

May 24, 1932.

W. A. READY

1,859,796

ELECTRIC CIRCUIT TUNING DEVICE

Filed July 8, 1927

2 Sheets-Sheet 1

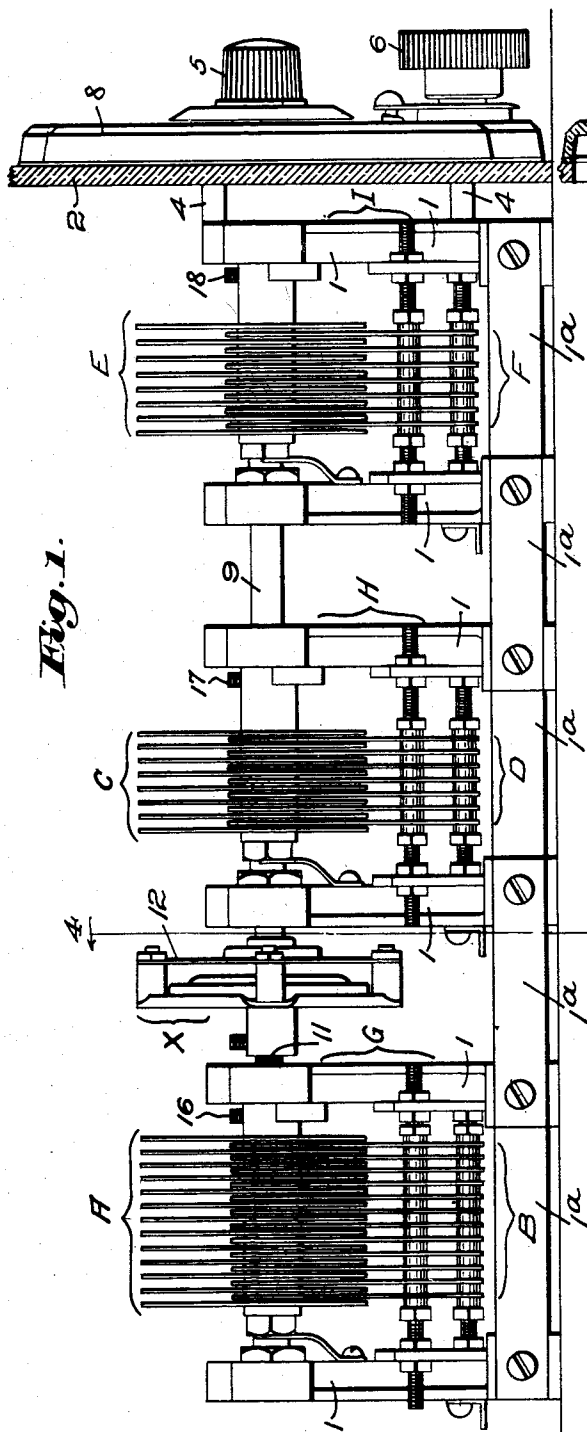


Fig. 1.

