Aug. 22, 1933. E. G. MURPHY 1,923,552

VACUUM TUBE

Filed Oct. 24, 1928

Fig. 1

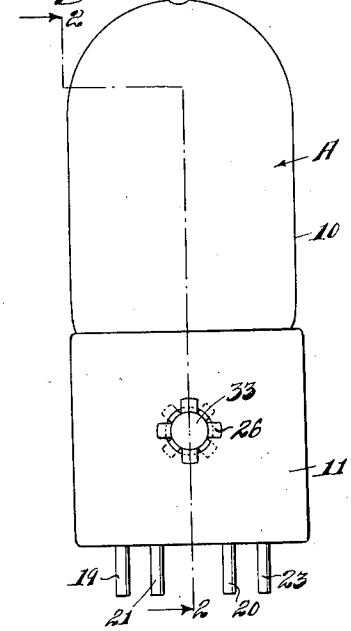


Fig. 2

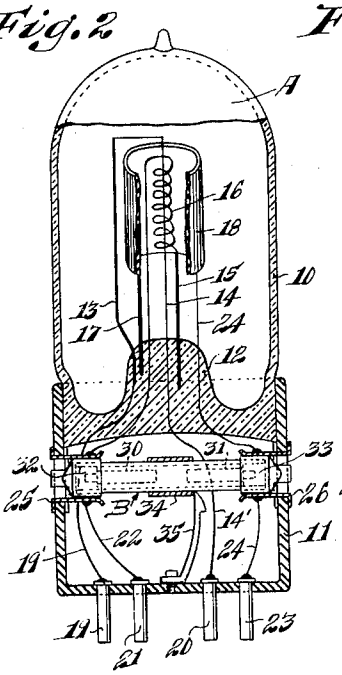


Fig. 3

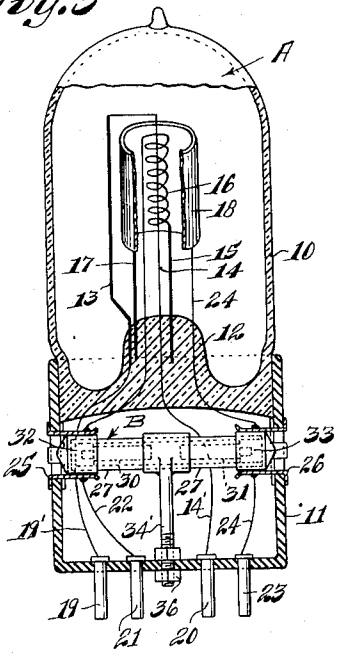


Fig. 4

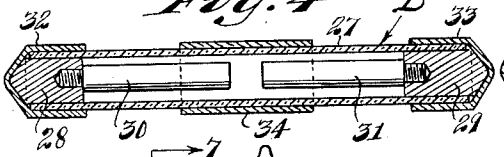


Fig. 5

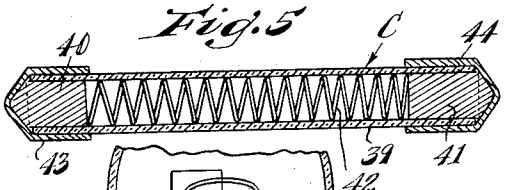


Fig. 6

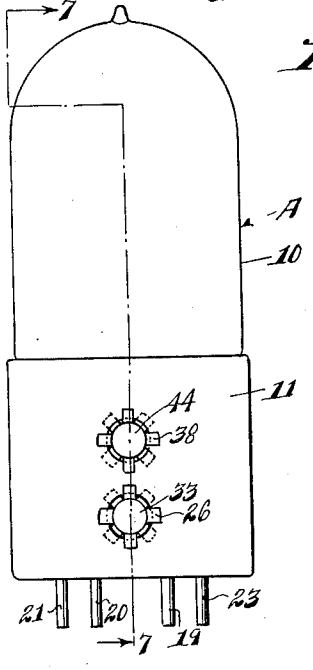
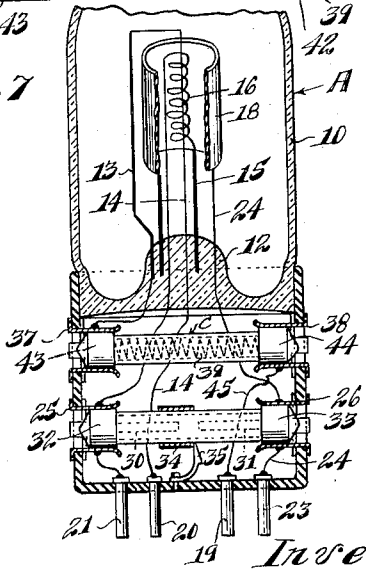


Fig. 7



Inventor:

Edmund Guyer Murphy,

By Edmund Guyer Murphy

Attorney

Patented Aug. 22, 1933 1,923,552

UNITED STATES PATENT OFFICE

1,923,552

VACUUM TUBE

Edmund Guyer Murphy, Chicago, Ill.

