

Dec. 5, 1961

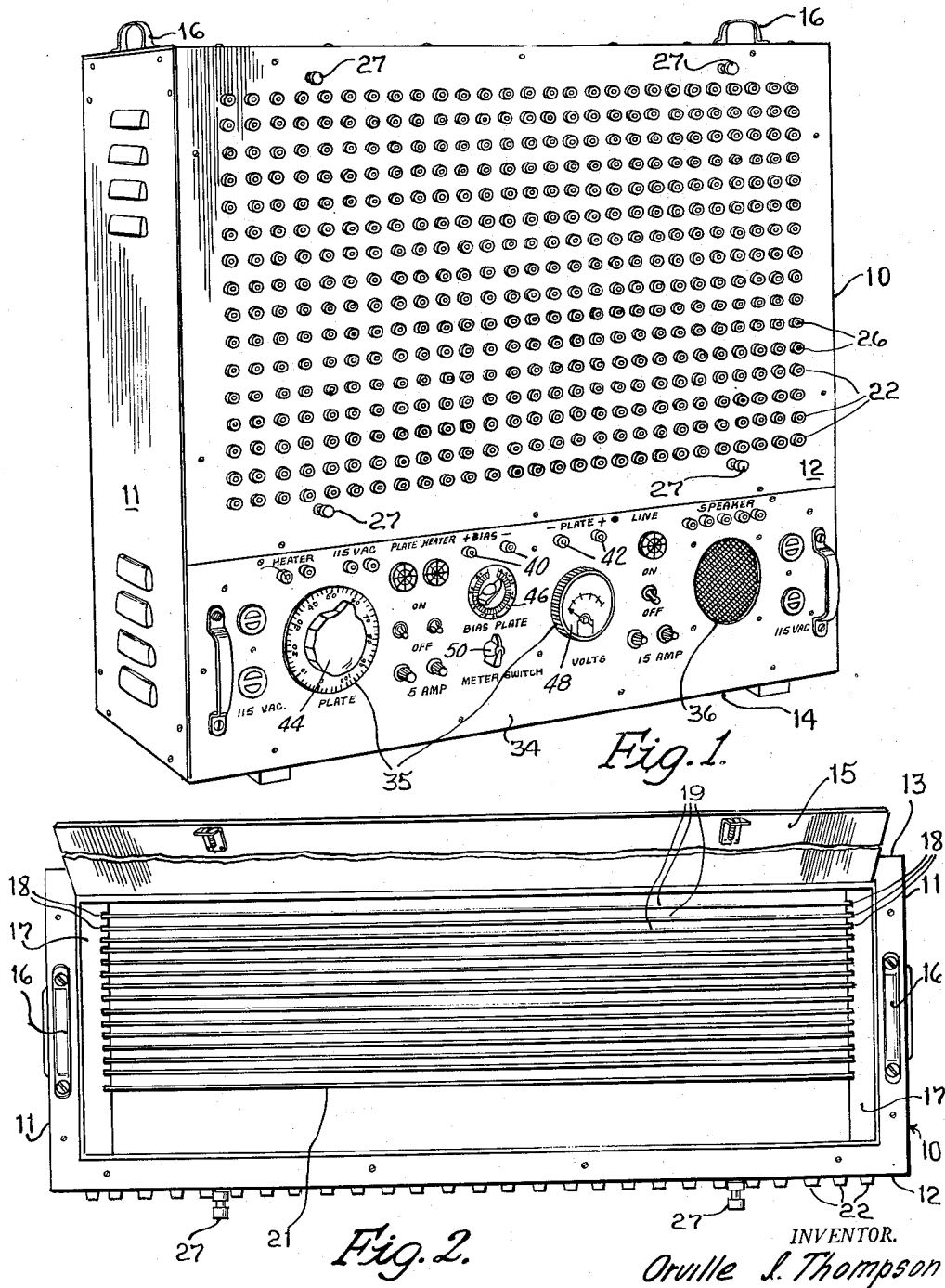
O. I. THOMPSON

3,011,269

ELECTRONIC INSTRUCTION DEVICE

Filed Sept. 24, 1958

3 Sheets-Sheet 1



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