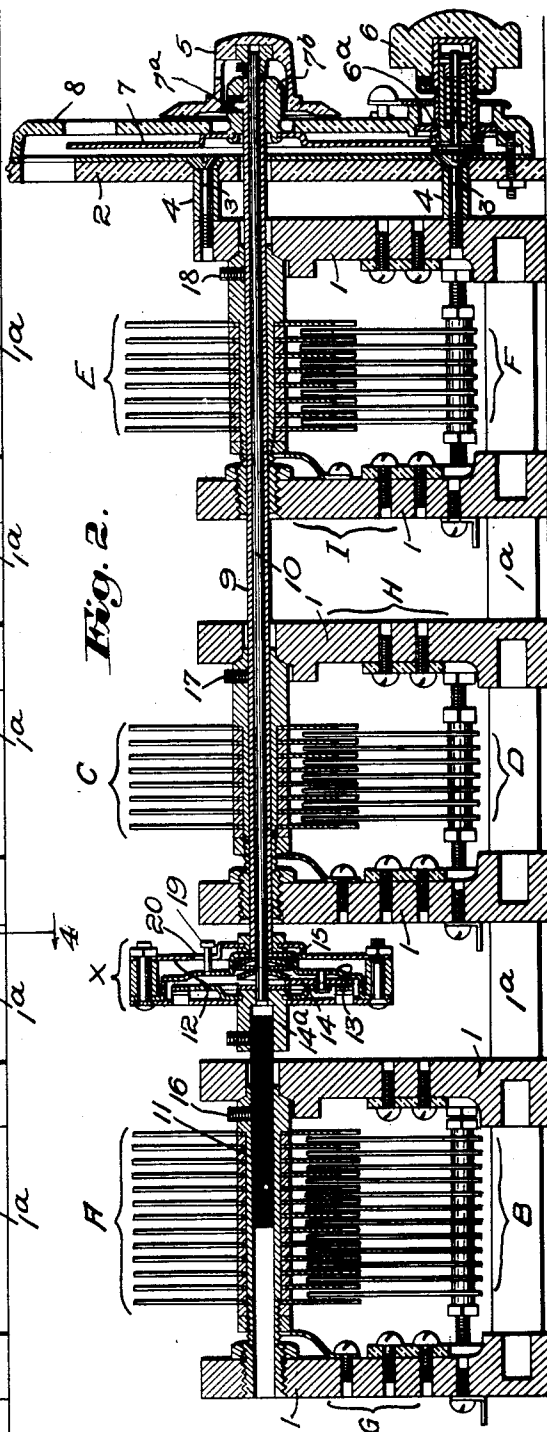


Fig. 2.

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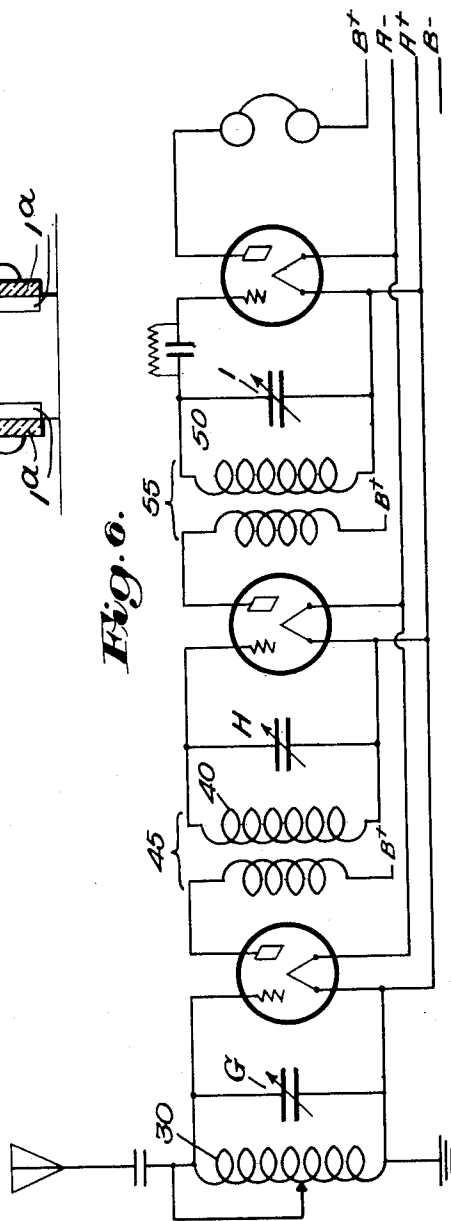
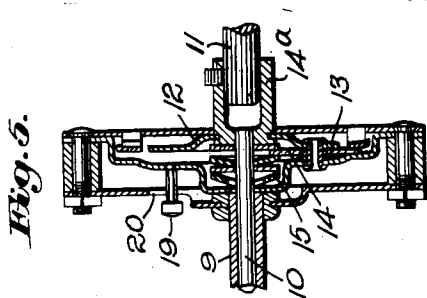
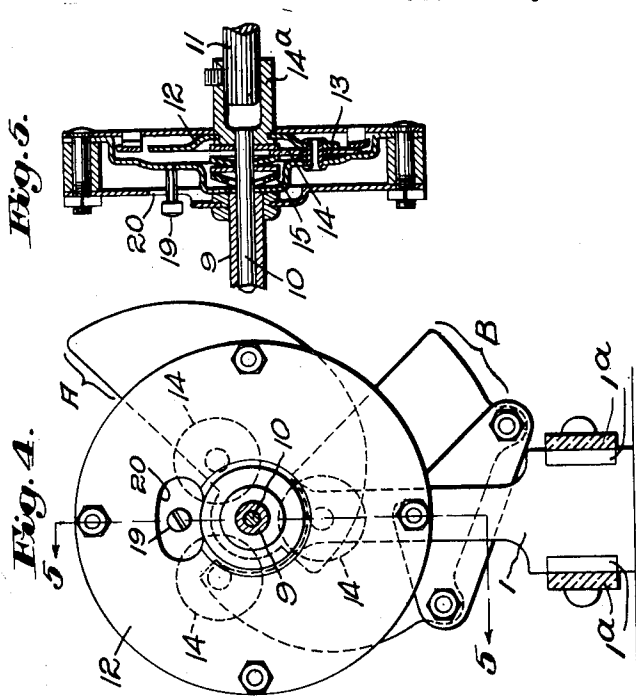
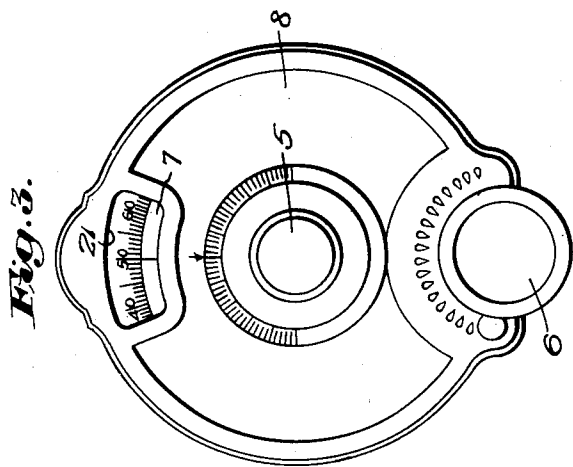
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ELECTRIC CIRCUIT TUNING DEVICE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ELECTRIC CIRCUIT TUNING DEVICE

