Sept. 20, 1932. E. D. KOEPPING 1,878,636

SHIELDED RADIO FREQUENCY TRANSFORMER AND CONDENSER UNIT

Filed Aug. 18, 1930

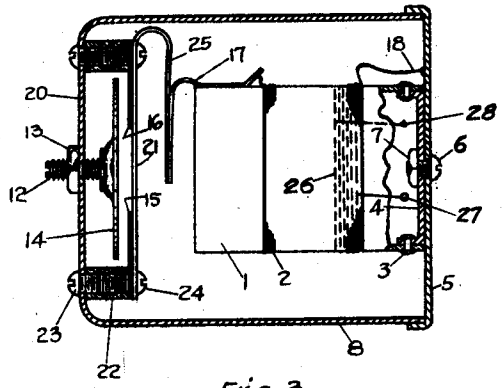


Fig. 3

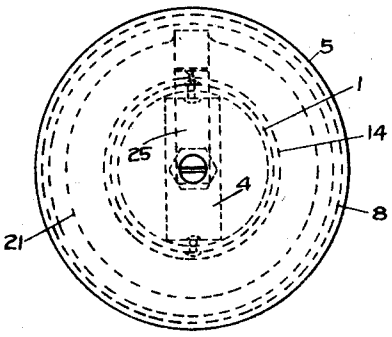


Fig. 4

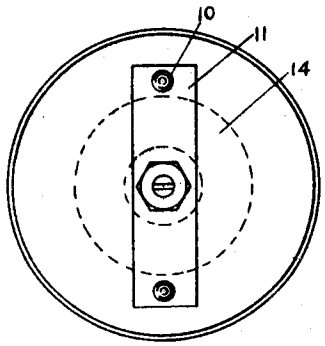


Fig. 2

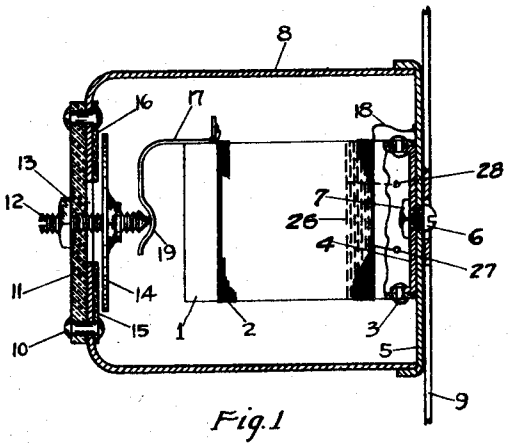


Fig. 1

Inventor
Emil D. Koepping
Attorney
A. D. T. Libby

Patented Sept. 20, 1932 1,878,636

UNITED STATES PATENT OFFICE

EMIL D. KOEPPING, OF HADDON HEIGHTS, NEW JERSEY, ASSIGNOR TO RADIO CONDENSER COMPANY, OF CAMDEN, NEW JERSEY

SHIELDED RADIO FREQUENCY TRANSFORMER AND CONDENSER UNIT

Application filed August 18, 1930. Serial No. 476,104.

This invention relates to the combination of a shielded tuning condenser and radio frequency transformer, and while not necessarily limited thereto, the construction is especially adapted for use in the coupling stages of an intermediate frequency amplifier such as used in superheterodyne radio receiving circuits wherein it is desired to adjust the amplifier to some predetermined frequency and to have all of the intermediate stages exactly tuned or differing from each other by some known value.

It is the principal object of my invention to provide a combined transformer coil and tuning condenser structure which is simple, readily assembled, and which may be easily and positively adjusted to the desired point and locked in this position, which it will retain because the surfaces forming the plates of the condenser are not under spring tension.

I am aware that various types of adjustable plate condensers have been proposed, but the construction herein described differs from prior art devices with which I am familiar in a number of respects as will be hereinafter set forth and claimed. In the drawing:

Figure 1 illustrates, on a reduced scale, a part sectional and part elevational view through one form of construction which may be used.

Figure 2 is an end view of the left-hand end of Figure 1.

Figure 3 is a part sectional and part elevational view on a reduced scale, showing a somewhat modified form from that shown in Figure 1.

Figure 4 is a view of the right-hand end of Figure 3.

In the various views of the drawing, wherein like numbers refer to corresponding parts, 1 illustrates a tube of suitable insulating material, carrying secondary windings 2 and primary winding 26, each of a suitable number of turns and size of wire and positioned each with respect to the other to give the desired results. The coil frame or tube 1 has preferably attached thereto in any suitable manner as by rivets 3, a mounting bracket 4. The bracket 4 is held to the metallic flange 5 in any satisfactory manner as by a screw 6 and nut 7. The metallic flange 5 is adapted to snugly fit over the end of the metallic shield 8. The flange 5 and shield 8 are made of metal of suitable thickness so as to properly shield the condenser and transformer windings 2 and 26. The metallic flange 5 may be attached to a metal chassis support member 9 in any satisfactory manner.

Attached at the top end of the shield 8, as by rivets 10, is an insulator 11. The insulator 11 carries an adjusting screw 12 which is adapted to be locked in any adjustable position by a lock-nut 13. On the inner end of the screw 12, is fixedly carried a plate 14 which acts as one element of a small tuning condenser, the other element of the condenser being the top end of the shield 8. To prevent the plate 14 from coming in contact with the end of the shield 8, a pair of suitably thin and flat insulators 15 and 16 are attached to the end of the shield 8 by the rivets 10.