Application October 24, 1928. Serial No. 314,799

2 Claims. (Cl. 250—27.5)

The present invention relates to vacuum tubes being a special adaptation of the method and means disclosed in my patent, Serial No. 1,699,-011, dated January 15, 1929, for vacuum tube.

In the copending application above referred to, a general method or system was shown whereby the electrodes of a vacuum tube could be controlled and regulated simultaneously or individually and selectively, as desired, by the insertion of removable cartridge elements. The results achieved by this system are accomplished by merely moving or exchanging the wiring leads in the base of the vacuum tube from one cartridge element or electrode to the other. Many external control devices and wiring are elminated by the method above indicated, while the greatly shortened leads to the electrods add also substantially to the efficiency of tubes of the design and construction herein referred to, the present modification of which has for its object the provision of a novel vacuum tube with self-inclosed means for varying or balancing the electrostatic capacity between the electrodes of the tube.

Another object is to provide a vacuum tube of the type indicated with insertable adjustable means for neutralizing or balancing the electrostatic capacity of the said electrodes with the option of immediately restoring the tube to its conventional operation and function by the withdrawal of the insertable means.

Additional objects and advantages of the method employed will appear more fully in the hereinafter described details when taken in connection with the accompanying drawing in which,

Figure 1 is a side elevation of the exterior of a vacuum tube embodying my invention;

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1, with parts broken away;

Fig. 3 is a vertical section, similar to Fig. 2, of a slightly modified form of my invention;

Fig. 4 is an enlarged longitudinal section of the adjustable cartridge condenser which is to be inserted in the base of the tube;

Fig. 5 is an enlarged sectional view of the cartridge resistance element also insertable in the base of the tube;

Fig. 6 is an elevational view of a tube similar to that shown in Figs. 1 and 2, with the addition of an insertable filament control cartridge resistance in the base, and

Fig. 7 is a vertical sectional view, taken on line 7—7 of Fig. 6, parts being broken away.

In the drawing wherein similar characters of reference indicate corresponding parts in the several views of the preferred forms of the invention, A designates a vacuum tube having an envelope 10 secured to a base 11, the enevelope being formed integrally with the glass press 12 in which latter are secured the supporting rod 13 for the filament 14; the supporting rod 15 for the grid 16, and the rod 17 which supports the anode or plate 18.

To the bottom of the base 11 of the vacuum tube are secured the circuit-completing prongs which include the filament prongs 19, 20; the grid prong 21 which is connected to the grid by the conductor wire 22, and the anode prong 23 connected to the anode electrode by wire 24. By inspection of Figs. 2 and 3, it will be seen that grid connecting wire 22 is attached to one of the split clamping conductor elements 25, 26 which are formed of metal and suitably fastened in registering holes in the base 11, the anode conductor wire being attached to element 26. The split clamping elements 25, 26 provide resilient gripping sockets for the reception of the insertable cartridge condenser B which is formed of a tube of suitable dielectric 27 having metal plugs 28, 29 at the ends thereof in which the plates or rods 30, 31 are imbedded. Metal caps 32, 33 communicating with the metal plugs 28, 29 provide a means whereby the cartridge condenser may be inserted in the metal clamping elements 25, 26. The cartridge condenser B has a metal sleeve 34 slidable on the exterior of the dielectric tube 27, the sleeve being engaged by an arm 35 secured to the bottom of the base 11, whereby when the condenser B is inserted in the socket provided by the clamping elements 25, 26, the arm 35, as shown in Fig. 2, will contact with the sleeve 34 and shift same to the right or left according to the direction in which the condenser is thrust,—this being accomplished with any convenient object such as a match, nail, pen handle, etc., etc.