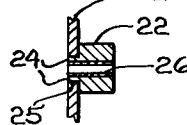
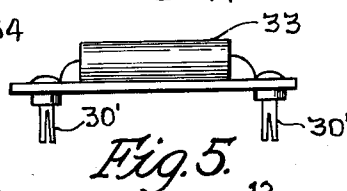
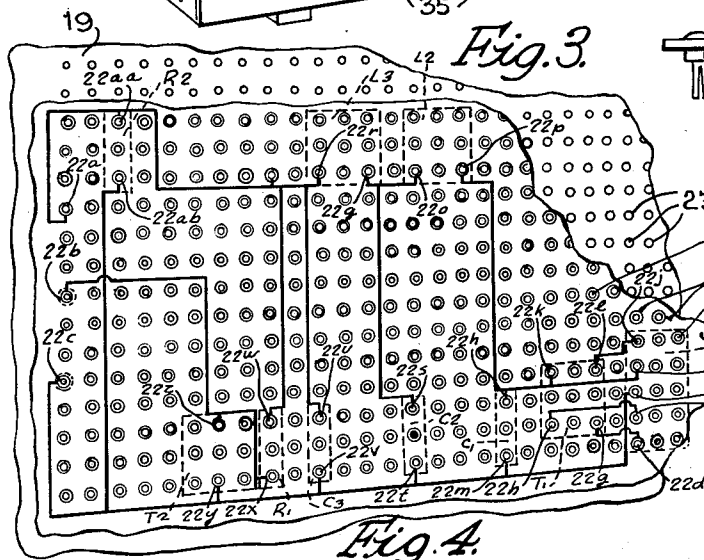
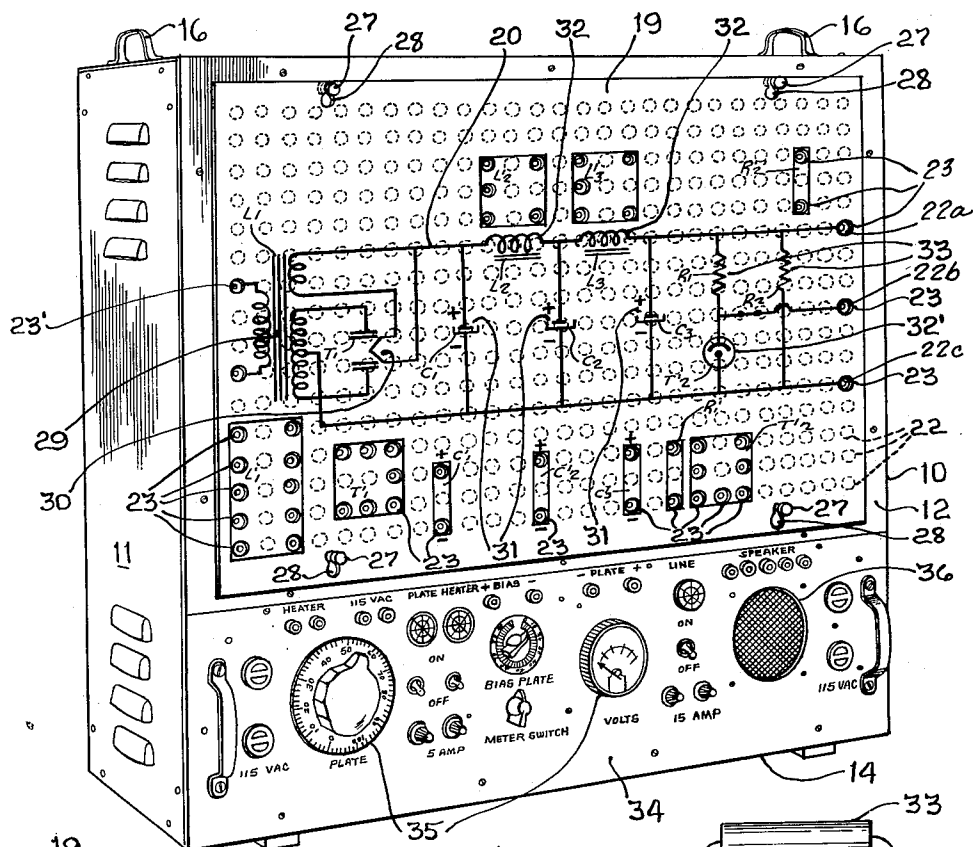
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Fig - 6

