

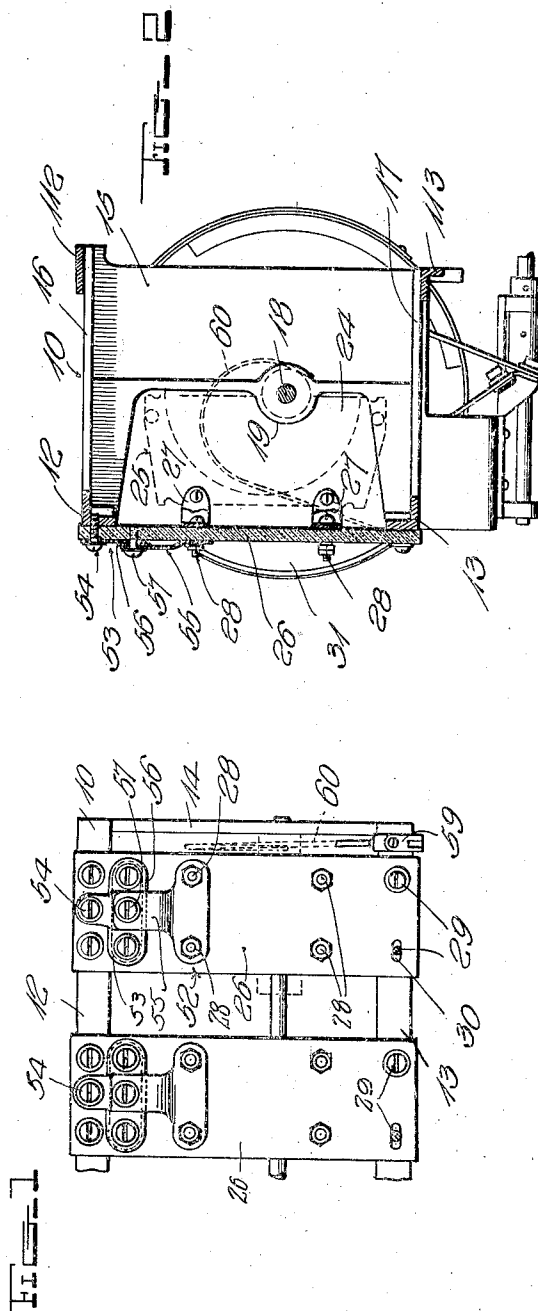
Sept. 6, 1927.

1,641,593

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MULTIPLE VARIABLE CONDENSER

Original Filed April 28, 1926



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MULTIPLE VARIABLE CONDENSER.

Original application filed April 28, 1926, Serial No. 105,050. Divided and this application filed October 6, 1926. Serial No. 139,947.

My invention relates broadly to a multiple variable electrical condenser and more particularly to means for accurately adjusting a plurality of selective circuits in cascade for facilitating the simultaneous control of said circuits for particular signaling frequencies by means of a multiple variable condenser.

This application is a division of my application Serial Number 105,050, filed April 28, 1926.

One of the objects of my invention is to provide a variable condenser wherein elements are employed for adjusting a plurality of circuits connected in cascade, with means connected in each of the circuits for fixing the ratio of maximum to minimum capacity thereby enabling the several circuits to be simultaneously and accurately adjusted for a selected signaling frequency.

Another object of my invention is to provide a construction of multiple variable condenser system for a multistage amplifier circuit in which auxiliary adjustable condenser units are mounted in association with each of the variable condensers and connected in the amplifier circuit in such manner as to establish the ratio of maximum to minimum capacity at a selected value.

My invention will be more fully understood from the following specification by reference to the accompanying drawings, in which:

Figure 1 is a front elevation of the multiple variable condenser of my invention; and Fig. 2 is a cross-sectional view taken through one of the condenser sections of the multiple variable condenser of my invention showing the relation of each of the auxiliary variable condenser units for fixing the maximum to minimum capacity ratio of the principal variable condenser unit.

In radio receiving apparatus where a multiple number of tuning condensers are employed for adjusting a plurality of circuits therein to resonance for a particular frequency, it is necessary that the ratio of maximum to minimum capacity of each variable condenser be the same. The ratio of maximum to minimum capacity for variable condensers used in circuits adjusted for operation over a wavelength range of 200 to 550

meters is 7.56, while the wavelength range is 2.75 following the expression:

$$\frac{C_v 180 + C_r}{C_{v0} + C_r} = \rho$$

Wherein:

$C_v 180$ = capacity at maximum exposure of stator and rotor plates;

C_{v0} = capacity at minimum exposure of rotor and stator plates;

C_r = capacity of compensating condenser and subsequent capacities.

