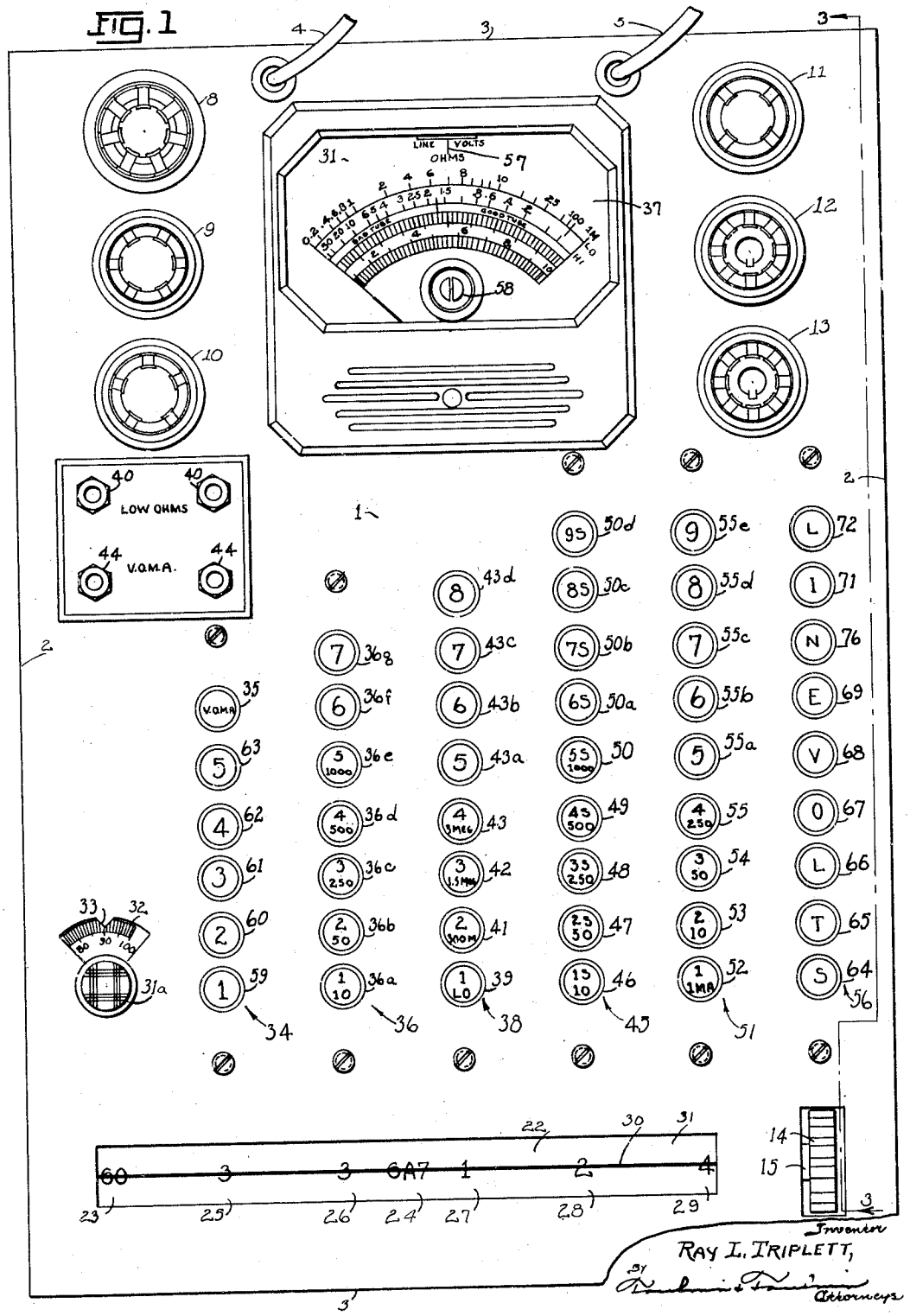
Oct. 15, 1940. R. L. TRIPLETT 2,217,925

RADIO TUBE TESTER

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Fig. 1



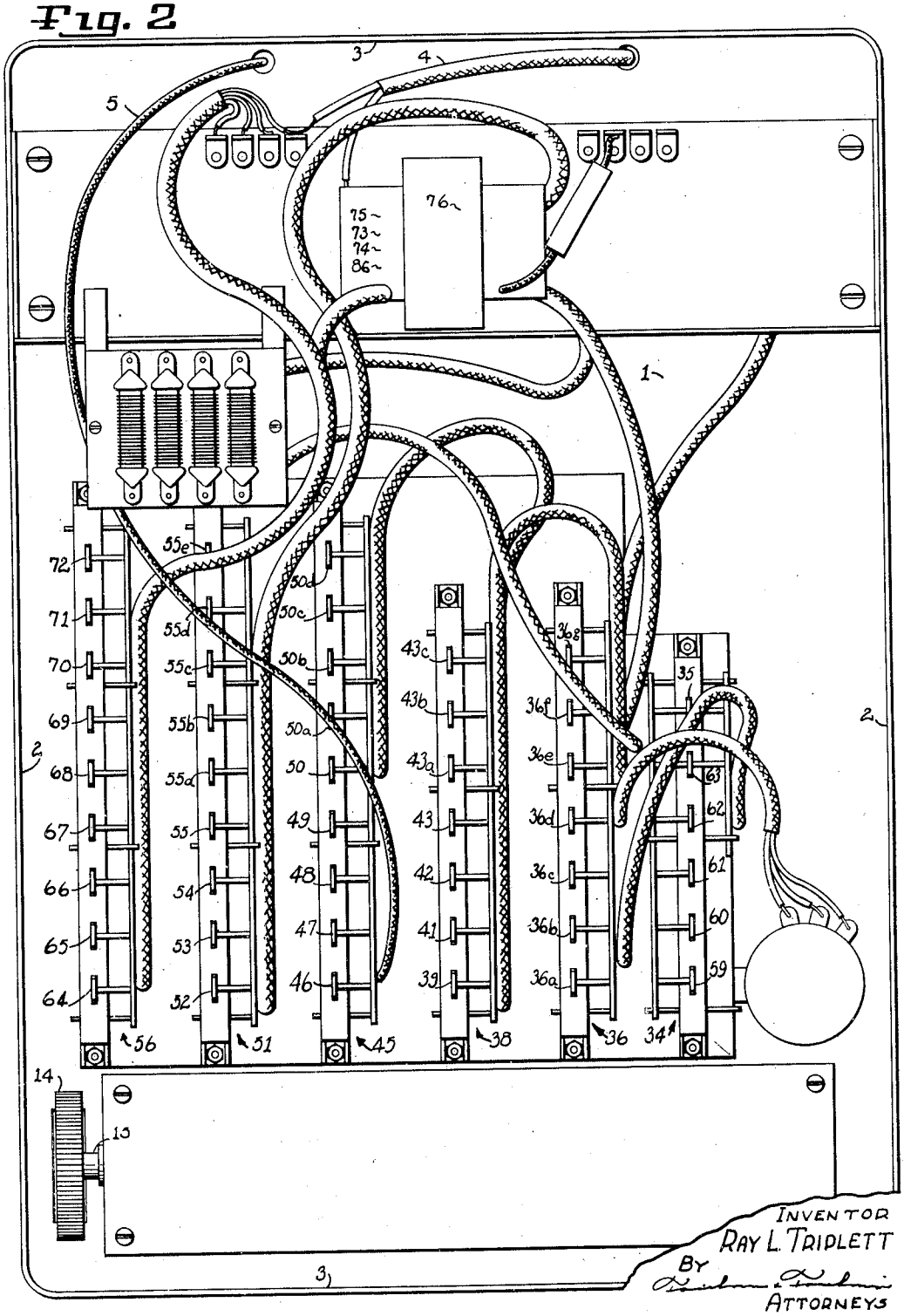

