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H. J. BENNER
ELECTRICAL APPARATUS
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2,136,731

Fig. 1.

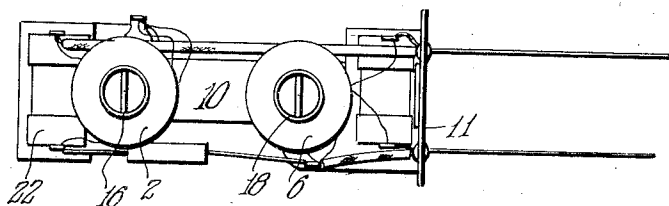


Fig. 2.

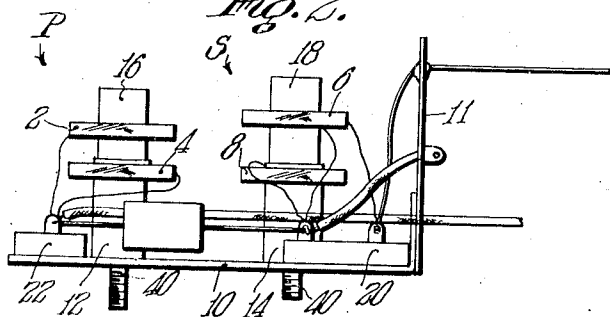


Fig. 3.

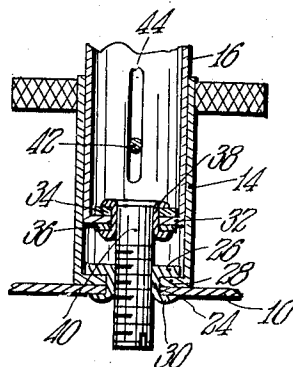
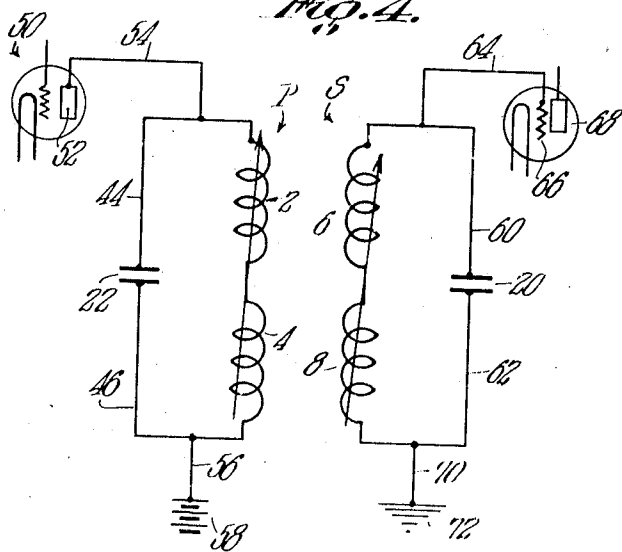


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRICAL APPARATUS

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Application April 1, 1937, Serial No. 134,236

3 Claims. (Cl. 74—89)

This invention relates to improvements in electrical apparatus and is directed more particularly to improvements in variable tuned circuits or the like.

According to one of the principal objects of the invention there is provided an electrical apparatus adapted for use as a transformer such as an intermediate transformer commonly used in radio apparatus. The apparatus of the invention in a broad way is characterized by a split winding or a primary and secondary, one or both of which are split to consist of separate series connected windings thereby providing a primary and/or secondary consisting of tunable units.

According to this invention, where the primary and secondary are used they are relatively adjustable to facilitate adjustments whereby the transformer may be tuned to a certain frequency without substantial changing of the flux linkage or coupling, which is desirable. When but a single tuned unit is used, one of its coils is adjustable relative to the other to facilitate variations, as is desirable for tuning purposes.

The apparatus is adapted for many and various uses but as shown and described hereinafter the preferred form thereof is adapted for use in radio receivers although the invention is not to be so limited.

In the drawing:

Figs. 1 and 2 are plan and side elevational views of an electrical apparatus embodying the novel features of the invention;

Fig. 3 is an enlarged sectional elevational view to explain certain features of construction; and

Fig. 4 is a wiring diagram to explain certain features of the invention.

Referring now to the drawing in detail the invention will be fully described. While the invention is not to be so limited in the drawing, there is a primary P and a secondary S. The primary is split so as to provide separate coils 2 and 4 and likewise the secondary is split to provide other coils 6 and 8.

The coils 2 and 4 are connected in series and are relatively adjustable and likewise the coils 6 and 8 are connected in series and are arranged for relative adjustment. In this way the coils of the primary and of the secondary are adapted for relative adjustment so that their mutual inductance is variable, thereby adapting the apparatus for many and various purposes. As stated, the apparatus may be used as a transformer or the parts described as the primary or secondary may be used for various purposes.