Application filed July 8, 1927. Serial No. 204,288.

My invention aims to provide improvements in electric circuit tuning devices.

In the drawings, which illustrate a preferred embodiment of the invention:—

5 Figure 1 is a side elevation of the device as it appears when attached to a panel, the panel being indicated in cross-section;

Fig. 2 is a vertical section through the device shown in Figure 1, some of the parts 10 being shown in elevation;

Fig. 3 is a front elevation of the dial mechanism of the device;

Fig. 4 is a section on the line 4—4 of Figure 1, showing the coupling means between two of the condenser units;

Fig. 5 is a section on the line 5—5 of Fig. 4; and

Fig. 6 is a conventional wiring diagram showing the various circuits to be tuned by 20 the circuit tuning device, and also showing the connections between the various circuits and the condenser units.

Referring to the drawings, I have illustrated a circuit tuning device in the form 25 of a condenser mechanism particularly, though not exclusively, useful in connection with tuning various electrical circuits of a radio-receiver. I have found that the circuits of radio-receivers using so called 30 "tandem" tuning devices may be more effectively tuned if allowance is made for tuning one or more of the circuits independently of the others. This may be accomplished by permitting individual adjustment of one or 35 more of the units of the "tandem" device. To this end I have shown, and will hereinafter describe, a condenser device, which is simple in construction and operation, for producing the desired results.

40 The condenser mechanism, illustrated in Figs. 1 and 2, includes a plurality of condenser units each comprising a group of rotary plates and a cooperating group of stationary plates. The rotary group A co- 45 operates with the stationary group B, the rotary group C cooperates with the stationary group D, and the rotary group E co-operates with the stationary group F, as shown in Figs. 1 and 2. The condenser units 50 are supported by suitable frame means com-

prising the upright pieces 1 and the connecting pieces 1^a. These condenser units per se may be of any suitable construction, but, in this instance, I have shown them as being constructed and secured together in substantially the same manner as shown and 55 described in my pending application, Serial No. 143,718, filed October 23, 1926.

The entire condenser device, as illustrated in Figs. 1 and 2, may be secured to a panel 60 2, as by means of the screws 3 and spacers 4. At the front face of the panel I have shown, secured thereto, a dial mechanism. For the purposes of this application the dial mechanism, except for the central turning knob 5, 65 may be considered as substantially the same as shown and described in my co-pending application, Serial No. 95,154, filed March 16, 1926.

The knob 6 which turns the main dial 7, 70 inside of the dial casing 8, is operatively connected with a hollow shaft 9 for turning the rotor groups A, C, and E together. Connection is made between the knob 6 and dial 75 by means of the friction disks 6^a, while connection between the shaft 9 and dial 7 is secured by means of the set screw 7^a located in the hub 7^b secured to the dial, as shown in Fig. 2.

The knob 5 is suitably connected to a shaft 80 10 extending through the hollow shaft 9 for turning the rotor group A independently of the rotor groups C and E, as more fully described hereinafter in connection with the operation of the device.

85 The indicia of the dial 7 may be read through the opening 21 (Fig. 3) in the casing 8, while the indicia for indicating the relative turning of the knob 5 is shown (Fig. 3) 90 as being carried directly by the knob 5.

To provide for turning all of the rotor groups together, while permitting movement of one group relative to the others, I have interposed between the rotor group A 95 and rotor group C a coupling mechanism X. This mechanism X is operatively connected to the shafts 9 and 10 and also to the shaft 11, as clearly shown in Fig. 2. The coupling mechanism X may be of any suitable construction that will provide for turning the 100

rotor group A with the other rotor sets when the shaft 9 is turned, while also permitting turning of the rotor set A relative to the other rotor sets when the shaft 10 is turned.