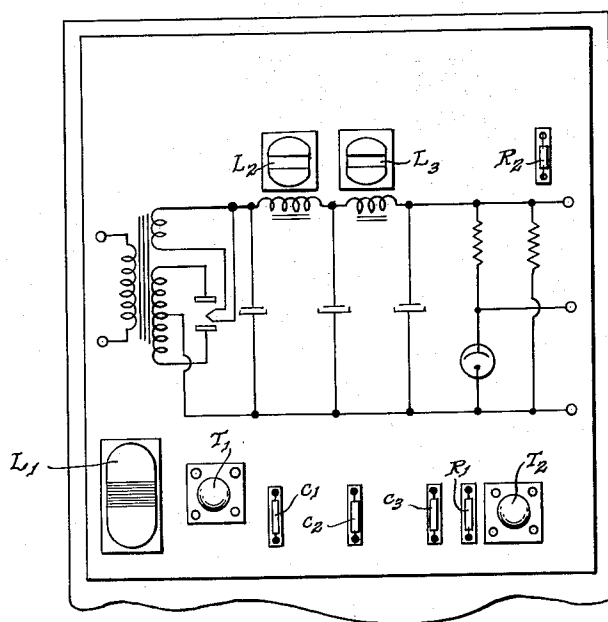


Fig - 7

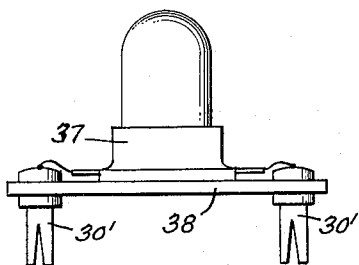
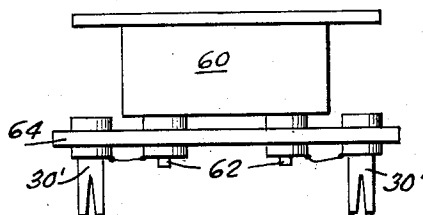


Fig - 8



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3,011,269

ELECTRONIC INSTRUCTION DEVICE

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7 Claims. (Cl. 35—19)

My invention relates to a radio instruction device in which a radio circuit to be set up by a student is visually displayed. It has for its principal object the provision of a device of this character which is capable of simultaneously representing visually and in animated form the various instrumentalities which go to make up a preselected radio circuit.

Another and equally important object of the invention is the provision of a device of the character hereinafter described in which a radio circuit symbolically illustrates to a student the elements incorporated in such circuit and which device provides for the actual setting up of such circuit at the completion of which the circuit may be checked, tested and operated by the student.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIGURE 1 is a perspective view of the device, less the circuit bearing plates embodying my invention;

FIGURE 2 is a top plan view of the same with the cover of the cabinet employed in the device in open position;

FIGURE 3 is a perspective view of the invention similar to FIGURE 1 but showing a circuit bearing plate mounted in position for the setting up of the circuit illustrated on such plate;

FIGURE 4 is a fragmentary elevational view looking toward the back surface of the front wall of the cabinet showing a wired radio circuit corresponding to that illustrated on the circuit bearing plate;

FIGURE 5 is a side elevational view of a radio part in the form of a resistor;

FIGURE 6 is a sectional detail view of a form of socket embodied in the invention;

FIGURE 7 is an elevational view of a vacuum tube and the means for mounting the vacuum tube to the device;

FIGURE 8 is an elevational view of a meter and the means for mounting it to the device; and

FIGURE 9 is an elevational view of the device constructed with the circuit shown in FIGURE 3 with the components in position.

