Oct. 29, 1929. J. A. GRIER 1,733,983

AMPLIFYING DEVICE FOR RADIO APPARATUS

Filed Oct. 1, 1925

Fig. 1

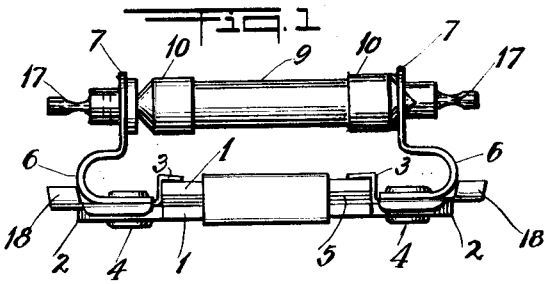


Fig. 2

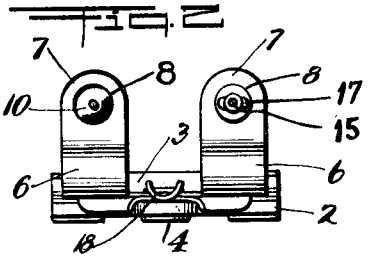


Fig. 4

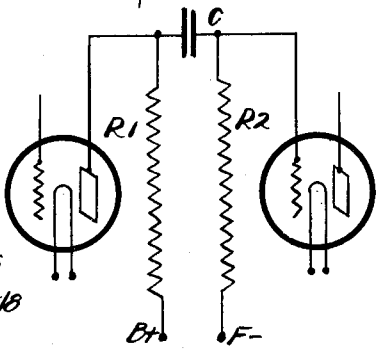


Fig. 3

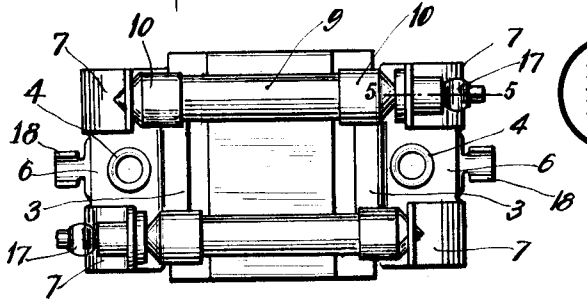


Fig. 5

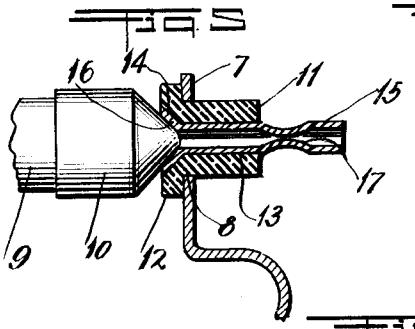


Fig. 6

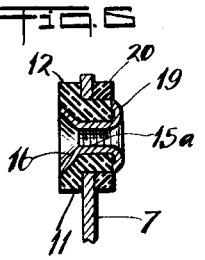


Fig. 7

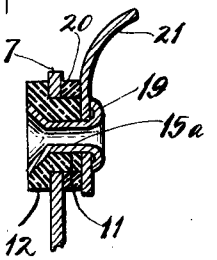
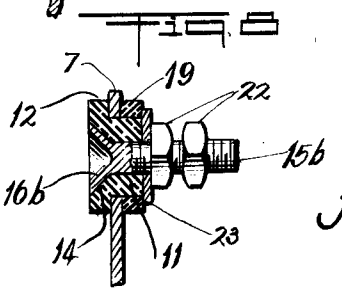


Fig. 8



INVENTOR
JOHN ALFRED GRIER,
BY
Van Deventer & Nickel
ATTORNEYS

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1,733,983

UNITED STATES PATENT OFFICE

JOHN ALFRED GRIER, OF NEW YORK, N. Y., ASSIGNOR TO DUBILIER CONDENSER CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

AMPLIFYING DEVICE FOR RADIO APPARATUS

Application filed October 1, 1925. Serial No. 59,971.

This invention relates to improvements in amplifying devices for radio apparatus; particularly amplifying devices comprising an electrical condenser and resistances adapted to be connected in circuit with the vacuum tubes by which amplification in such apparatus is usually effected.

An object of the invention is to provide a device comprising a combined electrical condenser and resistances of such construction that the device can be readily connected in any manner desired with the other electrical appliances in the circuit of the radio apparatus for which said device is intended.

Another object of the invention is to provide a condenser and suitable resistances for use in resistance-coupled radio amplification; and of such design that the condenser and resistances have the form of a compact unit, easy to manufacture, and convenient to connect and mount in position.

Other objects and advantages of the invention are set forth in the following description, taken with the accompanying drawings; and I of course reserve the right to make any changes that are within the principle of the invention as indicated by the broad meanings of the terms of the appended claims.

On the drawings:—

Figure 1 is a side view of a support for a combined electric condenser and grid leak resistances according to my invention, associated therewith;

Figure 2 is an end view thereof;

Figure 3 is a top plan of what appears in Figure 1;

Figure 4 shows the mode of connecting the device into circuit.

Figure 5 is a sectional view on the line 5—5 of Figure 3; and

Figures 6, 7 and 8 are views similar to Figure 3, showing modifications.

The same numerals identify the same parts throughout.