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Fig. 2




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Fig. 3

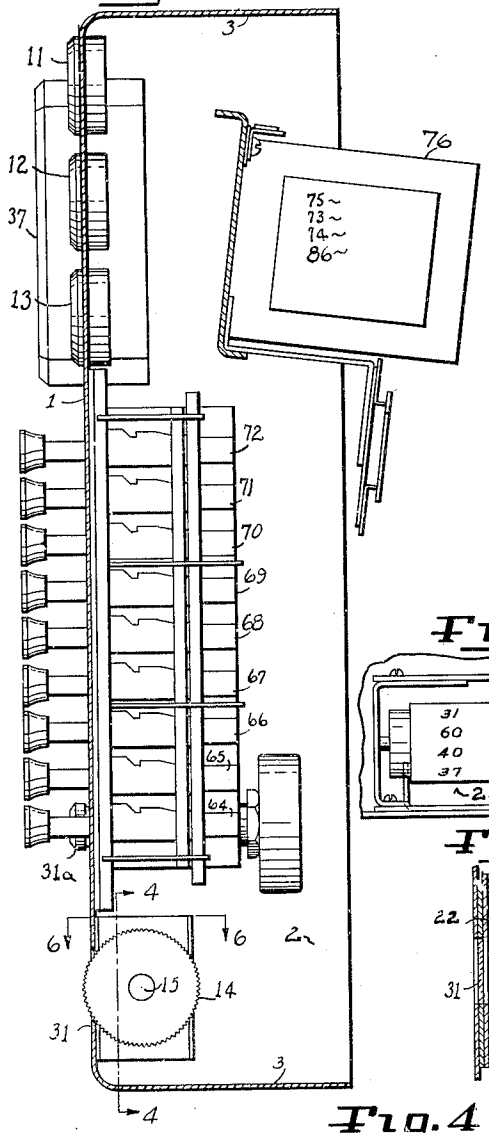



Fig. 5

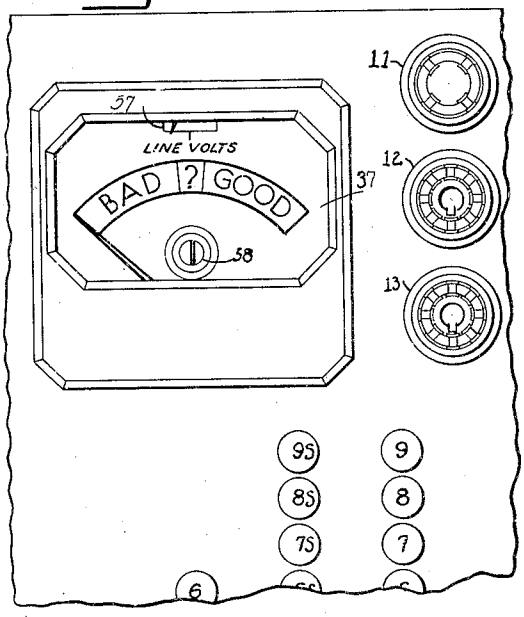



