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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

An Improved Method and Apparatus for Testing Radio Valves

We, SYDNEY RUTHERFORD WILKINS, a British Subject, and THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT COMPANY LIMITED, a British Company, both of Winder House, Douglas Street, Westminster, London, S.W.1, do hereby declare the nature of this invention to be as follows:—

This invention relates to the testing of radio valves, and has for its chief object to provide a novel method of testing valves and to provide a simple apparatus or test panel for carrying out the tests.

By common consent the static mutual conductance value has been chosen as the standard of merit of a valve. The mutual conductance value is usually stated on the valve maker's data sheets and a valve which gives a satisfactory mutual conductance figure, i.e., a figure approaching that given by the manufacturer, can be relied upon to operate satisfactorily and *vice versa*.

Mutual conductance is interpreted as the change in anode current, when the grid voltage is changed by one volt, under the correct conditions of anode voltage, screen voltage and the like applicable to the valve. The one volt change in grid voltage is obtained by swinging the grid voltage $\mp \frac{1}{2}$ volt about zero—i.e., from $-\frac{1}{2}$ volt to $+\frac{1}{2}$ volt.

Thus, if with the correct anode voltage (and, if necessary, screen voltage) the anode current obtained is "A" milliamps with $-\frac{1}{2}$ volt on the grid, and rises to "B" milliamps when the grid voltage is changed to $+\frac{1}{2}$ volt, then the change in current B—A represents the mutual conductance of the valve and can be compared with the maker's figure. If the current with $-\frac{1}{2}$ volt on the grid be balanced out of the meter circuit, the meter will then show accurately the change in current when the grid voltage is changed and the scale can therefore be calibrated directly in mutual conductance.

Now, a manufacturer's mutual conductance test figures are taken at standard figures, such as 100 volts on the anode and zero grid volts for triodes. In order, therefore, to obtain such mutual conductance figures correctly, it is necessary for the applied anode and screen voltages to be exactly those required for the valve under test, and what is more important it is necessary that these voltages do not change with load during the taking of a reading. As the D.C. voltages for anode and screen etc. are obtained from A.C. mains through a suitable transformer and rectifier, the bad regulation that is inherent in the rectifier prevents the applied voltages being constant in all conditions unless a voltage control and voltmeter are supplied by which the voltage can be constantly checked. To satisfy these conditions, the valve testing apparatus is necessarily complicated as well as cumbersome and costly, as it requires a number of meters and various regulating devices.

It has now been found that, if instead of D.C. suitable A.C. potentials are applied to the anode (and, if necessary, to the screen) of valves, a D.C. current is obtained from the anode of the valve which is capable of being controlled by a D.C. voltage on the grid of the valve, and that, if the anode (and, if necessary, screen) A. C. voltages are given suitable values, and the D.C. grid voltage also suitably adjusted, the change in anode current for the given change in grid voltage, is equivalent to the mutual conductance of the valve.

Thus, the present invention provides a method of determining the mutual conductance of a radio valve which consists in applying to the anode of the valve an A.C. voltage equal to $1.4 \times$ the rated D.C. voltage and measuring the anode current after changing the grid volts from -1 volt D.C. to $+1$ volt D.C., whilst applying the requisite A.C. volts to the filament or filament heater.

For multi-electrode valves suitable voltage must be applied to the screens or screen grids. Thus, according to a further feature of the invention, for all screen pentodes, screen grid valves and the like, an A.C. voltage is applied to the screens which equals the rated D.C. voltage, whilst for the screening grids of L.F. pentodes there is applied an A.C. voltage