In the particular description of the structure shown in the drawings, I use the numeral 1 to indicate plates or outside covers of insulation for a condenser, preferably bakelite. One of these plates has extended ends 2 and the two plates are held together by clamps 3 attached to the ends 2 by rivets 4 and engaging the opposite ends of the smaller bakelite plate or cover as illustrated clearly in Figures 1 and 3. Between the plates or covers 1 is the stack of body 5, of the condenser consisting of sheets of metal foil separated by insulation such as mica, part of the sheets of foil being in electrical connection with one of the clamps 3, and the remainder in connection with the other clamp 3, so that when the ends of a circuit are joined to the clamps 3 the condenser can be operatively connected therein. To each of the clamps 3 is secured a clip 6 in position to be normally perpendicular to the two plates 1, these clips constituting supports for two grid leak resistances and each having two upright resilient posts or ends 7 with apertures 8 therein. Each grid leak resistance may be of the usual type comprising a sleeve 9 of insulation, containing resistance material with metal caps 10 conical in form closing the ends of the sleeve and each connected to one extremity of the resistance material inside of the sleeve 9. The condenser here shown is fully described in William Dubilier's application Serial No. 692,869 filed February 14, 1924, but may be of any other suitable construction.

In condensers of this sort with clips for mounting the grid leak resistance, usually one grid leak only is present and the condenser and the resistance are usually in parallel and are connected as a unit in the line of the conductor leading to the grid of the vacuum tube with which the condenser and resistance are to operate. Sometimes, however, it is necessary to connect the grid leak resistance in circuit otherwise than in parallel with the condenser and to have more

than one grid leak in circuit. In this instance two grid leaks are used, each having one terminal connected to one terminal of the condenser, and its opposite terminal insulated from the condenser. For that purpose, I provide each clip with two insulating members or bushings 11, each having a collar or flange 12 at one end. These bushings are of the same external diameter as the internal diameter of the apertures 8, and can each be inserted into the end of one post 7, of each of the clips 6 with the collar or flange 12 facing the other clip. The bushings are arranged as shown particularly in Figure 3, one bushing being carried by the post 7 of one clip and the other bushing by the post of the other clip diagonally opposite, so that the two bushings are not in longitudinal alinement with respect to the condenser. With these bushings in position, if each resistance is mounted in the supports by pushing the coned end of one cap 10 into the aperture 8 of a post of one of the clips 6, and the end of the other cap 10 into the bushing 11 carried by the other clip, directly opposite the first post, the two resistances will be parallel and each resistance will then be connected to the condenser at one end, but disconnected or insulated from the condenser at its other extremity, or terminal, and two resistances will then be joined one to each of the opposite terminals of the condenser.

The bushing 11 has a bore 13 therethrough which is enlarged adjacent the collar 12, as shown at 14. See Figure 5. This bore is lined with a sleeve or piece of metal tubing 15 having a flared end 16 which fits the enlarged end 14 of the bore 13 of the bushing, and adjacent the opposite end of the collar, this piece of tubing 15 is squeezed or flattened to widen it as at 17 and thus make it tightly engage both ends of the bushing, so that it cannot become loose or be caused to slip out of the bore 13.

With these grid leak resistances mounted in the supports 6, the condenser and grid leak resistances will be connected as shown in Figure 4, the condenser being indicated at C and the resistances at R1 and R2. The condenser is directly united to the plate of one vacuum tube and the grid of the next, and the resistances are connected at one end to each terminal of the condenser, and at the other end one to the positive terminal of the anode battery B and the other to the negative pole of a filament battery F. The entire unit is put into circuit by joining the proper conductors to the clamps 3 in any convenient manner, as by securing such conductors to fastening lugs 18 on the clips 3, while the free terminals of the grid leak resistances can be joined separately into circuit as required by connecting the proper conductor to each lining 15 in the bushings 11. As these linings are hollow, a wire or conductor can be easily connected to it by pushing the wire into the end of the lining 15 as far as the flattened part 17 will permit. The wire can be joined to the lining 15 by soldering or in any desired fashion.

The lining 15[a] may be relatively short as in Figure 6. Here one end is expanded at 16 as before, and the other end 19 is riveted over to engage an insulating ring or washer 20 on the end of the bushing 14. The post 6 is thus firmly clamped between the flange 14 and the ring 20. A conductor 21 may be gripped between the riveted end 19 and the end of the bushing with its washer 20, as indicated in Figure 7; or as in Figure 6, the inside of the lining 15[a] may be threaded to receive a binding screw, to secure the end of a conductor in place.

Figure 8 shows a bushing 11, with flange 14 at one end and an insulating washer on the other, with a lining or element 15[b] that is solid, having a flared end 16[b] to fit the counterbored, end 14 of the bore 13, and with screw threads on its other end, the threaded ends carrying binding nuts 23 to secure a conductor, and to hold fast a metal washer 23 against the insulating washer 19.

Thus the supports 6 enable the resistances and condenser to be connected in the desired manner, while at the same time the supports mount both resistances on the condenser in the usual way and enable the entire device to be made up and handled in the form of a single unit.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. As an article of manufacture, a unitary device comprising an electrical condenser and a pair of resistances mounted on the condenser, each resistance being connected to a terminal of the condenser, and insulated from the opposite terminal.

2. A condenser having an electrically conductive support connected to each terminal, each of said supports comprising a pair of posts, a pair of electrical resistances having their extremities engaged by said posts, each resistance having one extremity in electrical contact with one of the posts engaging same, and an insulating member carried by the other post engaging said resistance to prevent electrical contact of said resistance therewith.

3. A condenser comprising a support having an aperture, a bushing of insulating material having a bore, an electrically conductive lining in the bore, and an insulating washer encircling one end of the bushing and clamped against the support by a riveted end of said lining.

4. A condenser comprising a support having an aperture, a bushing of insulating material having a bore, an electrically conduc-

tive lining in the bore, and an insulating washer encircling one end of the bushing and clamped against the support by a riveted end of said lining together with a conductor held in place by said riveted end of the lining.

5. A condenser having a plurality of electrically conductive supports attached to each end and resistances, the extremities of which are engaged by the supports each resistance being connected to one terminal of the condenser and insulated from the opposite terminal.

In testimony whereof I affix my signature.

JOHN ALFRED GRIER.