Feb. 14, 1933. T. J. SCOFIELD 1,897,337

TUNING ELEMENT

Filed Oct. 30, 1929

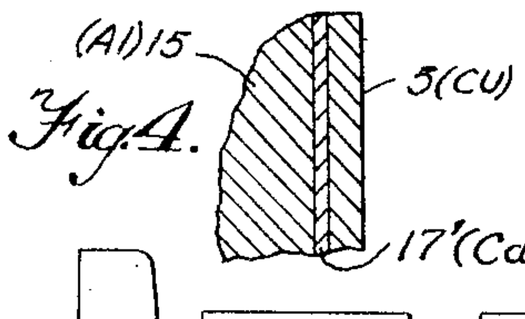
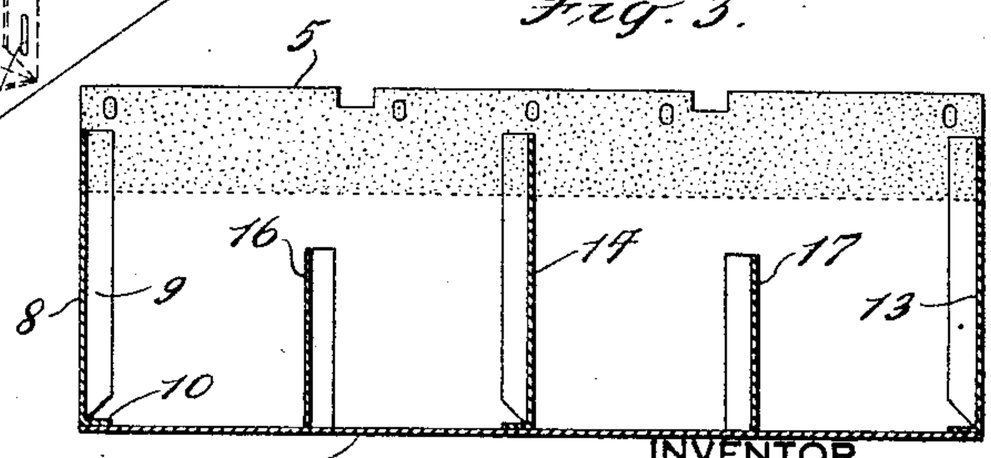


Fig. 4.

Fig. 1.

Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE

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TUNING ELEMENT

Application filed October 30, 1929. Serial No. 403,526.

This invention relates to radio devices and more particularly to tuning elements. An object of the invention is to shield tuning elements or units of radio sets by providing good contact throughout the entire portion of the shield around certain parts in said tuner.

Another object is to provide an intermediate coating of metal between metals of different parts in the tuner element which intermediate coating has minimum electrical potential with such metals so as to minimize electrolytic action in respect to "voltaic" couples.

Further objects will be given in the following specification, reference being had to the drawing, in which:

Fig. 1 is an elevation of a tuning element such as shown in the application of Theodore J. Scofield and William D. Miner filed October 30, 1929, Serial No. 403,530.

Fig. 2 is a perspective view of the shield over the lower part of the tuning element shown in Fig. 1.

Fig. 3 is a longitudinal section through the shield shown in Fig. 2.

Fig. 4 is a fragmentary showing of the contact portions of the metallic base of the tuner, the shield and the coating of metal therebetween.

The shield for the tuning coils 1, 2, 3 and 4 shown in dotted lines in Fig. 2 and more particularly described in the above referred to application, is of the shape shown in Figs. 2 and 3. It consists of a strip of good conducting metal such as copper bent in U-shape to form the two sides, 5, 6 and bottom 7. The end 8 has its side and bottom edges bent at 9, 10 and 11 to present welding or soldering surfaces. Preferably these surfaces are spot welded to the U-shape member at various points such as indicated at 12 to make good electrical contact. The other end portion 13 is similarly formed and welded to the U-shape member. An intermediate shielding partition 14 is shaped similarly to the ends and is spot welded or soldered to the two sides and bottom of the U-shape member in the way that has just been referred to in connection with the end member. This central shield 14 completely shields the coils 1 and 2 from coils 3 and 4 when taken in conjunction with the bottom 15 of the tuner element.

