Nov. 24, 1925. 1,562,629

H. GERNSBACK

VARIABLE CONDENSER

Filed Sept. 27, 1923

FIG. 1

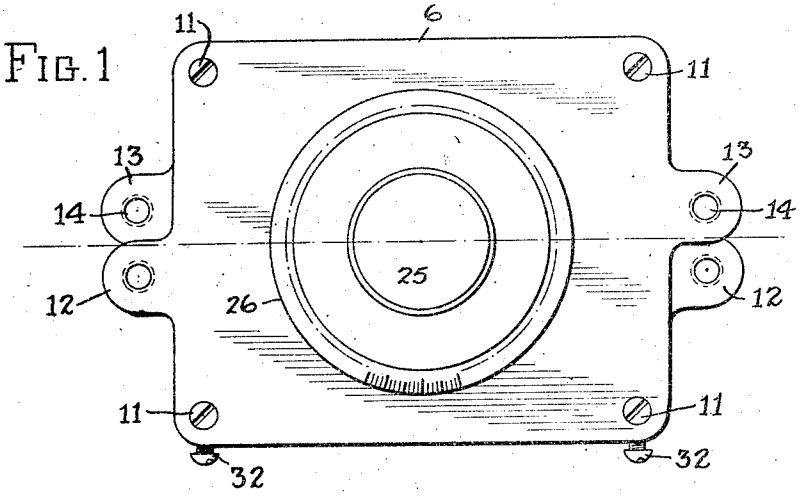


FIG. 2

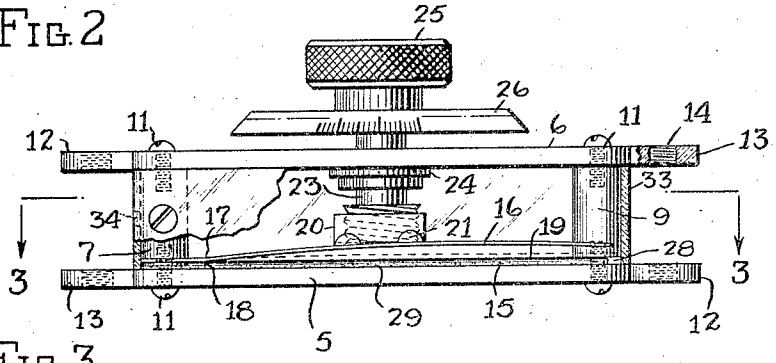
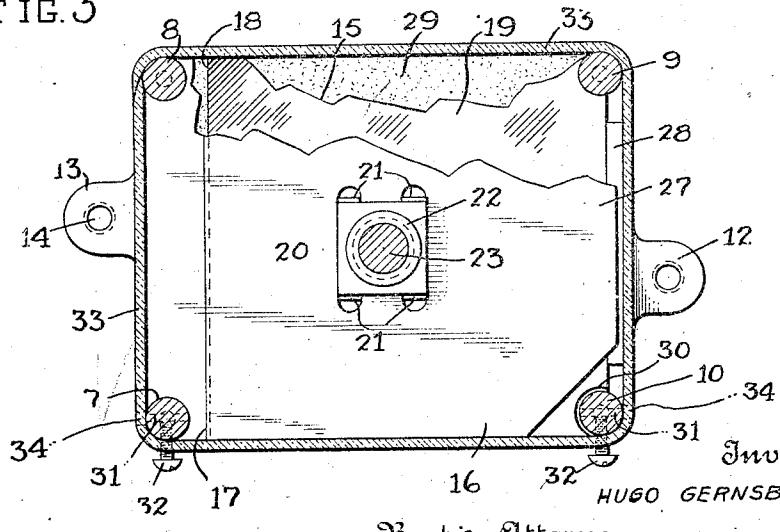


FIG. 3



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UNITED STATES PATENT OFFICE.

HUGO GERNSBACK, OF NEW YORK, N. Y.

VARIABLE CONDENSER.

Application filed September 27, 1923. Serial No. 665,092.

To all whom it may concern:

Be it known that I, HUGO GERNSBACK, a citizen of the United States of America, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Variable Condensers, of which the following is a specification.

The objects of this invention are to provide a condenser of simple, compact design having high capacity, constant in its operation and adjustable through a wide range of values.

Other objects and the novel features of construction, combination and relation of parts which make possible the attainment of all such objects will appear as the specification proceeds.

In the drawing accompanying and forming part of this specification there is illustrated but one of the many possible practical embodiments of the invention, it being understood that the form may vary without departure from the broad spirit and scope of the invention as hereinafter defined and claimed.

