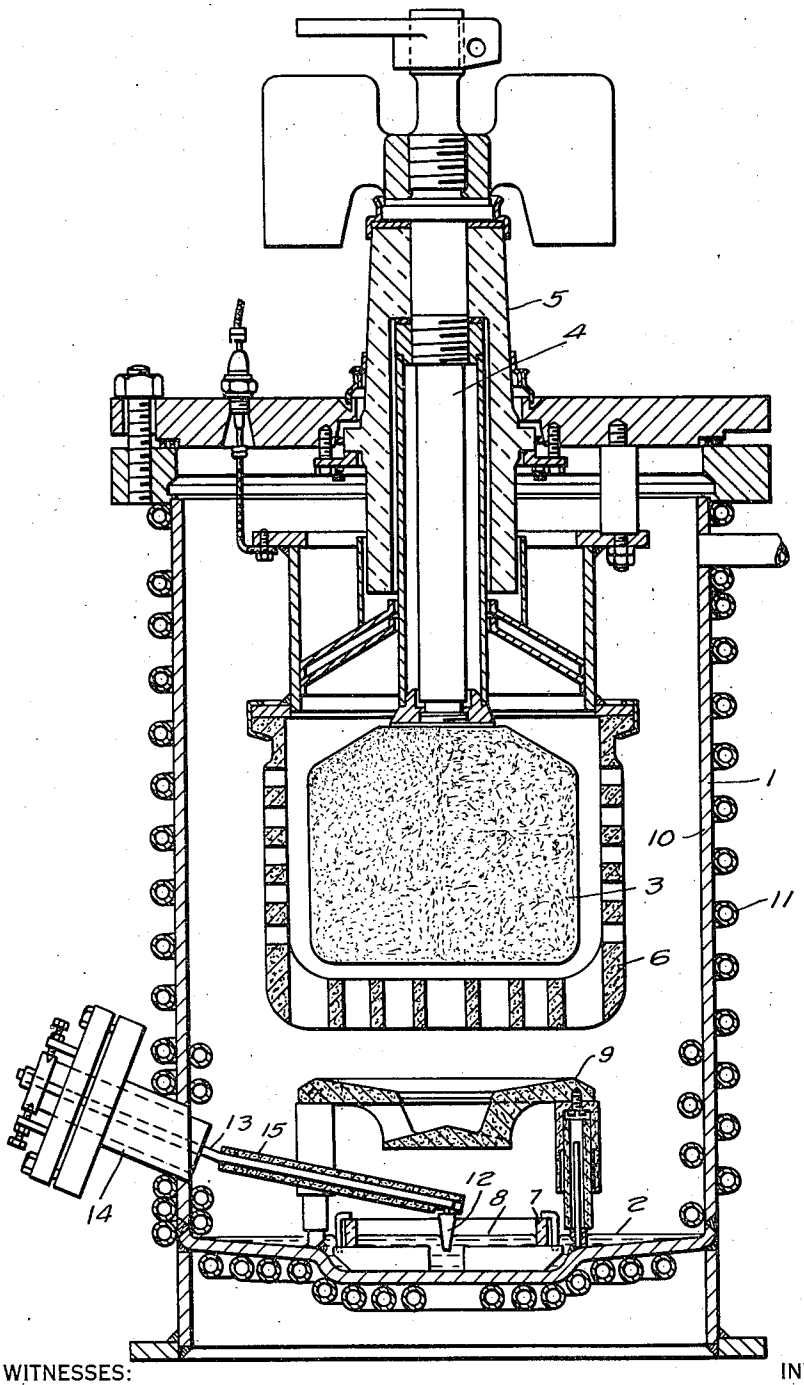
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IGNITER ASSEMBLY FOR IGNITRON RECTIFIER

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IGNITER ASSEMBLY FOR IGNITRON RECTIFIER

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Our invention relates to a vapor electric device, and particularly to an improved make-alive assembly for such a device.

Since the invention of the make-alive type valves, vapor electric converters have been developed to the point where they are now assuming a major portion of the conversion duties and are now being applied in installations where the converters operate at a high load factor for long periods of time.

One of the difficulties encountered under heavy load conditions over long time intervals is erratic pickup of the rectifying arc in the individual valves of the converter after long periods of operation. We believe that at least a portion of this irregularity is caused by so-called "wetting" of the make-alive electrodes. That is, certain metals, such as nickel, are dissolved, evaporated or sputtered off from some portion of the converter, and are carried by the mercury cathode and deposited on the make-alive electrode. This so-called "wetting" results in erratic formation of the cathode spot and occasionally a complete failure to produce the cathode spot within the ignition interval of the valve.