Several attempts have been made to provide a device for instructing a student in the art of setting up a radio circuit. Such devices have not proven to be entirely satisfactory for the reason that no arrangement was provided to allow the student to have a complete, unobstructed view of the diagram of the radio circuit while setting up the circuit. My device overcomes these objectionable features of prior art devices in that not only is the radio circuit a fully operative circuit after it has been set up by the student but there is always fully visual to the student the diagram of the circuit thus set up. This enables the student to familiarize himself both with the symbols of the elements which go into the circuit as well as the physical elements themselves.

To accomplish these and other objects of the invention, I provide a cabinet 10. This cabinet 10 comprises side walls 11, a front wall 12, a back wall 13, and a bottom wall 14. The top wall of the cabinet includes a

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hinged cover 15. Suitable handles 16 are provided to facilitate moving the cabinet 10 about.

At the upper and lower edge portions of the side walls on the interior thereof are fixed in any suitable manner transversely extending blocks 17 having slots 18 formed in their confronting faces for slidably receiving the edge portions of a plurality of plates 19 removably arranged in the cabinet 10. Such plates are each adapted to be individually removed from the cabinet. On one face of each of such plates is arranged a radio circuit 20, the present circuit being what is known as a power supply circuit. The circuits however are varied.

One portion 21 of the cabinet is provided for the storage of radio parts such as transformers, resistors, condensers, tubes and the like.

The front wall 12 of the cabinet has mounted thereon, over its entire upper area, and evenly spaced from each other and in vertical and horizontal rows a plurality of sockets 22 of nonconductive material. Each socket is provided with a reduced boss 24 securely fitted in an opening 25 formed in the front wall 12. In each socket is a sleeve 26 of conductive material. While I have illustrated a preferred form of construction for the sockets 22, it is manifest that any approved socket may be used without departing from the spirit of the invention.

On the front wall 12, at predetermined points thereof, are arranged laterally extending head bearing studs 27 which are adapted to project through bayonet slots 28 formed in each of the plates 19 thereby supporting a selected plate of the plates 19 in parallel confronting relation with respect to the front wall 12 over the sockets 22 with its radio circuit 20 in a position to be fully viewed by the student.

The particular radio circuit shown in FIGURE 3 is a conventional circuit, and in this circuit is illustrated symbolically the radio elements which go to make up the circuit. Such radio elements in the present instance comprise a power transformer 29, a full wave rectifier tube 30, condensers 31, filter choke coils 32, a voltage regulator tube 32', and resistors 33.

On the rear face of the front wall 12, the sleeves of certain of the sockets 22 are wired together as shown in FIGURE 4 in a circuit conforming to the circuit shown on the plate 20. This enables the student to take the various physical elements of the circuit and mount them on the plate 19 by projecting the prongs 30' thereof through openings 23 formed in the plate 19 into the sleeve of said certain sockets which are wired in the circuit to the rear of the wall 12. For example, the student takes a resistor 33 having the characteristics symbolically illustrated in the circuit 20 and projects the prongs 30' thereof into openings 23 formed in the plate 19 and which register with the sockets, the sleeves of which are wired in the circuit to the rear of the wall 12. The same procedure is followed with respect to the tubes, the condensers, filter choke coils, transformer and the other resistors, thereby completely setting up the radio circuit.

FIGURE 3 has positions for ten components to be plugged into the jacks or sockets 22, the same number of components as illustrated in the schematic diagram on the plate 19. It is to be noted that, with the exception of terminals, the components are plugged into the sockets on portions of the plate remote from the diagram. In order to illustrate the correlation of the positions of the components with the circuit symbols, reference numerals L₁, L₂, L₃, T₁, T₂, C₁, C₂, C₃, R₁, and R₂ have been applied to the symbols, and the same reference numerals primed have been applied to the positions for the elements. Correlating reference numerals may or may not be used in actual practice.