Fig. 6

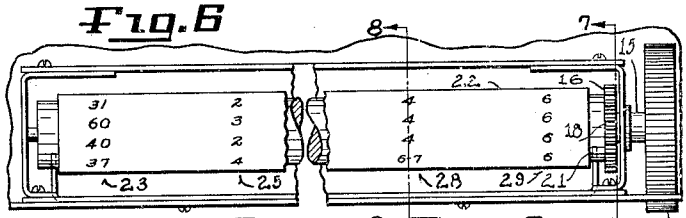



Fig. 7

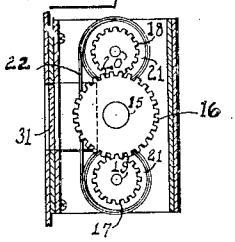



Fig. 8

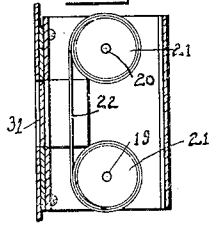
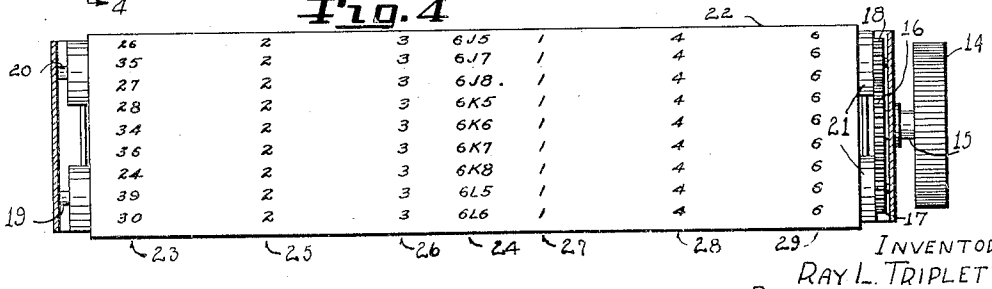



