

July 20, 1926.

G. W. LILIENTHAL

1,592,834

CONDENSER

Filed April 21, 1925

Fig. 1

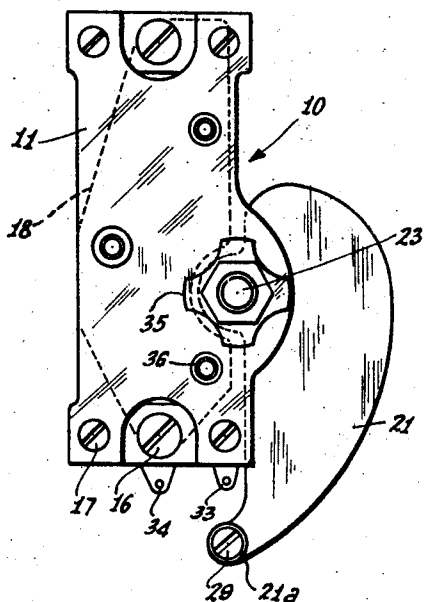


Fig. 2

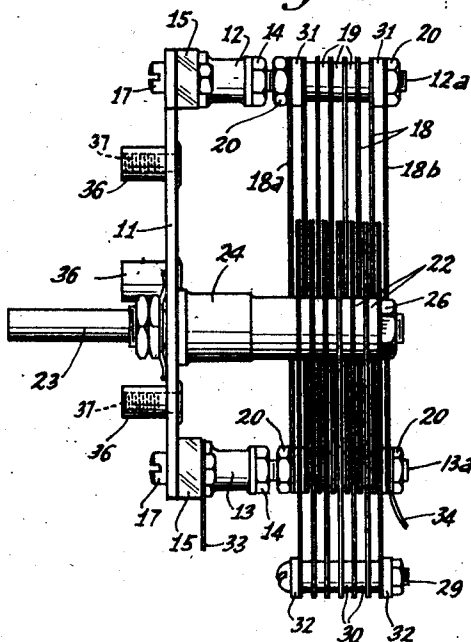


Fig. 3

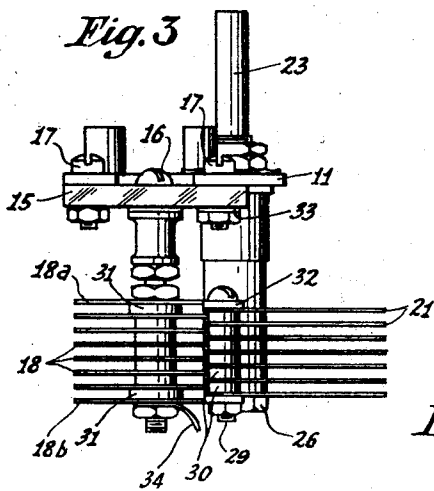


Fig. 4

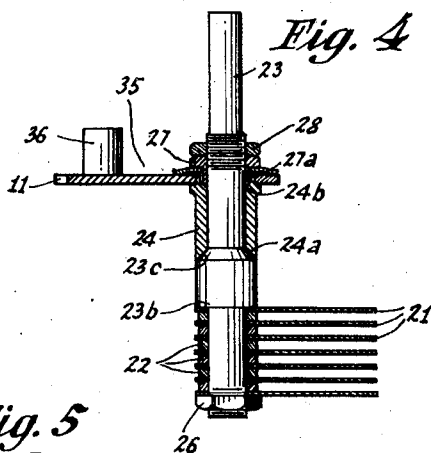
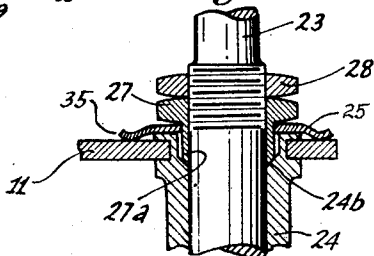


Fig. 5



George W. Lilienthal
INVENTOR

BY
M. J. Frick
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE W. LILIENTHAL, OF NEW YORK, N. Y., ASSIGNOR TO WIRELESS RADIO CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CONDENSER.

Application filed August 21, 1925. Serial No. 51,550.

This invention relates to electrical condensers of adjustable capacity adapted to be used in radio transmitting and receiving circuits and for other electrical apparatus. 55

5 An object of the invention is to generally improve this type of device and to provide a condenser of the character described of "low-loss," compact construction, and which shall be adjustable for low minimum capacity and adapted to give various desirable capacity characteristics such as substantially straight line plotted relation of the frequency or wave length to the dial setting, etc.

15 A further object of the invention is the provision of an improved condenser of the character described comprising few and simple parts, which is neat in appearance, rugged in construction, comparatively cheap to manufacture, and practical and efficient in operation to a high degree.

