

Aug. 1, 1939.

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2,167,844

VAPOR ELECTRIC DEVICE

Filed April 21, 1937

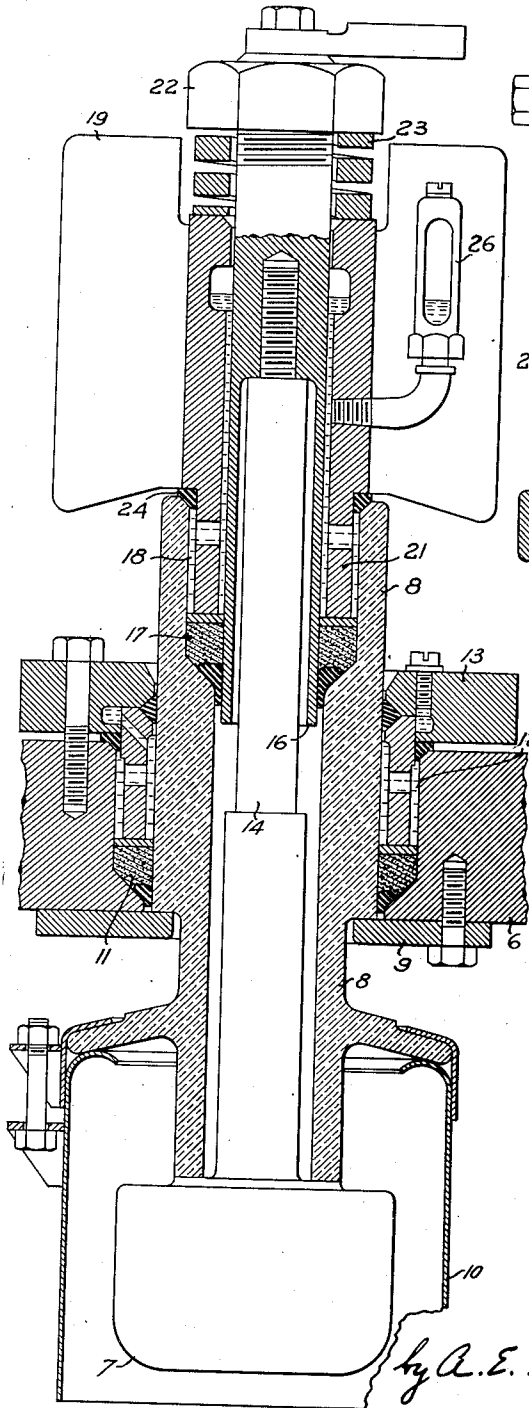


Fig. 1

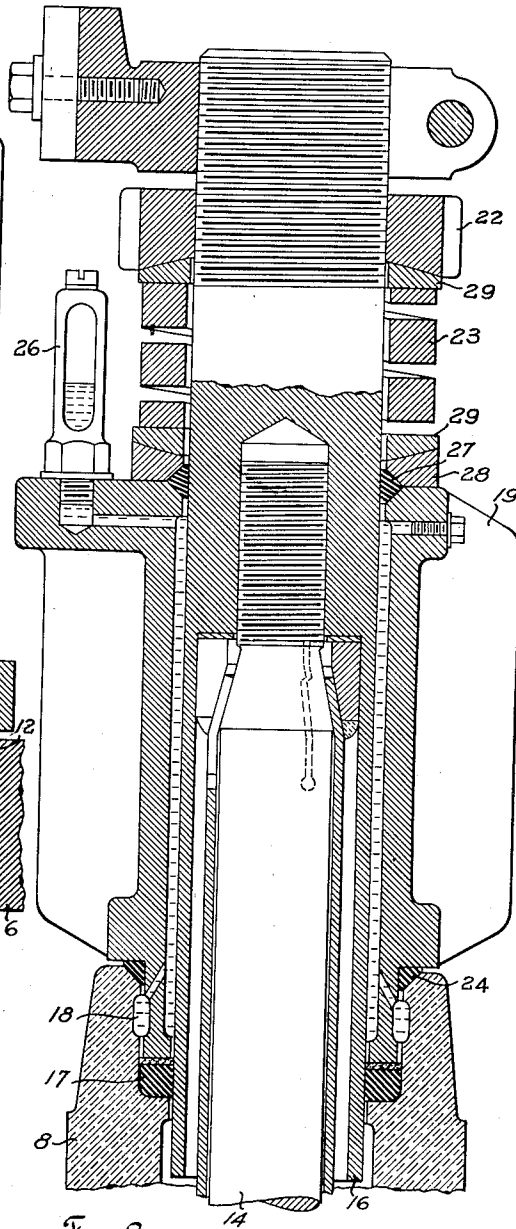


Fig. 2

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2,167,844

VAPOR ELECTRIC DEVICE

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Application April 21, 1937, Serial No. 138,190

1 Claim. (Cl. 250—27.5)

This invention relates in general to improvements in vapor electric devices, and more particularly to means for sealing an electrode in the casing of such a device and for transmitting heat between such electrode and a radiator.

Vapor electric devices such as electric valves are generally provided with electrodes which penetrate through the casing of the device and such electrodes are frequently sealed against the casing by means of a solid packing cooperating with a suitable sealing fluid such as mercury. The operation of the device results in the evolution of a considerable amount of heat at the electrodes, and such heat may be dissipated by means of suitable radiators mounted on the electrodes outside of the valve casing. To obtain the desired heat transfer between an electrode and the associated radiator, it is generally necessary to machine the cooperating surfaces of such members with high accuracy and to assemble such members with great care. It is therefore frequently more economical to space the adjacent surfaces of the electrode and of the associated radiator and to utilize a body of fluid both for sealing the electrode against the casing and for transmitting heat between the spaced surfaces of the electrode and of the radiator. The invention may, however, be utilized in any structure other than a vapor electric device in which a heat conductive member is to be sealed against a wall and is to be placed in heat conducting relationship with another member.

It is, therefore, one of the objects of the present invention to provide a structure in which heat may be transferred between two heat conductive members without necessitating accurate forming of the adjacent surfaces of such members.

Another object of the present invention is to provide a structure in which a single body of fluid serves both for transferring heat between two heat conductive members and for sealing one of such members against a wall.