Figure 1 is a plan view of a form of the condenser as constructed for either table or panel mounting.

Figure 2 is an edge and broken sectional view of the same.

Figure 3 is a broken sectional view as taken on substantially the plane of line 3—3 of Figure 2.

The base of the condenser illustrated is made up of two rigid plates or sheets 5, 6, of suitable insulating material of substantially rectangular outline and secured together in spaced overstanding relation by interposed corner posts 7, 8, 9, 10, with which fastening screws 11 are engaged. These base plates are shown as duplicates, each constructed with projecting end lugs 12, 13, for attaching purposes, disposed at opposite sides of a longitudinal center line, the plates being reversed in the assembling to effect a vertical offsetting of these lugs, so as to render them directly accessible either at the front or at the back of the condenser. Tapped holes 14 may be provided in the lugs to take attaching or supporting screws. In the case of mounting the condenser on a table or other support, the attaching screws may be engaged with or passed through the end lugs on the back plate 5, whereas, for a panel mounting, the screws passed through the panel may be engaged with the lugs on the front plate and in both events the lugs on one base plate are out of the way and do not interfere with the proper use of the other set of lugs.

The condenser elements consist of the two plates 15, 16, the first being shown as a thin metallic sheet, secured at one end of the base beneath the posts 9, 10, and the second or upper plate being shown as a heavier sheet secured beneath the opposite set of posts 7, 8 and bowed upwardly away from the first plate. The lower plate may be a thin flexible sheet of copper and the upper plate should be of a good resilient material, such as spring brass. The bend in the brass sheet may be in the form of a flat arch as shown, starting on a line at 17, adjacent the securing posts and approximately over the end of the copper sheet at 18.

A layer of solid dielectric is indicated at 19, interposed between the two cooperating plates. In practice this layer should be thin to allow the plates to come closely together. A film of insulating enamel applied to the face of the lower or relatively stationary plate answers this purpose and is flexible so as to yield with any slight movements of this lower flexible plate.

Means for flexing the upper plate toward the lower is shown in the form of a nut 20 held loosely on top of the arched plate between integral lugs 21 struck up from such plate and engaged by the screw-threads 22 of a stem 23, journaled in a bearing 24 in the upper base plate and provided with an operating knob 25 and scale 26.

In Figure 2 the adjustable spring plate is indicated in full lines as fully separated from the companion lower plate, the capacity being then reduced substantially to zero and the broken lines show how, as pressure is applied by the turning of the screw in the nut, the arch in the plate will be gradually flattened out until the plates are brought together into flat face to face relation separated only by the thin layer of dielectric.

To avoid friction and wearing away of the dielectric, the spring plate is shown as having an extension or tongue 27, of less width than the body of the plate so as to project between the posts 9, 10, beyond the end of the lower plate into sliding engagement with a ledge or bearing shoulder 28, at the adjacent end of the base. Where a layer of

mica is used as the dielectric, this sliding bearing is not so important but with the use of a dielectre having lesser wearing qualities the same becomes of more consequence.

Due to slight mechanical imperfections and variations in the plates, the supporting base, the operating means, etc., it has been found practically impossible, under usual or ordinary conditions, to bring two plates together into exact and intimate, flat, parallel, face to face relation, especially with the layer of dielectric therebetween, which though very thin as a whole, may vary in thickness at different points. This is particularly liable to occur where an insulating enamel is used, because the same may dry with minute waves or ripples in its surface. To overcome this difficulty and enable the plates to be brought so close together as to utilize to the full the surface capacity of the plates, the lower or relatively stationary plate in the illustration is made thin or flexible enough to yield to any irregularities or variations from the flat plane in the surface of the other plate and is backed by a cushioning layer 29, which will yield sufficiently to enable it to accommodate itself to the contour of the other plate. This cushion may consist simply of a layer of double faced canton flannel, blotting paper, felt or the like, at the back of the flexible plate and held in place beneath the posts 7, 8, 9, 10. By so compensating for variations in contour and thus increasing the intimacy of the plates, it has been found possible to increase the capacity above that heretofore obtainable with plates of equal area.

The terminals for the plates are provided in the illustration, by using the spacing posts 7 and 10, the first shown as having a direct contact on the upper bendable plate and the second as having a footing directly on the lower plate, where the insulating enamel is cut back for the purpose, at 30, and each having a wire passage 31 therethrough with a binding screw 32 for clamping a wire engaged therein.