20 Other objects of this invention will in part be obvious and in part hereinafter pointed out.

25 The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention,

35 Fig. 1 is a front elevational view of a condenser embodying the invention;

Figs. 2 and 3 are plan and side elevational views, respectively, of the condenser shown in Fig. 1;

40 Fig. 4 is a cross-sectional view showing the construction of the pivoting axis of the movable electrode; and

45 Fig. 5 is an enlarged fragmentary cross-sectional view showing the sleeve bearing construction for the shaft of the movable electrode.

Referring in detail to the drawing, 10 denotes a condenser embodying the invention, preferably designed to have substantially "straight line" characteristics, that is, the various signal frequencies when plotted relative to the graduations on the control dial (not shown) gives substantially a

straight line. The condenser 10 is constructed with relatively little insulating material and has its parts so disposed as to reduce the electrical losses to a practical minimum thus forming a so-called "low-loss" condenser.

As seen from the drawing, the condenser 60 10 comprises a front mounting plate 11 supporting a pair of spaced, rearwardly extending stanchions 12 and 13 having threaded members 12^a and 13^a, respectively, screwed into the ends thereof, a nut 14 being carried on each member to lock the latter in an adjusted position to said stanchions for the purpose that will hereinafter appear.

Said stanchions 12, 13 are insulated from the plate 11 by suitable means such as the 70 interposed bases 15 made of "bakelite" or other like material, the stanchions being secured to said base by means of screws 16, and the bases to said plate 11 by means of screws 17 as shown in Figs. 1 and 3. 75

Upon said threaded members 12^a and 13^a are mounted fixed condenser plates 18; and washers 19 of uniform thickness are provided to insure a desired accurate spacing. Screwed on said members 12^a and 13^a are 80 clamping nuts 20 which serve to hold the fixed plate 18 in alignment and secure said plates and washers together to form the stationary electrode or stator of the condenser 10 as shown in Fig. 2. 85

Movable condenser plates 21, each separated by a washer 22 are rigidly fastened in uniformly spaced relation on a shaft 23 and are rotatably mounted for movement in and out between the fixed plates 18 to 90 form the adjustable condenser electrode or rotor. The shaft 23 is journaled in a single sleeve bearing 24 which preferably is rigidly secured so as to extend rearwardly from the plate 11 by means of a riveted over-turned connection 25 (see Fig. 5). 95

The end of the rear portion 23^a of the shaft 23 supporting the plates 21 may be threaded to receive a nut 26 which is adapted to clamp the plates 21 and washers 22 100 in position against a shouldered enlargement 23^b of the shaft 23 and preferably formed integral therewith at the mid-portion thereof as shown in Fig. 4.

To eliminate accidental transverse or side 105 displacement of the movable plates 21 with

respect to the stationary plates 18, there is provided on the shoulder of the front end of said enlarged portion 23^b of said shaft a bevelled or tapering bearing surface 23^c adapted to co-operate with a correspondingly dished surface 24^a on the rear end of the bearing 24, and a collar nut 27 having a bevelled leading end 27^a screwed to the shaft 23 for engaging with the dished surface 24^b on the front end of said bearing as shown in Fig. 4. The shaft 23 is thus positively held against lateral shifting in the bearing 24, and said collar-nut provides means for adjusting the friction between said surfaces for retaining the shaft 23 and movable plates 21 in any set position with respect to the stationary plates 18. Suitable means such as a lock nut 28 screwed against the collar nut 27 may be provided for securing the latter against movement from an adjusted position.

As seen from Fig. 1, the movable plates 21 are preferably of proper asymmetrically curved shape to give substantially straight line plotted relation of the frequency of the signal with respect to the angular displacement of the adjustable electrode with relation to the stationary electrode, the degree of said angular displacement corresponding directly to the graduation on the control dial, as is well understood.

One end of each of said plates 21 is secured to the shaft 23 the other ends thereof being provided with extending portions 21^a having a through bolt 29 and separating washers 30 to more firmly hold the plate uniformly spaced and to increase the rigidity of the movable electrode. (See Figs. 2 and 3.)

To prevent the movable electrode from forming a metallic contact with the stationary one in its extreme swung positions, insulating washers 31 and 32 are provided, one or more washers 31 being mounted on the member 12^a between the fixed plates 18 as for example, one adjacent each of the rear and front plates 18^a and 18^b respectively, and one or more washers 32 being mounted on the bolt 29 as for example one on each end against the exterior sides of the movable electrodes as shown in Fig. 3.

By making the washers 31 and 32 larger in diameter than the spacing washers 19 and 30 respectively, the former serve as stops to hold the electrodes against coming in metallic contact with each other and also limit the relative swinging movement of said electrodes.

