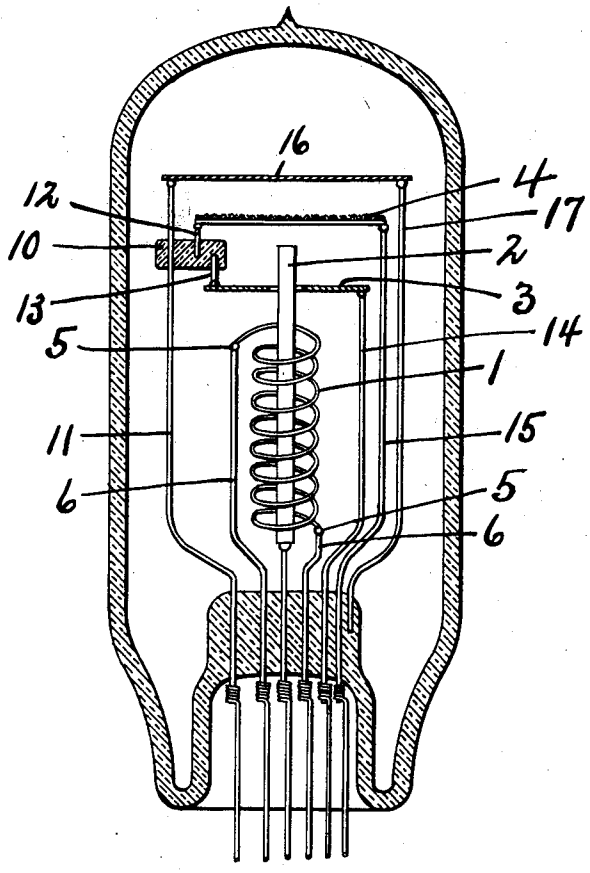
Aug. 8, 1933. C. J. KAYKO 1,921,619

VACUUM TUBE

Filed May 21, 1928



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Patented Aug. 8, 1933 1,921,619

UNITED STATES PATENT OFFICE

1,921,619

VACUUM TUBE

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Application May 21, 1928. Serial No. 279,595

4 Claims. (Cl. 250—27.5)

This invention relates to certain new and useful improvements in vacuum tubes and more particularly to those tubes, the cathodes of which are heated by alternating current.

One of the objects of my invention is to produce a tube which is easily exhausted and does not have an excessive amount of insulating material which makes this process difficult.

Another object is to provide a type of construction which is rugged and will not go out of shape easily.

Another object is so to choose the material of which the heater is made that electrons will be emitted from it with difficulty, thereby minimizing hum when alternating current flows through the heater.

Another of the objects of my invention is to shield the parts of the tube involved in the space discharge phenomenon from those associated with the heating of the cathode whereby hum may be completely eliminated.

How I accomplish these results is clearly set forth in the following specification:

Figure 1 is a sectionalized view of my tube in which —1— is a metal helix secured to the conducting members 6.6 by welds shown at 5.5.

2 is a rod of any suitable material covered with emitter material such as an alkaline earth oxide or oxides. The tip of part —2— (the emitter and cathode) projects beyond the helical heater —1—. Disposed above said heating coil is a washer-like shield —3— suitably supported by wire —13— welded to bead —10— and by lead —14— and through the central hole of the shield the tip of the emitter —2— projects. Above this shield suitably supported a screen-grid —4— is placed which for stiffness may also be welded to a wire —12— projecting from an insulating bead —10— melted on the plate support —11— and the grid may be welded to the lead —15—.

Above the grid, welded to the support —11— is a plate —16— as for instance in the form of a round disk of any suitable metal. Further, the plate may be welded to the lead —17—.

The operation of this very simple tube is as follows: Alternating current is fed into the heating helix —1—. Since the heater coil is not connected to any of the so-called radio parts of the tube, electrons emitted from this coil will be of a random nature, but usually unless the current density and temperature of the helix is low, will be emitted in sufficient strength to cause a serious hum. If, however, a small potential difference is applied between the heater filament and the shield —3— whatever electrons may be shot off from the filament will pass to the shield, and the main flow of electrons from the tip of the cathode to the plate will not be interfered with. Such a tube is silent in operation.

It will thus be seen that I have produced a very simple device which makes A. C. operation of radio tubes practical. I have eliminated, too, many aggravating points in the manufacture of such tubes, such as the de-gassing of porcelain insulators etc. The small amount of material in the tube makes pumping a simple process. I have illustrated the actual tubes I have made. It is, of course, obvious to those skilled in the art, that the geometrical arrangement of the parts may be widely varied and yet produce precisely the same result.

I claim:

1. A vacuum tube comprising a plate, a grid, a heating element, a cathode within said heating element and adapted to be heated by direct radiation therefrom, a shield electrode interposed between the heater and the grid of the tube said grid and said plate being positioned on the opposite side of said shield from said heating element.

2. In a vacuum tube, a helical heater, a cathode co-axially disposed within said heater but out of electrical contact therewith, a grid and a plate element disposed in operative relation above said heater, said cathode having a portion extending beyond said heater in a direction toward said grid and plate elements, and a metallic shield element disposed between said heater and said grid and said plate elements for preventing random electrons from said heater from interfering with the plate current flow.

3. In a vacuum tube, a heater element, a cathode covered with a coating, of high emission material disposed within said heater element and adapted to be heated by direct radiation therefrom, a grid, a plate, a metallic shield element having an orifice disposed between said heater element and said grid, said cathode having a portion projecting through the orifice in said shield element.

4. In a vacuum tube, a heating element, a cathode surrounded in part by said heating element, but out of electrical contact therewith and adapted to be heated by direct radiation from said element, a grid, a plate and a metallic shield interposed between the heater and said grid for preventing random electrons emitted from the heater from interfering with the plate current flow.

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