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E. J. MURPHY

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VACUUM CONDENSER

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FIG. 1

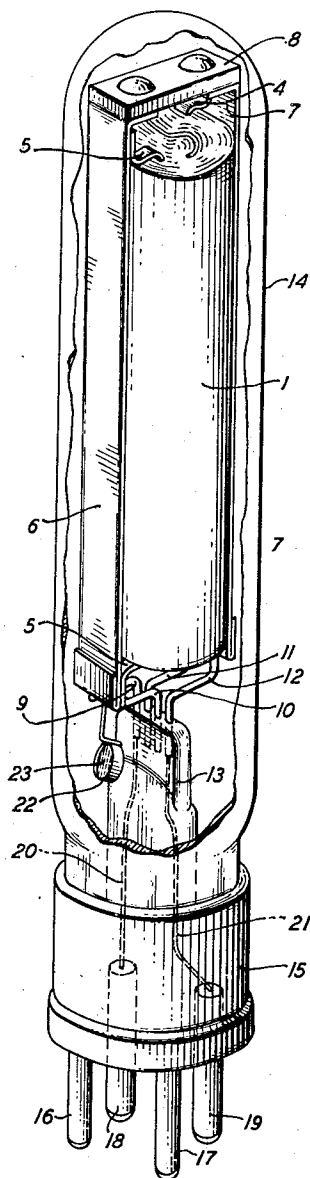
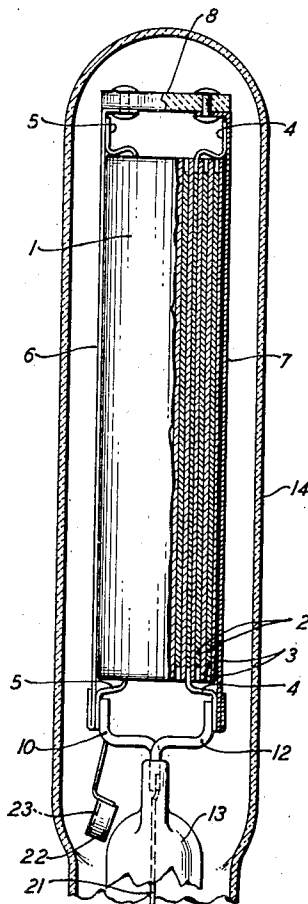


FIG. 2



INVENTOR
E. J. MURPHY
BY *J. W. Schmied*
ATTORNEY

UNITED STATES PATENT OFFICE

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VACUUM CONDENSER

Edward J. Murphy, Summit, N. J., assignor to
Bell Telephone Laboratories, Incorporated, New
York, N. Y., a corporation of New York

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2 Claims. (Cl. 175-41)

This invention relates to electrical condensers and more particularly to vacuum condensers.

According to the present invention, the lives of unimpregnated electrical condensers having solid dielectric spacers, particularly those having cellulosic spacers, are considerably increased and the dielectric strength of the dielectric is increased by maintaining the condenser under a high vacuum during use. This high vacuum is maintained within the envelope in which the condenser is sealed by the inclusion of a small amount of a highly adsorbent or absorbent solid which absorbs any gases evolved by the action of heat or electric potential upon the solid dielectric.

One manner in which the invention may be practiced is shown by way of illustration in the accompanying drawing in which:

Fig. 1 is a perspective view, partly in section, of a vacuum condenser of the present invention;

Fig. 2 is a front elevation, in section, of the same condenser.