Fig. 4




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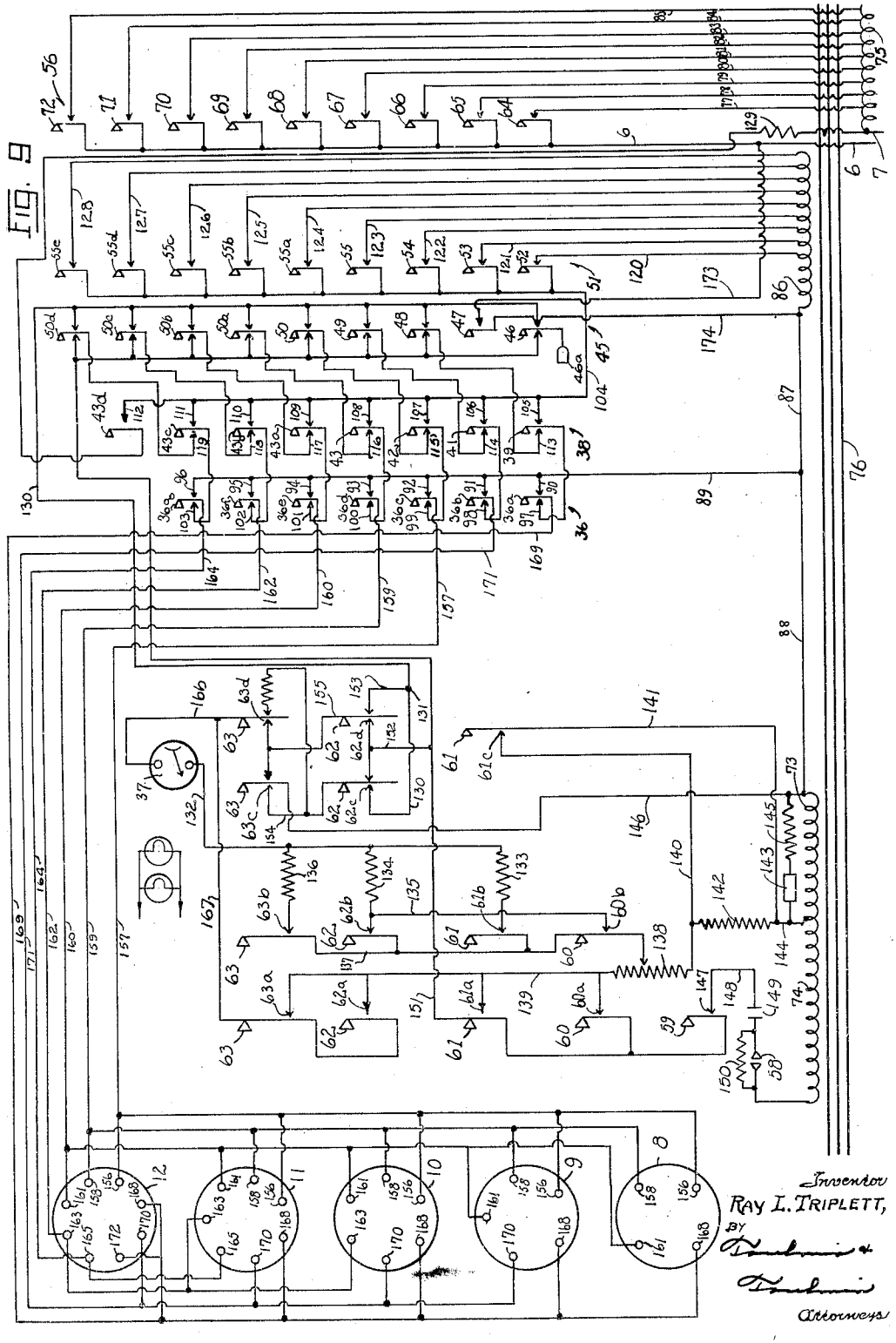


FIG. 9

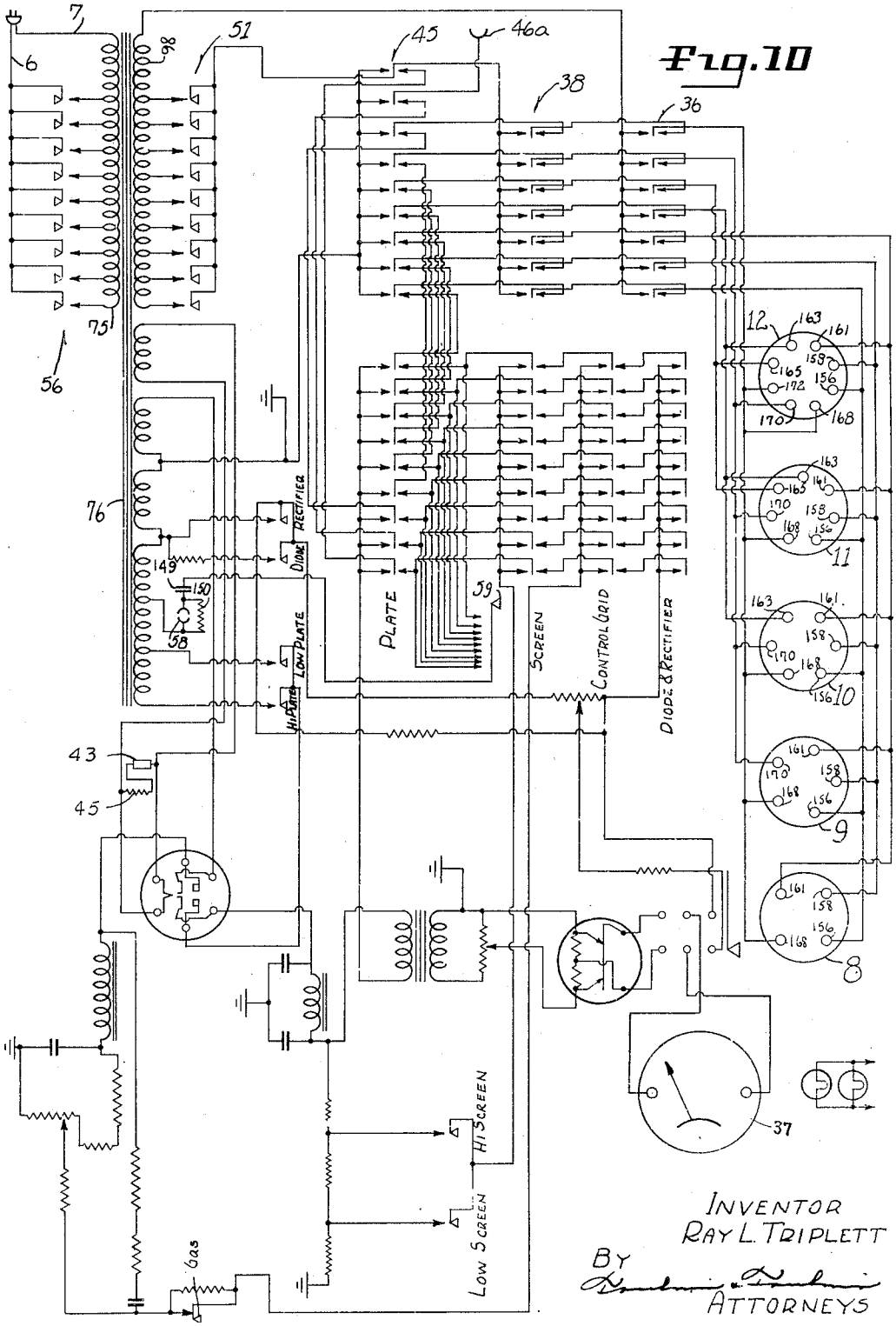
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Fig. 10




