is brought to operating temperature immediately after assembly the insert 19 will become bonded to the anode tip 18 and prevent relative movement therebetween. The anode stem or stud 21 is preferably formed of copper or similar material of high electrical conductivity. The stud is threaded at each end and has one end thereof threaded into the insert 19. The insert 19 is formed of a metal such as steel, which has reasonably low electrical resistance but which has a considerably lower heat conductivity than the anode stem. In order to provide for a very low resistance connection between the insert and the stud the threaded portions of the stud as well as the recess of the insert are tinned and the end of the stud screwed into the insert while the parts are above the melting point of the solder. In this way a very good electrical connection is obtained. As illustrated in the drawing, the stud is of smaller diameter than the cylindrical supporting tube 16 and if desired the space therebetween may be filled with suitable thermal insulating material 22, such as rock wool. A suitable shield 23 having the contour of the upper surface of the anode may be secured to the lower end of the sleeve 11 to provide for a uniform potential gradient over the upper anode surface, if desired.

From the foregoing description it will be seen that the vacuum-tight connection is made at the anode tip itself between the insert 19 and the sleeve 17 so that the entire length of the anode stud is at substantially atmospheric pressure. This makes it unnecessary for the external electrical connection to the anode stem to be made through any sealing joint and the electrical resistance from the anode to the external conductor

thereby is kept at a minimum. This is important in that it tends to reduce the heat generated in the vicinity of the seal and thereby reduce the operating temperature to which the seal is subjected. The construction also provides a sturdy support for the anode and a structure which is readily assembled or reassembled in the event that dismantling of the structure is required for repair purposes.

While I have described what I at present consider the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention, and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

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

1. In combination, a metal wall forming a part of a vessel of an electric discharge device, said wall having an aperture formed therein, an electrode for said discharge device, a metallic structure including an end portion secured to said electrode and a sleeve portion mounted in insulated and vacuum-tight relation with respect to said wall and positioned in said aperture, means for securing one end of said sleeve portion to said end part in vacuum-tight relation, and a conductor positioned within said sleeve electrically connected with said metal member for making electrical connection between said electrode and an external circuit, said metal member and said sleeve cooperating to provide a passage for said conductor which is vacuum-tight with respect to the interior of the vessel, the walls of the other end of said sleeve being spaced from and electrically insulated from said conductor so that essentially all of said sleeve portion is prevented from conducting current between said electrode and said external circuit.

2. In combination, a metal wall forming a part of a vessel of an electric translating device, said wall having an aperture formed therein, an elongated sleeve positioned in said aperture, means for mounting said sleeve near one end thereof in insulated and vacuum-tight relation with respect to said wall, an electrode for said translating device, a metal member secured to said electrode, means securing said sleeve near the opposite end thereof in vacuum-tight relation with said metal member, and an elongated conductor extending lengthwise of said sleeve and secured to said metal member to provide means for connecting said electrode with an external circuit, said metal member and said sleeve cooperating with said metal member to maintain the interior of said sleeve at a pressure independent of the pressure of the interior of said vessel, the walls of the other end of said sleeve being spaced from and electrically insulated from said conductor so that curent flow from said electrode to said external circuit is excluded from substantially the entire length of said sleeve.

3. In combination, a wall forming a part of a vessel of an electric discharge device, said wall having an aperture formed therein, an elongated sleeve positioned in said aperture, means for mounting said sleeve near one end thereof in insulated and vacuum-tight relation with respect to said wall, an anode tip, a metal insert secured in said anode tip, means securing said sleeve near the opposite end thereof in vacuum-tight relation with said insert, said insert having a recess formed therein opening within said opposite end of said sleeve and extending well below the upper surface of said anode tip, and an anode stem having one end thereof positioned in said recess and extending substantially below the upper surface of said anode tip to conduct heat and current from said anode tip.

4. In combination, a wall forming a part of a vessel of an electric discharge device, said wall having an aperture formed therein, an anode tip, a metal insert secured within said anode tip and means for supporting said anode tip from said wall comprising an elongated sleeve positioned in said aperture and supported in insulated and vacuum-tight relation with respect to said wall and means for securing one end of said sleeve in vacuum-tight relation with said insert, said insert having a recess formed therein opening on one face of said insert within the confines of said one end of said sleeve and extending into said sleeve a substantial distance below the upper surface of said anode tip, an anode stem having an outer dimension smaller than the inner dimension of said sleeve and having one end received in said recess a substantial distance below the upper surface of said anode tip, said stem being of greater length than said sleeve and having a portion extending beyond said sleeve to form a terminal for connection with an external circuit.

5. In combination, a wall forming a part of a vessel of an electric discharge device, said wall having an aperture formed therein, a hollow member secured to said wall adjacent said aperture, a member of insulating material sealed to one end of said member and having an aperture therein, a sleeve extending within said member of insulating material in telescopic relation with said first-mentioned member and secured to said insulating member in vacuum-tight relation, an anode tip, means for securing the other end of said sleeve to said anode tip in vacuum-tight relation so that the interior of said sleeve is at substantially atmospheric pressure when the area surrounding said anode tip is evacuated, an anode stem extending through said sleeve and secured to said anode tip, said anode stem being of smaller diameter than said sleeve to provide a space therebetween, and means having a low heat conductivity within said space for retarding the transfer of heat from said anode stem to said member of insulating material.

AUGUST SCHMIDT, JR.