The tube 1 carries a flexible contact member 17 which is connected to one end of the secondary winding 2, while the other end 18 of the secondary winding 2 is connected to the metallic flange 5 of the shield 8 and in contact with the chassis. The circuit connections to the winding and condenser to be described may be made at the contact spring 17 and at terminals 27 and 28. The end of the flexible spring member 17 is carried over the end of the tube 1 and bent to form a curved seat 19 in the axial center of the transformer and condenser. This construction enables the metallic flange 5, carrying the transformer, to be assembled within the shield 8 in any position; that is to say, no particular attention need be given to locating the coil

in any given position within the shield 8, thereby saving a great deal of time during the assembly operation.

In the form shown in Figure 3, the transformer is mounted in the same manner as in Figure 1, but in Figure 3, the condenser plate 14 is mounted directly on the end 20 of the shield 8, while a cooperating disc or plate 21 forms the other element of the condenser and is carried on a pair of insulators 22 fastened to the end 20 of the shield 8 in any satisfactory manner as by screws 23, the plate 21 being held to the insulators by screws 24.

The insulators 15 used, are the same as in Figure 1, to prevent the plate 14 becoming short-circuited against the plate 21. The plate 21 is provided with a flexible contact finger 25 adapted to extend inwardly to the axial center of the transformer and to automatically engage the contact member 17. The finger 25 may be made, and is shown integral with the plate 21. As shown in Figure 3, the finger 25 and the contact member 17 are shown in longitudinal contact relationship, but these fingers are preferably made wide enough so that if the head 5 and the transformer are put on in any position, sufficient contact area will be obtained to insure a good permanent contact between these members without introducing any undesirable resistance, which if present, would tend to defeat the purpose of my invention.

The construction of both Figures 3 and 2 is such as to insure a self-centering contact between the condenser and the transformer, and the tension of the spring 17 is such, in Figure 1, as to follow up the small adjustment of the screw 12 as the condenser plate 14 is adjusted.

If desired, in the construction shown in Figure 3, the contact spring 17 and the finger 25 may be, either one or both, provided with serrations of some kind to further insure a good contact. This construction is such that the condenser may be adjusted without removing the shield or disturbing the circuits.

Having thus described my invention, what I claim is:

1. A combined tuning condenser and transformer including; a metallic shield casing, a tuning transformer structure mounted within the casing, a contact member carried by said transformer structure and connected to one winding and extending over one end of the transformer so as to intercept the axial center of said transformer structure, and a condenser positioned in the end of the casing adjacent said contact member, said condenser having one element adjustable, and means for making engagement with said contact member and an element of the condenser.

2. A combined tuning condenser and transformer including; a metallic shield casing, a tuning transformer structure mounted within the casing, a contact member carried by said transformer structure and connected to one winding and extending over one end of the transformer so as to intercept the axial center of said transformer structure, an adjusting screw carried in the end of, but insulated from said casing at its axial center and engaging said contact member, and a plate carried by the screw and forming with the end of the casing an adjustable condenser.

3. A combined tuning condenser and transformer including; a metallic shield casing, a tuning transformer structure mounted within the casing, a contact member carried by said transformer structure and connected to the winding and extending over one end of the coil so as to intercept the axial center of said transformer structure, an adjusting screw carried at the axial center of the end of the casing, a plate carried by the screw, a second plate carried by the said end of the casing and forming with the first-mentioned plate a small condenser, and a finger on the second-mentioned plate for engaging said contact member.

4. A combined tuning condenser and transformer including; a metallic shield casing, a tuning transformer structure mounted within the casing, a contact member carried by said transformer structure and connected to one winding and extending over one end of the transformer so as to intercept the axial center of said transformer structure, and a two-plate condenser carried in the end of the casing adjacent said contact member, one of said plates having a flexible finger for engaging said contact member at least at the axial center of the transformer structure, the other of said condenser plates being adjustable to vary the capacity of the condenser.

5. A combined tuning condenser and transformer including; a metallic shield single compartment casing, a tuning transformer structure mounted within the casing from one end thereof thereby leaving a free end, a condenser mounted in the opposite end of the casing adjacent the free end of said transformer structure, said condenser having a pair of plate elements, one rotatably adjustable with respect to the other, and a pair of contact members mounted, one on the transformer and the other from the end of the casing carrying the condenser, said contacts meeting on the axial center of the transformer structure so as to secure a self-centering contact between one element of the condenser and a transformer winding.

6. A combined tuning condenser and transformer including; a metallic shield single compartment casing, a tuning transformer structure mounted within the casing from one end thereof thereby leaving a free end, a condenser positioned within the opposite end of the casing adjacent the free end of the transformer structure, said condenser comprising a pair of plates, one rotatably ad-

justable with respect to the other, and one electrically connected to the casing, and means for connecting the other plate of the condenser to one winding of the transformer structure, said means comprising a spring carried by the transformer structure and passing across the axial center of said transformer structure, and a screw for engaging said spring on said axial center of the transformer structure, said screw also acting as means for rotating the adjustable plate of the transformer.

In testimony whereof, I affix my signature.

EMIL D. KOEPPING.