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Fig. 11

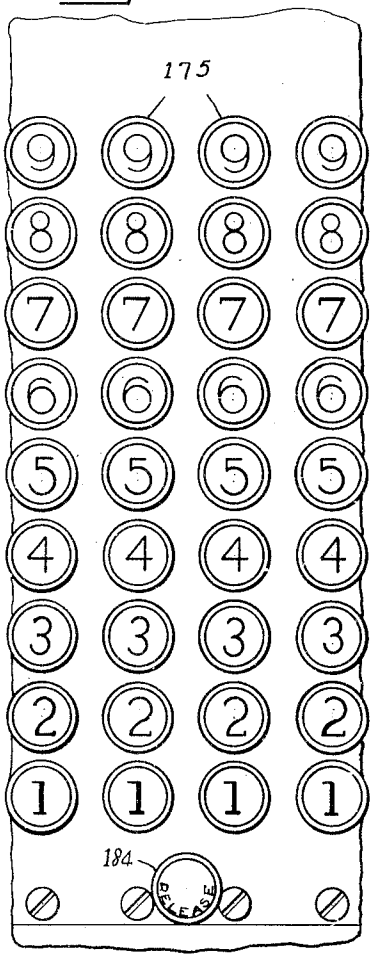



Fig. 12

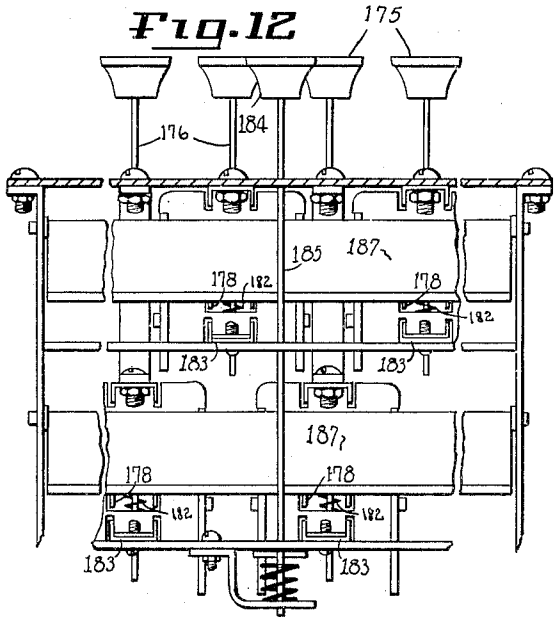
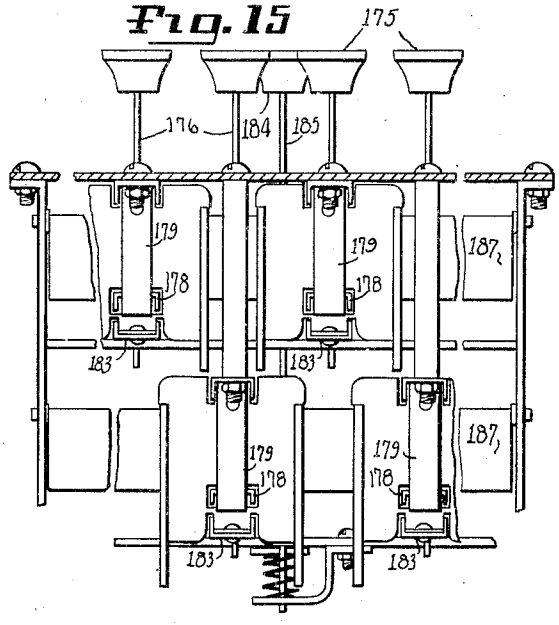