For reasons described in connection with the above mentioned application it is desirable to form a very loose coupling between the coils 1 and 2 and 3 and 4, and therefore a copper or other good conducting metallic shield 16, 17, is placed between these coils. The bent-over sides of these shields 16, 17 are spot welded to the sides of the U-shape member. These shields do not completely extend across the vertical space of the shield box as some coupling between the coils 1 and 2, 3 and 4 respectively, is permitted at the top of the shield 16 and 17. Therefore, it is immaterial whether or not the shielding action is complete at the bottom of the shield 16, 17 and these are not spot welded to the bottom 7. If there is any leakage of magnetic flux at the base of this shield it will be a useful flux added to that passing through the open space at the top.

I have found that in some cases, particularly where receiving sets are exposed to moisture, electrolytic action is set up between the positive copper shield and the negative aluminum alloy base 15 of the tuner element. This is because copper and the metals in the alloy form a voltaic couple. The passage of electrolytic current across the space between the copper and the alloy metals produces corrosion and increases a resistance at the junction points. Consequently the shielding action is rendered imperfect by the corrosion. Furthermore, the electrolytic action produces electrolytic variations in the electrolytic current that produce noises when the set is in operation. These variations become more marked as the corrosion increases.

I have found that I can minimize and substantially eliminate these electrolytic currents by coating with cadmium the entire upper portions of the shield box that makes contact with the base 15 of the condenser. To accomplish this plating I invert the shield box shown in Fig. 2 and extend it a sufficient depth into a plating solution which plates the sides 5 and 6 and the ends 8 and 13 at the upper portion including the edges. I have

stippled the upper portions of the various members to show the location of the cadmium plate at 17'. It is unnecessary to plate shields 16 and 17 because they do not contact with any dissimilar metal. The shield box therefore is not dipped sufficiently into the cadmium solution to plate those shields.

When the shield box is placed over the coils 1, 2, 3 and 4 in correct position the central shield partition 14 enters the notch 18 in a boss ridge case on the bottom of base 15 of the condenser body. The ends 8 and 13 in this position also contact with the bottom of the base 15 and the sides 5 and 6 contact with opposite sides of this base. Screws then are threaded through the holes in sets 5 and 6 and into threaded holes in the base 15 to clamp the cover in position.

When the parts are assembled in this way there will be a cadmium coating between the copper and the alloy metal of the base in all portions where there is contact between these metals. This substantially eliminates all electrolytic action.

While I have found that cadmium is a suitable metal for coating the shield, other metals may be used to accomplish this result and the invention is not limited to any particular coating metal.

While it is preferable to coat the copper shield box, the coating metal may be applied to the base 15 of the condenser without departing from the spirit of the invention. The invention consists in locating a layer of cadmium or other suitable material between the copper shield and the alloy base of the condenser and as far as the spirit of the invention is concerned it is immaterial whether the coating is applied to the one metal or to the other or even applied between the two in separate sheet form.

In defining the potential of copper, cadmium and aluminum, hydrogen is taken as the reference point. Copper is called positive because it has a higher potential than hydrogen with a tendency for current to flow from the copper in the copper-hydrogen electrolytic couple, the direction of the current being taken in what might be called the external circuit and not in the electrolyte. Cadmium on the other hand has a slightly lower potential than hydrogen with a tendency for the so-called external current to flow into the cadmium. Aluminum is likewise negative in respect to hydrogen but to a much greater extent. Thus there is a greater voltage tending to set up a current in the external circuit between aluminum and copper. By interposing a coating of cadmium, the potential is lowered to the point where disturbing electrolytic currents are absent.

Having described the invention, what I claim is:

1. In radio units, a metal frame member, a shield member attached to said frame consisting of a different metal adapted to produce with said metal frame an electrolytic couple of predetermined electromotive force and a sheet of still different metal integrally joined to one of said members and contacting with the other of said members, the metal of said sheet adapted to produce with said other member an electrolytic couple of materially less electromotive force whereby electrolytic action between said parts is reduced.

2. In shields for electrical devices, a copper box member, an aluminum alloy top member attached thereto and a coating of cadmium on one of said members separating it from the other member to prevent direct contact therebetween.

3. In a radio unit, an aluminum alloy base, tuning elements attached thereto, a copper shield surrounding said elements, a cadmium coating on said shield and means to secure said shield to said base with the cadmium in contact therewith.

In testimony whereof, I have signed my name to this specification this 22nd day of October, 1929.

THEODORE JOHNSON SCOFIELD.