Where vacuum tubes are to be mounted in the sockets 22, a tube socket 37, preferably of the "bread board"

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mounting type, is mounted to an electrically insulating rectangular board 38. The prongs 30' are mounted about the perimeter of the board 38 and align with the sockets to mount the tube and socket to the plate 19. The circuit of FIGURE 3, of course, requires two such constructions for mounting the tubes T_1 and T_2 .

Further, the power supply unit is provided with a voltmeter 48 which is electrically connected to a meter switch 50 having an open circuit position, a position connecting the meter in parallel with the low voltage terminals 40, and a position connecting the meter in parallel with the high voltage terminals 42.

When these physical elements of the radio circuit are mounted upon the plate 19 with their prongs engaging the proper sockets, it will be seen that the radio circuit 20 is in no way obstructed from the view of the student. In this way, he may observe and study both the physical element of the radio circuit as well as the symbols in that circuit which symbolize such physical element. He is, therefore, enabled to study both the circuit and the physical element of the circuit. When the circuit is complete, lines from the power source may be plugged in through the openings 23' formed in the plate 19 in registration with the proper sockets of the circuit to the rear of the wall 12.

Since each plate has a different circuit thereon, the respective sockets for that circuit are wired together to the rear of the wall 12. By this arrangement, the student's study is not limited to one circuit, but there are made available to him a plurality of plates, such as the plate 19 of FIGURE 3, each having a different radio circuit.

FIGURE 4 illustrates the electrical connections to the sockets at the rear of the wall 12. The output sockets 22a, 22b, and 22c appear at the left of FIGURE 4, and the sockets mounting transformer L_1 at the lower right, the transformer L_1 being on the reverse side of the plate 19. Sockets 22d, 22e, and 22f are connected to the secondary of the transformer L_1 , and sockets 22d and 22e are connected to sockets 22g and 22h which are electrically connected to the plates of vacuum tube T_1 . Socket 22f is connected to the center tap of transformer L_1 and to socket 22c. Socket 22i and 22j are connected to the filament winding of transformer L_1 and to sockets 22k and 22l which are connected to the filament of vacuum tube T_1 .

Capacitor C_1 is mounted in sockets 22m and 22n, and these sockets are electrically connected to sockets 22c and 22k, as shown. Further, choke L_2 is mounted in sockets 22o and 22p, socket 22p being connected to socket 22k. Choke L_3 is mounted in sockets 22q and 22r, socket 22q being connected to socket 22o and also to socket 22s. Capacitor C_2 is mounted in sockets 22o and also to socket 22s. Capacitor C_2 is mounted in sockets 22s and 22t, and socket 22t is connected to socket 22c. Socket 22r is electrically connected to socket 22a and to socket 22u. Capacitor C_3 is mounted in sockets 22u and 22v, and socket 22v is electrically connected to socket 22c.

Resistor R_1 is mounted in sockets 22w and 22x, and socket 22w is connected to socket 22a. Socket 22x is connected to socket 22b. Vacuum tube T_2 is mounted in sockets 22y and 22z, socket 22y being connected to socket 22c, and sockets 22z being connected to socket 22b. Resistor R_2 is mounted in sockets 22aa and 22ab which are connected to sockets 22a and 22c, respectively.

To familiarize the student with a power unit, the lower portion 34 of the wall 12 may be arranged to support the various instrumentalities 35 which go to make up a power unit. This wall portion 34 forms a panel and may have associated therewith a suitable speaker 36. This portion 34 of the wall 12 may be removable so that the student may examine the various circuit connections comprising the power unit.