Another object of the present invention is to provide a structure in which a radiator receiving heat from a heat conductive member also serves as a gland for a stuffing box associated with the heat conductive member.

Objects and advantages other than those above set forth will be apparent from the following description, when read in connection with the accompanying drawing, in which:

Fig. 1 diagrammatically illustrates one embodiment of the present invention utilized for sealing an anode of a vapor electric device against the

casing thereof and for transmitting heat between the anode and a radiator;

Fig. 2 diagrammatically illustrates a modified embodiment of the present invention differing from the embodiment illustrated in Fig. 1 in that the chamber for the sealing fluid has no outlet other than a level gauge mounted thereon.

Elements performing the same function in both embodiments herein illustrated are designated by the same reference character although such elements may be of different configurations and may be arranged differently in such embodiments.

Referring more particularly to the drawing by characters of reference, reference numeral 6 designates a portion of the wall of the casing of a vapor electric device defining an aperture for an anode 7 penetrating therethrough. Casing 6 may be made of electrically insulating material such as glass, and the anode may then be sealed directly thereagainst. If casing 6 is made of electrically conductive material, as shown on the drawing, it is generally necessary to provide the casing with an insulating portion, such as a hollow insulator 8, engaging the conductive portion of the casing in sealed relation therewith about the aperture provided for the passage of the anode. The anode thus penetrates through both the aperture in the casing and through the insulator. Although the insulator need not necessarily penetrate through the aperture in the casing, such arrangement is generally preferable, the insulator being supported on the casing by a split flange 9 bolted on the casing wall. The insulator may then be utilized for supporting an arc guide 10 associated with anode 7. The insulator may be sealed against casing 6 by any suitable known means. As illustrated in Fig. 1, casing 6 may be machined to form a stuffing box receiving a suitable packing 11 cooperating with a suitable body of sealing fluid 12. Packing 11 is compressed against casing 6 and insulator 8 by means of a suitable gland 13.

