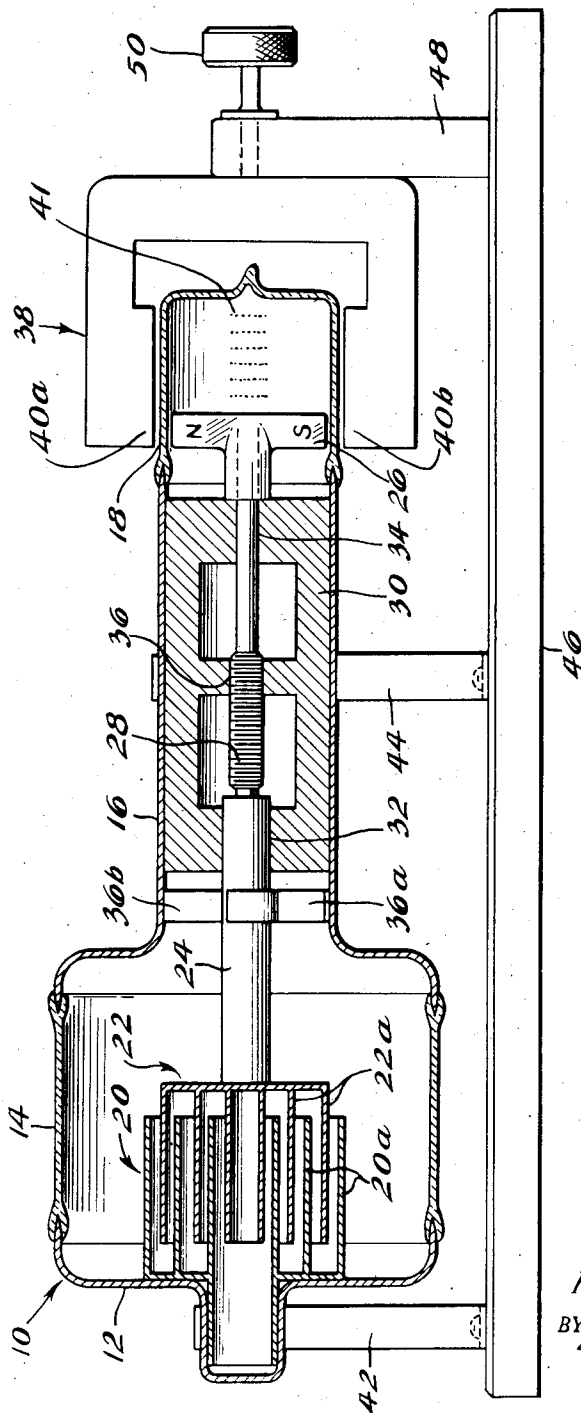


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ENCLOSED VARIABLE CONDENSER

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ENCLOSED VARIABLE CONDENSER

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2 Claims. (Cl. 175—41.5)

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This invention relates to variable electrical condensers.

Electrical condensers have been hermetically sealed within evacuated or gas-filled containers for the purpose of eliminating undesirable effects on their characteristics due to changes of atmospheric pressure, temperature and humidity. This general type of condenser is constructed either with a fixed capacitance value, or with means for varying the capacitance of the condenser.

It is an object of the invention to form an enclosed variable electrical condenser of such improved structural features as to enable adjustment externally, to impart shock resistance, and to enable the unit to withstand high electrical potentials.

Other objects and novel features will be apparent from a consideration of the specification and the accompanying drawing illustrating a specific embodiment, the single view being a longitudinal cross-sectional view.

Hermetically sealed envelope 10 enclosing the plates of the illustrative condenser is formed with a metal end section 12, a cylindrical glass section 14, a metal section 16 and a glass end section 18 joined together with hermetic seals in the order named.

Stationary member 20 of the illustrative condenser comprises plural cylindrical plates 20a. Adjustable member 22 is formed in this instance to include plural cylindrical plates 22a interposed with and in spaced relation to fixed plates 20a.

Stationary member 20 is secured to end metallic section 12 of the envelope, which serves as an external terminal for the condenser.

Adjustable member 22 is supported by means of a conductive shaft 24 rotatably mounted in bearings 32 and 34 in metal plug 30 within envelope section 16. Endwise movement of member 22 and variation of the capacity of the condenser is achieved by means of a threaded portion 28 of shaft 24 in a female thread 36 in plug 30. A permanent magnet 26 is secured to the shaft within glass section 18 of the envelope that is non-magnetic. A soft-iron armature is rotatably supported outside envelope portion 18, and here takes the form of a C-shaped yoke 38 having axially extended faces 40a and 40b. These faces are approximately equal to the total range of axial adjustment of member 22, plus the axial extent of magnet 26.