In the development of ignitron tanks, it has been found desirable to eliminate as far as possible, all of the nickel bearing alloys which come in contact with the arc stream between the anode and cathode. This has been accomplished by constructing anodes, anode shields and cathode shields in such manner that no metal portion is exposed to the arc plasma. However, since in service the portions of the converter exposed to the arc must operate at a temparture of the order of 1000° C., and since ordinary iron or steel are unsuitable at this temperature, it is necessary to use so-called high temperature alloys for any such portion which must be constructed of metal.

Most of these high temperature alloys, and particularly those which are substantially inert to hot mercury, contain a certain percentage of nickel or chormium, or both. Nickel has a slight tendency to dissolve in mercury, particularly at high temperatures, and also has a certain vapor pressure which evaporates a certain amount of nickel into the rectifier chamber. Also, the actual contact of the arc stream sputters away a portion of the metal which may be deposited in the cathode material.

In order to eliminate this difficulty, we have provided the metal portions which must necessarily be in the vicinity of the arc stream, such as the supporting arm for the make-alive electrode, with a protective shield or coating of a material which is substantially inert to mercury and which has a high thermal emissivity so that the rod is not only protected from contact with the mercury but is maintained at a lower temperature because of the emissivity of the protecting material.

It is, accordingly, an object of our invention to provide a vapor electric device having a minimum amount of metal exposed to the arc stream.

It is a further object of our invention to provide a protector shield for any metallic members which must necessarily be in the vicinity of the arc stream.

Other objects and advantages of our invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing, in which the single figure is a vertical elevation of a vapor electric valve embodying our invention.

In the illustrative embodiment of our invention, the vapor electric valve comprises a container 1, preferably of metal, which may be exhausted to provide a vacuum in which the action of the converter takes place. A pool 2 of vaporizable reconstructing material, such as mercury or mercury amalgam, is placed in the bottom of the container 1 and cooperates with a suitable anode 3 usually of graphite which is mounted in spaced insulated relation to the cathode by means of an anode stem 4 sealed in vacuum-tight relation to an insulating bushing 5 usually of ceramic material.

A deionizing shield 6 is placed around the anode 3 and is placed as close to the anode as is mechanically feasible. At least that portion of the shield 6 exposed to the arc stream is constructed of graphite. A suitable barrier, such as a quartz ring 7, is anchored in the cathode pool 2 to define an active cathode area 8. Placed between this active cathode area 8 and the anode 3 is a cathode shield 9, preferably composed of graphite which is so constructed that the anode 3 is optically obscured from the active cathode area 8. Suitable condensing surfaces 10 are provided in the container 1 by means of coils 11 or other cooling means for maintaining the temperature of the container sufficiently low that it will condense mercury vapor which impinges thereon.

A make-alive electrode 12 is maintained in contact with the cathode pool 2, preferably in a position substantially central of the active cathode area 8. The make-alive electrode 12 is supported by a metallic supporting arm 13 which is controlled in position by a suitable in-

sulated inlet mounting 14. Since the supporting arm 13 for the make-alive electrode 12 must of necessity be within the arc stream between the anode 3 and the action cathode surface 8, we prefer to construct the arm 13 of a suitable high temperature alloy, such as the nickel, chromium, steel alloy at present sold under the trade name "Nichrome." In order to prevent direct contact between the vapor blast arising from the cathode 2 and the ion stream between the anode 3 and cathode 2, we provide a covering in the form of a graphite tube 15 enclosing that portion of the make-alive arm 11 extending within the arc stream. This graphite covering 15 is not only a mechanical protection to prevent erosion of the arm by ion bombardment or by the cathode blast, but it also has a high thermal emissivity so that there is a constant tendency to radiate the temperature away from the make-alive arm, thereby maintaining the arm at a much lower temperature than would otherwise result, thus lowering the tendency of the metal to evaporate into the container.

While for purposes of illustration we have shown and described a specific embodiment of our invention, it is apparent that changes and modifications can be made therein without departing from the true spirit of our invention, or the scope of the appended claims.

We claim as our invention:

1. A vapor-electric device comprising a container, a pool of vaporizable reconstructing cathode material in said container, a graphite anode in insulated spaced relation to said cathode, a graphite shield substantially surrounding said anode, means for determining an active cathode area on said cathode pool, a make-alive electrode, a high temperature nickel steel alloy support for supporting said make-alive electrode in contact with the cathode pool within the active cathode area and a graphite shield enclosing that portion of the support exposed to the cathode blast.

2. A vapor-electric valve comprising a metallic container, a mercury pool cathode in said container, a graphite anode in spaced insulated relation to said cathode, a graphite shield interposed between said anode and cathode, a make-alive electrode, a nickel steel supporting arm maintaining said make-alive electrode in a predetermined relation to said cathode and a protective covering on said arm, said covering being composed of an at least partially conducting material having a high thermal emissivity and being substantially inert to mercury.

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