Fig. 15




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Fig. 13

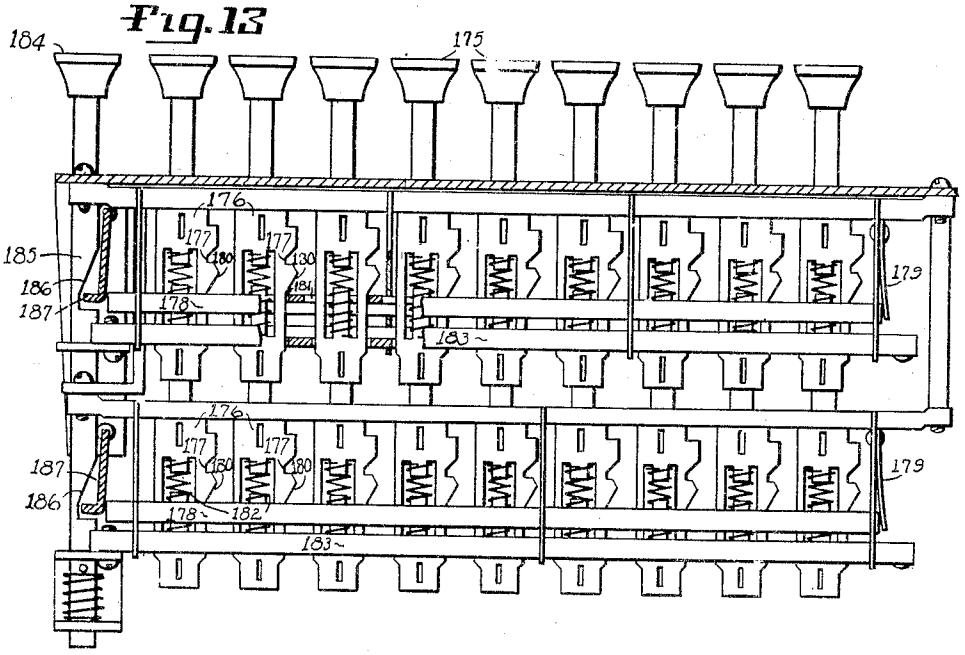
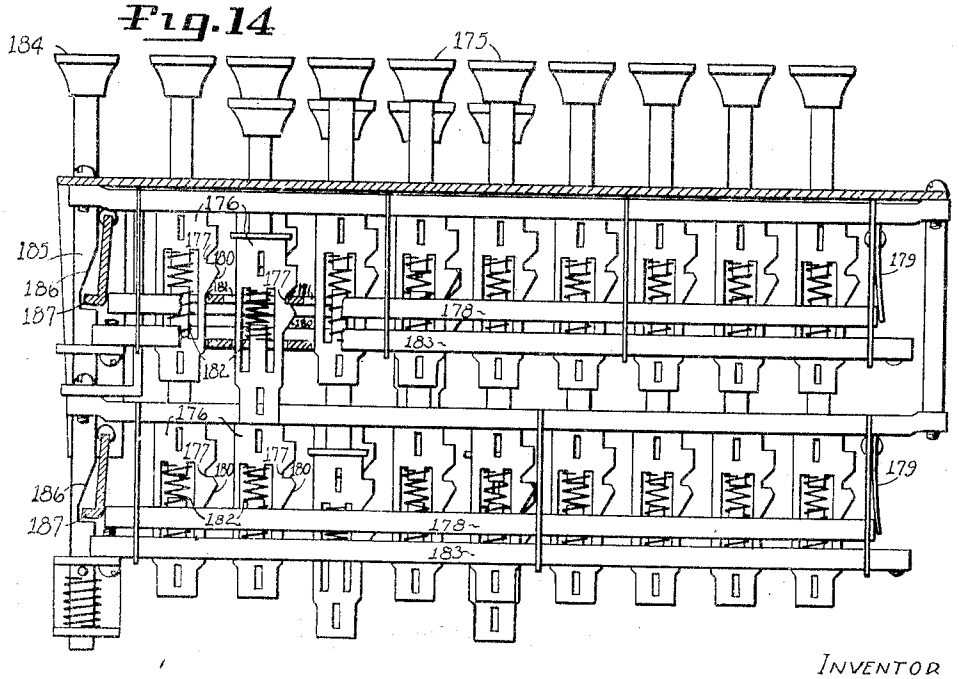



Fig. 14




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# UNITED STATES PATENT OFFICE

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## RADIO TUBE TESTER

Ray L. Triplett, Bluffton, Ohio

Application September 21, 1938, Serial No. 231,028

5 Claims. (Cl. 250—27)

My invention relates to a radio tube tester.

It is the object of this invention to provide a quick and easy method for testing radio tubes, radio circuits and other similar mechanisms and circuits.