This power unit is illustrated as assembled as a unit with the cabinet and wired sockets, but this construction is optional, it being pointed out that the essence of my

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invention is the circuit bearing plates having thereon a radio circuit and having formed therein, adjacent such circuit, openings which communicate with sockets connected in the circuit in the manner illustrated by the diagram on the plate 19, whereby when the student has mounted the physical elements upon the plate 19 with their prongs engaging their respective sockets a complete operative circuit will be the result. The power unit or supply, however, should be provided with a plurality of voltage outputs, or taps, such as those indicated by the reference numerals 40 and 42 in FIGURE 1. The power unit is, of course, not used with the circuit illustrated in FIGURE 3, since it is itself a power supply, but the power unit is employed with devices such as amplifiers, oscillators, trigger circuits, and the like. The power unit is provided with means for varying the potentials appearing across the high voltage terminals 42 and low voltage terminals 40 which include adjustment knobs 44 and 46, respectively.

It is to be understood that the power supply symbolically illustrated on the plate 19 in FIGURE 3 is merely illustrative of the invention. Another example of a typical use of the invention is to determine the characteristics of vacuum tubes. In this case, the plate 19 bears a circuit diagram illustrating a single vacuum tube with its elements connected to the sockets 22 in the same manner illustrated for the power supply in FIGURE 3. The heater, bias, and plate potentials are then connected to these sockets in the proper manner to determine the characteristics of the tube. The plate 19, of course, exposes only one group of sockets, such as T_1 in FIGURE 3, for a single vacuum tube. Further, the plate 19 exposes a pair of sockets for a meter in the plate circuit of the tube.

FIGURE 8 shows a meter 60 having threaded terminals 62 extending therefrom and mounting the meter to an insulating board 64, similar to the board 39, for mounting a vacuum tube. Prongs 30' are also mounted to the board 64 and electrically connected to the terminals 62. The prongs 30' are spaced by the same distance as the sockets 22 and are adapted to fit within a pair of exposed sockets connected either in the plate or grid circuits of the vacuum tube.

If it is desired to provide metering positions in a circuit, the circuit merely includes a jumper connected between a pair of sockets 22. The jumper is essentially the device illustrated in FIGURE 5, except that the resistor 33 has negligible resistance, or in other words, is an electrical conductor.

As illustrated in the figures, the power unit is connected external to the circuit represented on the diagram of the plate 19 by connecting wires between the terminals of the power supply and the sockets exposed through the plate 19. It may be desirable for certain instruction purposes to prewire the power supply to one or more of the sockets 22 in the panel 12, thus eliminating the need for the power supply terminals and those sockets 22 used to connect power to the tube. This is particularly true for elementary instruction, such as determining the characteristics of a vacuum tube.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

The invention claimed is:

1. A vacuum tube demonstrator comprising a power supply having a plurality of voltage taps, a panel capping said power supply, a plurality of means to vary voltages supplied by said taps, said means being mounted on said panel, a plurality of jacks carried by said panel, said jacks comprising two groups, selected jacks of the first group being prewired to selected jacks of the second

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group, and said second group being adapted to be coupled to the electrodes of a vacuum tube, selected jacks of the first group each being positioned proximate the periphery of said panel and being prewired to selected taps through selected voltage varying means, an overlay card mounted removably on said panel, said card having an opening revealing each jack of said second group, further openings revealing some of said jacks of the first group and a circuit diagram containing a schematic representation of the electrodes of a vacuum tube and of wiring connections from the electrodes to said revealed jacks, said represented wiring connections duplicating the prewiring between said revealed jacks of the first group and the revealed jacks of said second group, whereby circuit components, shorting links and meters may be connected between said revealed jacks of the first group so as to complete said circuit by means of which the electrical characteristics of a vacuum tube of the represented type may be determined upon its being coupled to the jacks of the second group.