Anode 7 of electrically conductive and heat conductive material comprises a head portion abutting one end of insulator 8 within arc guide 10 and a stem portion arranged within the insulator. Such stem preferably comprises a solid cylindrical portion 14 and a hollow cylindrical portion or sleeve 16, such portions being connected with each other by screwing to insure the proper electric current conduction and heat conduction therebetween. For the purpose of sealing sleeve 14 against insulator 8 and hence against casing 6, the bore of insulator 8 is preferably recessed to form a stuffing box receiving a suit-

able solid packing 17 arranged between insulator 8 and sleeve 14 in sealing contact therewith. Packing 17 alone would not generally form a sufficiently fluid tight seal between sleeve 14 and insulator 8. Such seal is accordingly perfected by means of a body of suitable sealing fluid 18. In general, it is desired that any portion of the fluids 12 and 18 which may leak past the associated packings should be without harmful effect on the operation of the device. Such fluids are therefore generally selected identical to the fluid used in the operation of the device, such as mercury.

A heat dissipating member such as a radiator 19 of heat conductive material of any suitable known type is arranged adjacent the sleeve 16 outside of casing 6 to receive heat from the electrode and to transmit such heat to the ambient atmosphere. Radiator 19 preferably comprises a cylindrical body surrounding sleeve 16 and bearing a plurality of heat dissipating fins, the body of the radiator being provided with an extension 21 serving as a gland cooperating with packing 17. Radiator 19 is urged against packing 17 to compress such packing by means of a nut 22 screwed on sleeve 16 and acting on radiator 19 through a spring 23. Radiator 19 is maintained in sealed relation with insulator 8 by means of a yieldable packing 24 compressed therebetween by spring 23.

Fluid 18 is thus confined within a chamber defined by packing 17 and the adjacent surfaces of sleeve 16, radiator 19 and insulator 8, but it will be understood that electrode 7 and radiator 19 may also have complementary surfaces in direct contact with each other. The chamber containing fluid 18 may be enlarged at the level of the surface of the fluid for reducing the variations of such level resulting from changes in the temperature of the fluid. The fluid level is preferably indicated outside of the chamber by means of a level gauge 26 of any suitable known type. Fluid 18, being in contact with packing 17, sleeve 16, insulator 8 and radiator 19, seals anode 7 against insulator 8 and therefore also against wall 6, and the same fluid also transmits heat resulting from the operation of anode 7 between sleeve

16 and radiator 19. Fluid 18 follows all the irregularities of the adjacent surfaces of sleeve 16 and of radiator 19 and is thus in perfect contact with both such members. The heat transfer therebetween accordingly takes place under the most favorable conditions and results in sleeve 16 being maintained at the lowest possible temperature.

In the embodiment illustrated in Fig. 2, the chamber for fluid 18 is closed at the top thereof by means of a packing 27 pressed against radiator 19 by spring 23 through a washer 28. Level gauge 26 may then be mounted on top of radiator 19 and the entire chamber may be filled with fluid to obtain the maximum rate of heat transmission between sleeve 16 and radiator 19. If desired nut 22 and washer 28 may be formed with concave spherical surfaces, each such member then being provided with a complementary spherical washer 29 to insure transmission of an axial thrust to radiator 19 by spring 23.

Although but two embodiments of the present invention have been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claim.

It is claimed and desired to secure by Letters Patent:

In an electric valve, the combination with an insulator defining an aperture, of an electrode penetrating through said aperture in spaced relation with said insulator at an upper level and in sealed relation therewith at a lower level, a heat conductive member encircling a portion of said electrode in spaced relation therewith and in sealed relation with said insulator, said electrode, insulator and member forming a chamber, and a single body of fluid contained within said chamber to seal said electrode against said insulator and to conduct heat between said electrode and said member.

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