It is the object of my invention to provide a radio tube tester, in which a place is provided for the mounting of the tube to be tested, an indicator for indicating the condition of the tube, and a series of selector buttons which can be selectively actuated to bring various testing circuits in circuit with the tube to be tested, and a movable selection indicator, the positioning of which opposite the indicating designation of type of tube being tested will indicate the buttons to be pressed so as to adequately test the particular tube being tested.

In view of the fact that there are a variety of different types of tubes to be tested, each having different characteristics, there has been provided a movable chart adapted to be unrolled beneath an indicating hairline, and on this chart each tube is successively designated and, opposite each designation in line therewith, there is indicated the numerals or letters which designate the particular buttons that must be pressed in order to close or open, as the case may be, the testing circuits to test that particular tube.

It is an object of this invention to arrange this selection indicator, the testing circuit buttons and switches and indicating mechanism in such a combination as to permit of a ready selection and operation of the circuits necessary for testing.

It is a further object to so align the selection indicator that the numerical or lettered indications thereon will be opposite the column of buttons which control the several circuits for the several tubes in each class of tests.

It is an object to group the circuits, selector switches and actuating buttons so that the buttons are arranged in columns, preferably in a predetermined location over the numbers of the buttons in that particular column opposite each of the tube designations so that the operator need only select the number under the hairline under the column, a button of which is to be pressed and to press the button so numbered in the column like that under the column and under the hairline on the selection indicator.

It is a further object to provide a plurality of circuits for test purposes which are adapted to utilize certain common features as indicating load, line voltage, etc. and a common indicator on which the various circuits, as they are selected, can indicate comparative readings.

In the drawings:

Figure 1 designates the front or top of the testing instrument;

Figure 2 illustrates the back thereof;

Figure 3 is a section on the line 3—3 of Figure 1, looking in the direction of the arrows;

Figure 4 is a section on the line 4—4 of Figure 3, looking in the direction of the arrows;

Figure 5 is a front elevation of a part of the instrument, showing an alternative form of indicator;

Figure 6 is a section on the line 6—6, looking in the direction of the arrows, of Figure 3;

Figure 7 is a section on the line 7—7, looking in the direction of the arrows, of Figure 6;

Figure 8 is a section on the line 8—8, looking in the direction of the arrows, of Figure 6;

Figure 9 is a wiring diagram showing one of the possible wiring diagrams embodying the invention herein;

Figure 10 is an alternative wiring diagram;

Figure 11 is a top plan view of a portion of the key switchboard showing the master release key;

Figure 12 is a front elevation of the switchboard showing the arrangement of the master key;

Figure 13 is a side elevation thereof, showing the master key mechanism and the switches in their uppermost position;

Figure 14 is a similar view showing them in their lowered position; and

Figure 15 is a rear elevation of the switchboard.

The ordinary tube tester requires a setting of filament, volts, load controls and other variables.

Referring to the drawings in detail, and particularly to Figure 1, the instrument comprises a front panel 1 which is provided with side walls 2 and end walls 3. This panel serves to support the following mechanism. The incoming power line cable 4 leads in the alternating current power lines 6 and 7. The cable 5 terminates in a grid cap 46a.

Sockets 8, 9, 10, 11, 12 and 13 are provided for the mounting of different types of tubes to be tested. Sockets 12 and 13 are duplicates so that one socket is a spare socket. This instrument is designed for the purpose of testing such tubes as diode, amplifier, battery and rectifier.

It is only necessary for the operator to select a tube to be tested, which is placed in one of the sockets 8, 9, 10, 11, 12 and 13. He then rotates the handwheel 14 which actuates the

shaft 15. On this shaft is a master gear 16 which meshes with gears 17 and 18 that are respectively mounted on the shafts 19 and 20.

Each of these shafts carries a drum 21, on which is wound a roll of indicating material such as a sheet of paper 22 that has a series of aligned designations.

These designations include tube type numbers and other information by which the operator can ascertain the proper button in each group to press for a given tube under test. The panel is cut-away and provided with a cover glass 31 over the cut-away portion. The hairline 30 is drawn along the glass. The cut-away portion is of a size sufficient to permit only a single aligned group of designations to be visible through the opening behind the glass panel 31 for each adjustment of the knob 14.

Reading from left to right, the first column of buttons is the circuit selector column; the second column of buttons is the filament selector column No. 1; the third column of buttons is the filament selector column No. 2; the fourth column of buttons is the circuit return column; the fifth column of buttons is the filament volt column, and the sixth column of buttons is the line volt column.

Directly above the column 23 on a sheet 22 is a load indicator comprising a button 31*a* which operates a rheostat control which is provided with a scale 32. 33 indicates a pointer over the scale. All of the selector buttons in the several columns are connected in conventional tube tester circuits, of which there may be a great number and variety.