2. A vacuum tube demonstrator comprising: a power supply having a plurality of voltage taps; a panel capping said power supply, a plurality of jacks disposed in two groups, each jack of the second group being prewired to a jack of the first group and a plurality of jacks of the first group being each prewired to at least one tap on said power supply; and an overlay card removably mounted on said panel, said card having an opening revealing the jacks of the second group, further openings revealing some of said jacks of the first group and a circuit diagram containing the schematic representation of the electrodes of a vacuum tube and of wiring connections from the electrodes to said revealed jacks of the first group, said represented wiring connections duplicating the prewiring between said revealed jacks of the first group and the jacks of the second group, whereby circuit components, shorting links and meters may be connected between said revealed jacks of the first group so as to form a circuit by means of which the electrical characteristics of a vacuum tube of the represented type may be determined upon its coupling to the jacks of the second group.

3. A device as set forth in claim 2, including a plurality of means for varying the voltage supplied to said taps.

4. A vacuum tube demonstrator comprising, in combination: a power supply having a plurality of voltage taps; a panel for said power supply, said panel mounting a plurality of electrical connection means arranged in two groups and having electrical wiring connections between the connection means of the first and second group, the wiring connections being in accordance with predetermined circuits for testing the characteristics of certain predetermined vacuum tubes; and an overlay card having an opening revealing each of the connection means of the second group, other openings revealing a plurality of said connection means and a pictorial representation showing the electrodes of a vacuum tube and wiring connections between said represented electrodes and said revealed connection means of the first group, said represented wiring connections corresponding to the existing wiring connections between the connection means of the second group and said revealed connection means of the first group, so that by connecting the proper circuit components, shorting links and meters between said revealed connection means of the first group, the electrical characteristics of a tube of the represented type may be determined upon its electrical coupling to the connection means of the first group.

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5. An electronic demonstrator comprising, in combination, a panel having a plurality of spaced apertures therein, the apertures being arranged in equally spaced orthogonally related parallel rows and spaced from each other by the same distance as the spacing between rows, an electrical terminal socket mounted in each of the apertures, a plate of electrically insulating material, removable means for mounting the plate adjacent to the panel, said plate having a plurality of apertures therein fewer than the apertures in the panel and each aperture therein exposing a terminal socket, said plate having thereon an electrical circuit diagram, said plate also being provided with an opening exterior to the circuit diagram for exposing terminal sockets for receiving an electrical component, means for electrically interconnecting the terminal sockets on the side of the panel opposite the plate to form the electrical circuit illustrated on the schematic diagram of the plate, and means including outwardly extending prongs adapted to mate with the sockets for mounting the electrical components schematically illustrated on the diagram of the plate to the sockets exposed by the openings in the plate.

6. An electronic demonstrator comprising, in combination, a panel having a plurality of spaced apertures therein, the apertures being arranged in equally spaced orthogonally related parallel rows and spaced from each other by the same distance as the spacing between rows, an electrical terminal socket mounted in each of the apertures, a plurality of plates of electrically insulating material, removable means for mounting each of the plates adjacent to the panel, each plate having a plurality of apertures fewer than the number of terminal sockets, each of said apertures exposing a terminal socket, and each plate having thereon an electrical circuit diagram, at least one of the sockets exposed by each plate and the circuit diagram on each plate being different, each of said plates also being provided with an opening exterior to the circuit diagram for exposing terminal sockets for receiving an electrical component, means for electrically interconnecting the terminal sockets on the side of the panel opposite the plate to form each of the electrical circuits illustrated on the schematic diagrams of the plates, said interconnecting means connecting the exposed sockets for each of the plates to form the circuit diagrammatically illustrated on said plate, and means including outwardly extending prongs adapted to mate with the sockets for mounting the electrical components schematically illustrated on the diagram of the plate to the sockets exposed by the openings in the plate.

7. A vacuum tube demonstrator comprising the elements of claim 4 in combination with a vacuum tube adapter having a plurality of outwardly extending prongs adapted to engage the jacks of the second group and a plurality of female sockets adapted to engage the base of a vacuum tube, the prongs of the adapter being disposed within the jacks of the second group.

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