To this end, the mechanism X comprises a differential mechanism substantially the same as shown and described in my pending application, Serial No. 597,014, filed October 26, 1922. Therefore, I shall describe only enough of the parts of the transmission mechanism necessary for a clear understanding of the operation of the turning device, as I do not wish to be limited to the construction shown. The outer housing 12 is secured directly to one end of the shaft 9, the plate 13 carrying the friction wheels 14 is secured directly to the hub 14^a, and the disks 15, which drive the friction wheels 14, are secured to one end of the shaft 10, as best illustrated by Fig. 5.

In Fig. 2 I have shown the groups A, C and E secured to the shafts 11 and 9 by means of the set screws 16, 17 and 18 so that they may be turned when the shafts 11 and 9 are turned.

If desirable, I may limit the amount of relative movement between plate 13 and the housing 12 by utilizing a pin 19 and slot 20 connection, as best shown in Figs. 4 and 5.

For the purpose of identifying the various condenser units of the condenser mechanism, shown in Figs. 1 and 2, with the condenser units indicated diagrammatically in the wiring diagram shown in Fig. 6, I will assign the letters G, H and I to the various condenser units. Referring now to Fig. 6, the condenser unit G is shown in the proper position in the diagram for tuning the antenna and ground circuit 30, while the condenser units H and I are indicated diagrammatically in the proper positions for tuning the secondary circuits 40 and 50 of the transformers 45 and 55 respectively.

The shaft 11 and the connecting pieces 1^a, connecting the condenser units G and H, may be made of a non-conductive insulating material so that, electrically, the condenser unit G is absolutely separate from the other condenser units H and I.

Assuming that the condenser device, above described, is to be used in connection with tuning the circuits indicated in Fig. 6, the operation may be as follows:—Ordinary adjustment of the circuits may be secured by turning the knob 6 either clockwise or contra-clockwise, thereby turning the shaft 9. As the rotor groups E and C are fixed directly to the shaft 9, and as the rotor group A is connected to the shaft 9 through the shaft 11 and coupling device X, all of these groups will be turned equally, when the knob 6 is turned. If it is desirable to tune a circuit to a finer degree, an adjustment of the antenna and ground circuit may be readily made by merely turning the knob 5. If the

pin 19 and slot 20 (Fig. 4) connection is used, only a limited adjustment may be made by turning the knob 5. (In most cases a limited adjustment is all that is necessary.) Thus when the knob 5 is turned the shaft 10 will be rotated relative to the shaft 9. This shaft 10 acts through the planetary means of the coupling mechanism X (Fig. 2) to turn the shaft 11 while the housing 12 remains stationary. By this arrangement, I may secure an adjustment of the antenna and ground circuit 30 independently of the circuits 40 and 50 by turning the condenser group A relative to the groups C and E.

It should be understood that my invention is not particularly limited to a condenser mechanism for radio-receivers, but may be equally useful in connection with any type of mechanism for tuning two or more electric circuits.

While I have shown and described a preferred embodiment of my invention, it should be understood that I have done so for the purpose of clarification rather than limitation, my invention being best defined in the following claims.

I claim:

1. A device for tuning electric circuits, said device comprising two or more tuning units each having a movable tuning part and a vernier dial mechanism operatively connected by shaft means to the movable tuning parts and an axially fixed shaft operatively connected to one of said movable tuning parts and to said dial mechanism, said dial mechanism being provided with means whereby all of the movable tuning parts may be moved together or one may be moved independently of the others.

2. A device for tuning electric circuits comprising a plurality of condenser units, frame means securing the units together in axial alignment, shaft means connecting all of the rotor plates of the condenser units for unitary operation, a differential mechanism operatively connected between two groups of rotor plates and a second shaft whereby one of said groups of rotor plates may be operated relative to the other group and said shafts being mounted for rotation about the same axis.

3. A device for tuning electric circuits, said device comprising two or more tuning units each having a movable tuning part, shaft means to which all of said movable tuning parts are operatively connected for positive turning movement therewith, a second shaft rotatable about the same axis as said first shaft means and operatively connected to one of said movable tuning parts, a differential mechanism connected between the said shafts, dial means operatively connected to said shafts for turning them, said dial means including a knob operatively connected for turning all of said movable tuning parts

and a second knob operatively connected for turning one of said movable tuning parts by operation of said differential mechanism.

4. An electric circuit tuning condenser
5 mechanism having a plurality of axially
aligned plates adapted to be turned with
relation to other plates of the device, inde-
pendently operable shafts connected to the
turnable plates, coupling means and dial
10 means operatively connected through the said
shafts with said turnable plates and all be-
ing operable about the same axis, said cou-
pling means having relatively movable parts
whereby said turnable plates may be rotated
15 together and whereby one or more of said
turnable plates may be rotated relative to
the others according to which shaft is turned.

In testimony whereof, I have signed my
name to this specification.

20 WILLIAM A. READY.

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