In the slightly modified form of the invention shown in Fig. 3, the disposition of the electrodes and the wiring therein is identical with that illustrated in Fig. 2, the only difference in the two forms shown being that in Fig. 3 the sleeve 34 has an integrally depending rod 34' which is secured permanently to the bottom of the base 11 by small nuts 36 or in any suitable manner. As in Fig. 2, the sleeve 34 forms one of the plates of the condenser B, the electrostatic capacity of which is varied by sliding the sleeve relatively to the inner plates or rods 30, 31.

The cartridge condenser B is slid to the right

or left through the fixed sleeve in the modification shown in Fig. 3. In Fig. 2, the sleeve 34, although movable on the exterior of the body of the condenser, is also held in one position and the condenser slid relatively thereto.

In the embodiment of the invention shown in Figs. 6 and 7, the disposition of the electrodes of the tube and the means employed for varying the electrostatic capacity between the grid and plate electrodes, or neutralizing the electrostatic capacity coupling between the grid and plate electrodes, together with the wiring therefor,—is practically the same as that shown in the tube illustrated in Fig. 2. In Figs. 6 and 7 however, an additional convenience is provided in the form of an insertable cartridge resistance C for the control of the cathode or filament 14. For the reception of this cartridge resistance, a second pair of metal clamping elements 37, 38 are provided. The resistance C like the cartridge condenser B consists of the usual tube of dielectric 39 having metal plugs 40, 41 connected by a small coil 42 of resistance wire. Metal caps 43, 44 communicating with the metal plugs 40, 41 complete the element C which is also removably received between the clamping elements 37, 38.

In Figs. 2 and 3, the filament circuit is completed from prong 19, through wire 19', rod 13, filament 14, conductor 14' to prong 20. In the tube shown in Figs 6 and 7, prong 19 is connected by a wire 45 to clamping element 38 whence the current passes through metal cap 44, metal plug 41, resistance 42, metal plug 40, metal cap 43, clamping element 37, wire connected to rod 13, filament 14, wire 14' to prong 20. In the form of tube last mentioned, the electrostatic capacity of the grid and plate electrodes can be varied or neutralized, while the filament may be suitable energized without the aid of external control apparatus.

The function and operation of the tubes illustrated and described has been in large measure indicated from the foregoing description, the inter-electrode capacity of the electrodes of these tubes being susceptible of variation and the inter-electrode capacity coupling, of neutralization by the method and means set forth. The tendency to self-oscillation in circuits associated with the grid and anode electrodes of a thermionic valve, particularly circuits employing radio-frequency amplification and regeneration,—is frequently an undesirable feature by reason of the distortion of the signals received. The remarkable clearness of tone and general quietness of operation of radio receiving sets employing the so-called neutralization principle is, of course, well known. It is most conveniently practical by the present method and means to vary or neutralize the grid-plate electrostatic capacity of thermionic vacuum tubes without resorting to the use of external means in the associated circuits, as heretofore used. The method now shown may be employed in connection with any of the electrodes of the tubes besides the usual grid-plate combination above referred to and illustrated, as will be readily understood. It is especially to be noted that the envelope of this tube and the electrodes therein are of conventional pattern as manufactured by any of the factory methods now employed, and that if desired, these tubes may be used in their ordinary capacity at once by merely thrusting out the cartridge condenser.

As pointed out in the original system described in my Patent 1,699,011 alluded to above, a substantial saving of time, labor and material can be effected by directly incorporating into the base of the tube the control elements heretofore used externally in the circuits associated with the tube electrodes.

The present modification of my invention, as is apparent to those skilled in this art, is susceptible of considerable variation and modification, and I do not accordingly wish to be understood as confining myself to the precise details of construction set forth, save to the extent these are circumscribed within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A thermionic valve having a plurality of electrodes in an envelope, a base secured to said envelope, a variable cartridge condenser insertably mounted in said base and having a make-and-break connection with two of said electrodes, and an element in the base coacting with a sleeve slidably mounted on said condenser whereby the capacity of the condenser and consequently the electrostatic capacity of the two said electrodes may be varied.

2. A device of the character described comprising a plurality of electrodes in an envelope, a base secured to said envelope, a cartridge condenser movably mounted in said base and having an electric connection to at least two of said electrodes, and a sleeve arranged on the periphery of said cartridge condenser, the sleeve being fixedly secured to said base, said sleeve serving, when said cartridge condenser is moved relatively thereto, to vary the electrostatic capacity of the condenser and consequently the electrostatic capacity of the electrodes electrically connected.

EDMUND GUYER MURPHY.