To keep the plates and operating parts clean and free of dust, moisture, etc., the space in which these parts are located may be enclosed at the sides by a cover, shown as a strip 33 of insulating material secured about the posts and fitting closely between the edge parts of the two base plates. This cover is shown pierced at 34 to admit wires to the passages in the binding posts.

In addition to being small and compact for a high rated capacity, the condenser of this invention can be made particularly neat and attractive in appearance, and produced quite inexpensively. The screw adjusting means enables very fine and accurate adjustments to be made, continuously, throughout a wide range. The total effective movement of the adjustable plate, that is, from substantially zero capacity up to the maximum, is so small that the same can be effected with one complete turn of the dial, this also being an advantage in giving 360 degrees of continuous adjustment.

What I claim is:

1. A variable condenser comprising an insulating base, a yielding cloth backing on said base, a condenser plate secured on the base over said backing and cushioned thereby, a cooperating condenser plate fixedly secured at one end on the base, having its free portion overstanding the first plate and formed on a single continuous curvature with the concave face of the same opposed to the first plate, a layer of solid dielectric between the plates and screw means mounted on the base and engaging the upwardly bowed free portion of the curved plate to flatten the same in self-adjusting engagement with the cushioned lower plate.

2. A variable condenser comprising an insulating base, a condenser plate on said base, screw means fastening said plate at one end in fixed relation on the base, said screw means including a terminal post for connecting said plate in circuit, a cooperating condenser plate overlying the first plate, screw means securing the end of the second plate which is opposite the secured end of the first plate fixedly upon the base and including a terminal post for connecting the second plate in circuit, said second plate being bowed away from the first plate on a curvature extending substantially uninterruptedly in a single arc from the attached portion of the plate, a layer of solid dielectric interposed between the plates and screw means engaging the free bowed portion of the second plate for flattening the same over the first plate.

3. A variable condenser comprising an insulating base, a condenser plate on said base, screw means fastening said plate at one end in fixed relation on the base, said screw means including a terminal post for connecting said plate in circuit, a cooperative condenser plate overlying the first plate, screw means securing the end of the second plate which is opposite the secured end of the first plate fixedly upon the base and including a terminal post for connecting the second plate in circuit, said second plate being bowed away from the first plate on a curvature extending substantially uninterruptedly in a single arc from the attached portion of the plate, a layer of solid dielectric interposed between the plates and screw means engaging the free bowed portion of the second plate for flattening the same over the first plate and a support on the base beneath the free end of the bowed portion of the second plate, providing a bearing with which said free end has sliding engagement

during the flattening of the plate and whereby wear on the dielectric is avoided.

4. A variable condenser comprising insulating base plates, posts securing the same in spaced relation, a condenser plate engaged by and electrically connected with one of such posts, a cooperating resilient condenser plate held by and electrically connected with one of the other posts, terminal means for the plates, carried by said posts, a dielectric layer between the condenser plates and means for flexing the resilient plate.

5. A variable condenser comprising insulating base plates, posts securing the same in spaced relation, a condenser plate held by and electrically connected with one of such posts, a cooperating resilient condenser plate held by and electrically connected with one of the other posts, terminal means for the plates carried by said posts, a dielectric layer between the condenser plates, means for flexing the resilient plate and a layer of cushioning material also held by the posts at the back of the first condenser plate to enable the same to adapt itself to the varying pressure of the resilient plate.

6. A variable condenser comprising insulating base plates secured in spaced relation and provided with end lugs arranged those of one plate offset with respect to those of the other plate, cooperating condenser plates mounted in the space between the insulating plates with a dielectric layer therebetween and means mounted on one of the insulating plates for effecting a relative adjustment of the condenser plates.

7. A variable condenser comprising insulating base plates, metallic posts securing the same in spaced relation, an insulating cover extending about said posts and providing with the base plates an enclosed insulating chamber, cooperating condenser plates mounted within said chamber with a dielectric layer between the same and means for effecting relative adjustment of said plates, in which two of the posts are electrically connected with the condenser plates and are provided with terminal means and in which the insulating cover adjacent said posts has openings for connection of wires with such terminal means.

8. A variable condenser comprising an insulating base, a layer of cushioning cloth material on said base, a thin flexible condenser plate on said cushioning layer, a thin flexible dielectric layer on said plate, a second flexible condenser plate mounted on the base over the dielectric layer and adjustable toward and away from the first plate and means for effecting such adjustment of the second plate to thereby force the plates and interposed dielectric into intimate self-adjusting contact.

In witness whereof, I have hereunto set my hand this 24th day of September, 1923.

HUGO GERNSBACK.