Referring to Figs. 1 and 2, the condenser unit is of the conventional rolled foil type made up of two metal foil electrodes 2 interleaved with spacers of condenser paper 3, the whole being rolled into a compact unit. Metal strips 4, 4 and 5, 5 are connected respectively to the two foil electrodes in the conventional manner and serve as leads for the electrodes. The condenser unit is supported by the metallic supports 6 and 7 to which are soldered the leads 4, 4 and 5, 5. The metallic supports 6 and 7 are joined at the top by a bridge 8 of insulating material, to which they are fastened in any suitable manner. The supports 6 and 7 are in turn supported by the metal wires or rods 9, 10, 11 and 12 to which they are connected electrically. These wires or rods are imbedded in and supported by the glass stem 13. The entire unit is enclosed in a sealed and evacuated glass envelope 14. The glass envelope is mounted on a suitable base 15 which is provided with dummy prongs 16 and 17 and terminal prongs 18 and 19. Lead wires 20 and 21 connect the terminal prongs 18 and 19, respectively, with the support wires 9 and 12, respectively. A container 22 for solid gas sorbent is supported within the envelope in any suitable manner. This container is open at one end and is provided with a porous cover 23 at this end for permitting the entry of gases while preventing the escape of the solid sorbent.

The electrical device described above may be prepared using conventional rolled foil condenser

technique and conventional vacuum tube technique. Any suitable condenser paper such as linen, cotton, or kraft paper may be used. In place of paper, any sheet cellulosic material of the requisite thinness, such as sheets of regenerated cellulose or of cellulose derivatives, such as cellulose acetate, may be employed. Thin textile fabrics may also be used, such as thin cotton gauze and in particular the highly purified cotton gauze of the type used for bandage purposes.

Although the degree of evacuation necessary will vary somewhat with the spacing of the electrodes and the voltage to which the condenser is subjected, it is ordinarily necessary that a vacuum of the order of not more than 10^{-2} millimeters of mercury be employed. Under most circumstances, it is more desirable to evacuate initially to 10^{-4} millimeters or less, and to maintain a vacuum of not much above 10^{-3} millimeters during the operation of the condenser.

When the spacer is a cellulosic material, it has been found that gases are slowly evolved from the spacer due to the action of heat and electric potential. The gases evolved appear to be primarily water, carbon dioxide, carbon monoxide and hydrogen. If these gases are not removed, it has been found that, after a period of operation, the pressure within the evacuated envelope rises to a point where the beneficial effects of high evacuation are no longer obtained. It has also been found that by placing suitable solid sorbent materials within the evacuated envelope, the required degree of evacuation can be maintained for considerable periods of time.

It has been found that a finely divided mixture of three parts of activated alumina or magnesium perchlorate, two parts of soda lime, and one part of hopcalite, form a very effective sorbent for the purposes of the present invention. Hopcalite is a mixture of about 50 per cent manganese dioxide, 30 per cent cupric oxide, 15 per cent cobalt oxide and 5 per cent silver oxide. The hopcalite serves as a catalyst for the oxidation of carbon monoxide to carbon dioxide, which in turn, together with any other carbon dioxide present, is absorbed by the soda lime. The activated alumina and magnesium perchlorate serve to absorb any water vapor present. Obviously any other suitable solid sorbent materials having similar properties may be used in place of these substances. For condensers having capacities up to about one microfarad, between about one gram and about five grams of sorbent material is sufficient.

Although the invention has been described in terms of its specific embodiments, certain modifications and equivalents will be apparent to those skilled in the art and are intended to be included within the scope of the invention, which is to be limited only by the reasonable scope of the appended claims.

What is claimed is:

1. An electrical device comprising an electric condenser, the dielectric of which comprises a cellulosic material, said condenser being enclosed in an evacuated envelope, said cellulosic material during the normal operation of said condenser evolving gases which tend to reduce the vacuum in said envelope, said gases including carbon monoxide, said envelope containing a solid sor-

bent material for sorbing said gases from the space surrounding said condenser, said sorbent material including means for oxidizing carbon monoxide to carbon dioxide.

2. An electrical device comprising an electric condenser, the dielectric of which comprises a cellulosic material, said condenser being enclosed in an evacuated envelope, said cellulosic material during the normal operation of said condenser evolving gases which tend to reduce the vacuum, and a solid sorbent material for sorbing gases evolved from the cellulosic dielectric during the operation of the condenser, said sorbent material comprising finely divided soda lime, activated alumina and hopcalite.

EDWARD J. MURPHY.