Inasmuch as the shape of the stator and rotor plates of a condenser system are not uniform in one condenser with respect to another condenser, even though it may have practically the same physical dimensions, the capacity ratio for several condensers varies to a substantial degree. I have devised the construction of condenser herein for compensating and correcting for this difference in capacity ratio so that each condenser of a plurality of condensers may have the capacity ratio thereof matched for the accurate control of the several circuits for the receiving system in which the condensers are employed.

I mount the compensating condensers directly upon the terminal boards of the variable condenser systems. These compensating condensers are parallel connected with the stator and rotor plates of the variable condenser, and by means of a micrometer screw adjustment the capacity ratio may be initially fixed and thereafter accurately maintained.

The tuning system includes generally a metal frame 10 which is adapted to be operatively disposed behind an instrument panel of a radio set. The frame 10 is made as rigid as possible and comprises upper horizontal bars 12 and 112 and lower horizontal bars 13 and 113, these upper and lower bars being interconnected by the vertical members 14 and the vertical intermediate members 15. Cross bars 16 and 17 serve to make the frame more rigid. Within the frame 10 there is arranged a horizontal shaft 18 which is preferably journaled in bearing 19 provided upon the vertical members or webs 14 and 15. The variable condenser

structures 20, 21, 22 and 23 are operatively mounted in spaced relationship within the frame 10 so as to be simultaneously varied upon rotation of the shaft 18.

5 A suitable form of auxiliary variable condenser structure is shown as comprising a group of spaced rotor plates 24 directly mounted upon the shaft 18. The rotor plates are adapted to interleave a group of
10 spaced stator plates 25 which are suitably mounted upon the insulating strip 26. One suitable form of mounting comprises a bracket 27 secured to the stator plates 25 and to the insulating strip 26 by means of
15 bolts 28. The ends of the insulating strip 26 are secured to the rear faces of the bars 12 and 13 by suitable means such as screws 29, the apertures 30 provided in the insulating strip for reception of these screws 29
20 being enlarged so as to permit lateral adjustment of the insulating strip.

To indicate the angular position of the shaft 18 there is provided an indicating dial or drum 31 which is mounted upon this
25 shaft, preferably between the intermediate vertical members 15. This indicating dial is adapted to be visible through an aperture 32 in the instrument panel of the receiver. Suitable means are provided for rotating the indicating dial.
30

In assembling condensers such as are described above, it has been found that the respective minimum capacitance of the different condenser structures will vary between certain limits. In order to definitely
35 fix this minimum capacitance each condenser structure is provided with the small adjustable condenser 52 which is mounted upon the rear face of the insulating strip
40 26. In the construction shown this variable condenser comprises a metallic strip 53 which is connected to a screw 54 which is threaded into the bar 12, thus being grounded to the frame. The strip 53 forms one
45 electrode of a condenser, while the spring strip 55 forms the other electrode, the lower end of this strip being connected with two of the bolts 28. The overlapping portions of the strips 53 and 55 are separated by
50 means of a strip 56. A screw 57 serves to press down the upper plate against the lower plate a more or less amount, depending upon the capacitance desired.

For making connections to the rotor

plates of the respective condenser structures 55 there are provided terminal connectors 59 which are connected to the stator plates by means of a flexible ribbon or other suitable conductor 60. Connections to the insulated
60 stator plates may be made to any one of the screws 28. Metal shields may be positioned between the condensers and grounded to the frame in order to reduce inter-capacitative coupling. The front bars 112 and 113 may
65 be employed for operatively mounting the device behind the instrument panel 11, and as shown, are secured to a metal panel 35.

The several auxiliary condensers 52 are each adjusted by the turning of the screw-device 57 to a selected position before the
70 receiving apparatus reaches the factory. The maximum to minimum capacity ratio of each condenser is in this manner matched so that the several tuning condensers 20, 21, 22 and 23 may function from the same con-
75 trol for the accurate adjustment of the several circuits. The adjustment necessary at each of the auxiliary condensers may be extremely slight but in each instance the adjustment must be made quite accurately.
80

While I have described my invention in certain preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed
85 by the scope of the appended claim.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

A multiple variable condenser comprising a metal frame, a shaft journaled in said frame and grounded to the same, a plurality of variable condenser structures mounted upon said frame, said structures including a rotor plate mounted upon said shaft and
90 stator plates mounted upon the frame, the mounting for the stator plates comprising an insulating strip secured at its ends to said frame, and secured to said stator plates at its intermediate portion, and a small ad-
95 justable condenser shunted across each variable condenser, each of said adjustable condensers being mounted upon the insulating strip of the condenser structure with which it is in shunt for fixing the maximum
100 to minimum capacity ratio thereof. 105

In testimony whereof I affix my signature.

FREDERICK A. KOLSTER.