Suitable terminal pieces 33 and 34 for connecting the condenser into a circuit are provided, the terminal piece 33 being secured to the mounting plate 11 in any suitable manner as by means of screw 17 for connecting with the movable electrode through the bearing 24 and shaft 23, while

the terminal piece 30 is mounted on the member 13^a against the stationary electrode as shown in Fig. 2.

A spring washer jumper 35 frictionally engaging the collar nut 27 and contacting with the plate 11 provides a secondary path or shunt circuit for the current from the plate 11 to the movable electrode supplementing the circuit formed by the sleeve 24 with the shaft 23 as shown in Figs. 1 and 5.

Suitable means for mounting the condenser 10 to a support (not shown) may be provided such as a plurality of spacing members 36 secured to extend from the front of plate 11. Said members may be threaded as at 37 for receiving fastening screws (not shown).

To assemble the condenser 10 is a comparatively simple matter. First, the plates 19 are mounted on members 12^a and 13^a in spaced relation to form the fixed electrode, and then the latter is properly aligned with respect to the spaced movable plates 21 which are assembled on the shaft 23 and journaled in the bearing 24 by adjusting and locking said members on their respective stanchions 12 and 13 as shown in Figs. 2 and 3.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A condenser comprising a front mounting plate, a pair of spaced stanchions supported on said plate, each stanchion having a threaded member screwed into the end thereof, a base insulating each stanchion from the plate, an electrode mounted on said members to form the stator of the condenser, a single sleeve bearing secured to said plate, a shaft journaled in said bearing, and an electrode secured to the shaft to form the rotor of the condenser, said stanchions and members being adjustable to permit aligning of the rotor and stator in proper co-operative relation.

2. A condenser comprising a front mounting plate, a pair of spaced stanchions supported on said plate, each stanchion having a threaded member screwed into the end thereof, a base insulating each stanchion from the plate, an electrode mounted on said members to form the stator of the condenser,

a single sleeve bearing secured to said plate, a shaft journaled in said bearing, and an electrode secured to the shaft to form the rotor of the condenser, said stanchions and members being adjustable to permit aligning of the rotor and stator in proper co-operative relation, and means mounted on the member engaging each stanchion to lock the member in the adjusted position.

3. A condenser comprising a front mounting plate, a pair of spaced stanchions supported on said plate, each stanchion having a threaded member screwed into the end thereof, a base insulating each stanchion from the plate, an electrode mounted on said members to form the stator of the condenser, a single sleeve bearing secured to said plate, a shaft journaled in said bearing, an electrode secured to the shaft to form the rotor of the condenser, said stanchions and members being adjustable to permit aligning of the rotor and stator in proper co-operative relation, a terminal piece secured to the plate connecting with the rotor through said bearing and shaft, and a spring jumper secured between said plate and said shaft to form a shunt circuit about said bearing.

4. A condenser comprising a front mounting plate, a pair of spaced stanchions supported on said plate, each stanchion having a threaded member screwed into the end thereof, a base insulating each stanchion from the plate, a metallic electrode mounted on said members to form the stator of the condenser, a single sleeve bearing secured to said plate, a shaft journaled in said bearing, and a metallic electrode secured by one end thereof to said shaft to form the rotor of the condenser, said stanchions and members being adjustable to permit aligning of the rotor and stator in proper co-operative relation, the other end of the electrode and one

of said members each having means for preventing the rotor and stator from coming into metallic contact.

5. A condenser comprising a mounting plate, a plurality of metallic plates supported and insulated from said plate secured together in uniform spaced relation adapted to form the stator electrode, a single bearing rigidly secured to said plate, a shaft journaled in said bearing, a plurality of metallic plates secured together in uniform spaced relation adapted to form the rotor electrode and mounted by one end thereof to said shaft, said stator being adjustably supported by the mounting plate to permit aligning the stator and rotor in proper co-operative relation, and an insulating member forming part of each electrode for preventing the rotor and stator from coming into metallic contact and serving as stops to limit the movement of the rotor.

6. A condenser comprising a mounting plate, a plurality of metallic plates supported and insulated from said plate secured together in uniform spaced relation adapted to form the stator electrode, a single bearing rigidly secured to said plate, a shaft journaled in said bearing, a plurality of metallic plates secured together in uniform spaced relation adapted to form the rotor electrode and mounted by one end thereof to said shaft, the ends of the plates of the other end of the electrode having extensions, means projecting through said portions for spacing and securing said rotor plate ends together to increase the rigidity of the rotor, and insulating members carried by said means and by the stator electrode to provide stops to prevent the electrodes from making metallic contact with each other.

In testimony whereof I affix my signature.

GEORGE W. LILIENTHAL.