Direct, low-resistance contact to the adjustable member is obtained by means of silver-plated

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wiper contacts 36a and 36b which engage conductive shaft 24 that is also advantageously silverplated. The wiper contacts are attached to metallic section 16. This connection is supplemented by the electrical path across bearing 32.

The only moving contacts and the closely spaced portions of the fixed and adjustable members are guarded by the envelope from deterioration because of mechanical deformation and injury by atmospheric action. Fixed connections to the mutually adjustable condenser parts can be made directly to metal envelope portions 12 and 16. These envelope sections are illustrated as mechanically supported by straps 42 and 44 on base 46 of insulating material. Yoke 38 is supported on base 46 by post 48 which also forms a rotary bearing for the yoke and inhibits endwise travel of the yoke.

Adjustment of the condenser from the extreme minimum to the maximum and reversely is achieved by rotating yoke 38 about envelope section 18. This causes bar magnet 26 to rotate and operate screw 28 axially. Rotation is effected manually by grasping knob 50 attached to yoke 38, or by any other suitable driving means. The capacity of the condenser is indicated by the position of magnetic bar 26 opposite markings 41.

The arrangement of yoke 38 of large axial extent opposite a small bar magnet is effective and economical. However, various modifications of this arrangement will be apparent to those skilled in the art. Part 26 may be formed as a soft-iron armature and yoke 38 may include a permanent magnetic section or an electromagnet establishing a field between faces 40a and 40b, for broadly comparable advantage. Additionally, part 26 might be made of considerable axial extent and faces 40a and 40b could be of limited axial extent. This would further extend the axial dimension of the structure shown and for that reason the illustrated arrangement is preferred. One face 40 could be arranged to serve the purpose of yoke 38 generally.

Breakdown potential is dependent upon the dielectric medium between the condenser plates and may be increased by appropriate fill within the envelope or by evacuation. The breakdown limit is also affected by the axial extent and surface characteristics of envelope section 14 which may be increased as required by surface coating, by external ribs and other known expedients. The mechanical stability afforded by bearings 32 and 34 which are spaced apart lends electrical

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stability to the structure; and this is enhanced by the cylindrical form of plates which can be displaced eccentrically somewhat without greatly changing the capacitance or the rate of capacitance variation. The adjustment structure involving screw 28, magnet 26 and armature 38 affords a wide range of adjustability with fine control over the degree of adjustment.

While the invention is concerned with a particular mechanical arrangement of parts for achieving adjustment of an enclosed condenser the particular illustrative form is naturally capable of a certain latitude of rearrangement and substitution of detail, as well as wide application in varied electrical organizations. Therefore the appended claims should be allowed such broad interpretation as is commensurate with the spirit and scope of the invention.

What is claimed is:

1. A variable electrical condenser comprising an envelope having a transparent portion and a pair of metallic sections mutually separated and joined to an interposed glass section, at least two cylindrical plates enclosed within said envelope and electrically and mechanically connected respectively to said metal envelope sections, one of said plates being axially movable in telescopic relation to another of said plates, said movable plate being supported on an axially movable shaft and having secured thereto a magnetic element also enclosed within said transparent portion of said envelope, rotatable external magnetic means co-acting with said enclosed magnetic element for shifting said shaft axially and having an axial extent at least equal to the transverse of said enclosed magnetic element, said transparent envelope portion having scale markings opposite said enclosed magnetic element.

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2. A variable electrical condenser comprising an evacuated envelope, a pair of plates enclosed within said envelope, adjustable supporting means secured to one of said plates comprising a shaft having a threaded portion, a threaded element fixed in relation to said envelope and receiving said threaded portion, a magnetic element extending transverse to said shaft and secured thereto, said magnetic element being enclosed within said envelope, and a further magnetic element rotatably supported external to said envelope in a bearing preventing its axial displacement relative to said envelope and having portions opposed to and cooperating with said enclosed magnetic element, the axial extent of the portions of the external element being greater in axial length than the opposite portions of the enclosed magnetic element so as to cooperate with that enclosed element in all adjusted positions thereof.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,557,725	Proctor	Oct. 20, 1925
1,625,330	Pinkus	Apr. 19, 1927
2,454,049	Floyd	Nov. 16, 1948
2,464,716	Piton	Mar. 15, 1949
2,511,338	Jennings	June 13, 1950

FOREIGN PATENTS

Number	Country	Date
351,686	Germany	Apr. 12, 1922
278,748	Great Britain	Mar. 15, 1928