The coils 4 and 8 are associated with a support

10 by means of tubes 12 and 14 secured to the said support 10. The coils 2 and 6 are carried by tubes 16 and 18 which are for purposes of adjustment slidable up and down in the tubes 12 and 14. There is an end plate 18 associated with the support 10 which is preferably of dielectric material and this may support various wires and connections but is not necessarily a part of the invention.

A condenser is represented at 20 adjacent one end of the support 10 while another condenser 22 is associated with the support, at its other end. The condensers are preferably of the fixed type since variations or adjustments are taken care of by the relatively adjustable coils.

The tubes 12 and 14 are fixed to the support in the manner shown in Fig. 3. Hollow members 24 have upper flanges 26 which bear on the lower walls 28 of tubes 12 and 14 and the ends of the members 24 extend through and are threaded over upon the support 10. The upper tubes 16 and 18 have end walls 32 and washers 34 and 36 at opposite sides thereof. Hollow rivets 38 extend through the washers 34 and 36 and end walls 32 and to the rivets 30 there are secured, as by soldering or some other suitable means, rod or screw members 40 which are threaded at their lower ends, as shown. The threaded ends are in threaded engagement with the members 24. By rotating the members 40 the uppermost tubes 16 and 18 may be moved up and down relative to the lower tubes 12 and 14. In this way the upper coils 2 and 6 are moved relative to the lower coils 4 and 8.

Preferably the upper tubes 16 and 18 are held against rotation and to that end pins 42 or the like are associated with the lower tubes 12 and 14 and the upper tubes have slots such as 44 for receiving the said pins. The slot and pin construction allows movement of the upper tubes up and down but prevents rotation thereof.

By reference to the diagram in Fig. 4 the connection of the parts will be explained. The coils 2 and 4 of the primary P are connected as shown so as to be in series relation. The opposite ends of the primary are connected at 44 and 46 to opposite sides of fixed condenser 22. A tube is represented by 50 to the plate 52 of which is connected at 54 one end of the primary. The other end of the primary is connected at 56 to a source of energy represented by a battery 58.

The secondary coils 6 and 8 are connected in series as shown and their opposite ends are connected at 60 and 62 to fixed condenser 20. One end of the secondary is connected at 64 to a grid

66 of a tube 68 while the other end of the secondary and condenser is connected at 70 to a biasing means, ground or the like indicated by 72.

From the foregoing it will be observed that the apparatus is compact in size so as to occupy but small space while the coils forming the primary and the secondary are relatively adjustable. It has been discovered that the novel construction above described affords the desired degree of variation where but a set is used and permits the tuning of the sets of coils, where the sets are used, without substantially changing the flux linkage. This is not only desirable in apparatus of this kind but affords a means of precision variation which tends to facilitate efficiency and accuracy.

Various other advantages will be observed from the foregoing description and it is not desired to be limited thereto since many changes and modifications may be made therein without departing from the spirit and scope of the invention. What it is desired to claim and secure by Letters Patent of the United States is:

1. In an apparatus of the class described comprising in combination, a support, a lower tube having an end wall on said support, the said support and end wall having openings therethrough, an internally threaded member extending through said openings and securing the end wall to said support, an upper tube slidable in the lower tube having its lower end spaced from the end wall of the lower tube and provided with an end wall having an opening therein, a member rotatable in said opening, a screw member fixed to said last-named member extending through and threadedly engaging the internally threaded member adapted to move the upper tube relative to the lower tube when it is rotated.

2. In an apparatus of the class described com-

prising in combination, a support, a lower tube having an end wall on said support, the said support and end wall having openings therethrough, an internally threaded member extending through said openings and securing the end wall to said support, an upper tube slidable in the lower tube having its lower end spaced from the end wall of the lower tube and provided with an end wall having an opening therein, a member rotatable in said opening, a screw member fixed to said last-named member extending through and threadedly engaging the internally threaded member adapted to move the upper tube relative to the lower tube when it is rotated, and means to prevent relative rotation of said tubes including a pin extending across one tube which is slidable in slots extending longitudinally of the other tube.

3. Apparatus of the class described comprising in combination, a support, a lower tube having an end wall on said support, the support and end wall provided with openings therethrough, a securing member extending through the openings having upper and lower parts on the lower side of the support and upper side of said end wall and adapted to hold said tube and support against relative movements, the said member being provided with a threaded opening therethrough, an upper tube slidable in the lower tube having a lower end wall provided with an opening, a member rotatable in said opening provided with means to hold the same against axial movements relative to the end wall of the upper tube, a screw fixed to said member threadedly engaging the securing member, and means to prevent relative rotation of said tubes including a pin in one of said tubes disposed in a slot provided in the other tube.

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