This invention does not deal with the particular circuit which may be employed and controlled by the several buttons. The control button 31*a* is used to adjust to zero when testing for ohms.

For instance, reading from left to right, the extreme lefthand column, indicated at 23, indicates the ohms zero adjustment. The column 25 is the volt-ohm-milliammeter column. The column 26 is the A. C. volt column; the column 24 indicates the tube designation identifying the particular type of tube to be tested; the column 27 is the ohms-hi-lo column; the column 28 is the D. C. volt column, and the column 29 is the milliammeter column.

Among the buttons in the circuit selector column 34 is the "VOMA" button 35 which is to be pressed. In the column of buttons for the filament selector No. 1, designated 36, either 10, 50, 250, 500 or 1000 volts can be indicated on the meter 37 by pressing the respective buttons 36*a*, 36*b*, 36*c*, 36*d* and 36*e*, and by buttons 36*f* and 36*g*.

This test for A. C. voltage is selectively arranged according to which of the buttons in column 36 is pressed. The buttons in the filament selector column No. 2, which column is designated 38, are used for testing either high or low ohms. If low ohms are to be tested, then the button marked "low" No. 39 is pressed, and the resistance to be measured is connected in the low ohms jack 40. If high ohms are to be tested, then button 41, 42 or 43 is pressed. In such an event, the resistance to be measured is connected in the two jacks marked 44. The remaining buttons 43*a*, 43*b* and 43*c* of this column of control filament terminal push buttons may be utilized as indicated in the circuit of Figure 9.

Likewise, when D. C. volts are to be measured, the button switches in the series marked 45 are pressed according to the measurements to be taken, which are 10, 50, 250, 500 and 1000 D. C., as represented by buttons 46, 47, 48, 49 and 50, 50*a*, 50*b*, 50*c* and 50*d*. These tester buttons in this column are used to return the proper cathode and other elements to the secondary transformer 73, and to test for shorts by placing necessary elements in circuit with the opposite transformer 74.

If milliamperes are to be measured, then the buttons in the column designated 51, such as buttons 52, 53, 54 and 55, are depressed for one milliampere, 10 milliamperes, 50 milliamperes and 250 milliamperes, respectively. The buttons in this column, which control the filament voltage selector switches, are used as follows: button 52 for 1.5 volts, button 53 for 2 volts, button 54 for 2.5 volts, button 55 for 3.3 volts, button 55*a* for 5 volts, button 55*b* for 6.3 volts, button 55*c* for 7.5 volts, button 55*d* for 12.6 volts, and button 55*e* for 25 volts.

In order to correct line voltage fluctuations, the switch buttons in column 56 are depressed to bring the line voltmeter indicated on the dial 37 at 57, to the center marking as thus indicated at the top of the metal scales. The switches controlled by these buttons are so arranged in such circuits that the line volts increase from button 72 towards button 64. For clarity, the button and its switch arm, in all these cases, is given the same number or number and letter.

Thus the switches are so arranged that, according to their functions, at least two switches are required in each column. When one switch is depressed fully, any one which has been depressed previously will be released in that group, or a general clearance switch is utilized, as illustrated in Figure 11. These are standard switches and need none other than a general description, as they are standard in the market. The tube testing circuits can be any which are commonly employed in tube testing devices such as emission, dynamic mutual conductance, power output, etc. Various other tests and combinations of circuits may be used for measuring voltages, amperes, resistances, capacities, inductances, etc. for set testing. Heretofore, such circuits were complicated and their operation difficult and confusing in connection with the wide variety of tubes on the market to be tested.

A detail description of typical circuits follows hereinafter so that this invention may be completely understood in its adaptation to one or more circuits.

When any of the buttons in the line volt column 56 are depressed, the line voltage indications will be indicated according to the button depressed. When the proper button is depressed, the indication on the meter 37 will be on the line to indicate the proper line voltage setting. A separate meter for line volts may also be used. It is attached to back of meter 37 and the needle moves over the small upper portion of the dial of meter 37.

Within this meter 37 is also the neon light indicator 58 for indicating the results of short tests. This neon light shows through the lower portion of the dial of the indicating instrument 37.

On the panel 1, after the "S" button 59 is pressed, the buttons 46, 47, 48, 49, 50, 50*a*, 50*b*, 50*c* and 50*d* in row 45 are successively depressed, one at a time. If any inter-element short exists in the tube, it will then be indicated on the neon tube 58. The buttons 60, 61, 62 and 63 are used to actuate the switches associated therewith, hereinafter described. The button 60 closes the

switches 60a and 60b. Both of these switches are closed when button 60 is depressed. When button 61 is depressed, it actuates three switches 61a, 61b and 61c. When button 62 is depressed, it actuates four switches 62a, 62b, 62c and 62d. When button 63 is depressed, it actuates four switches 63a, 63b, 63c and 63d. These several buttons 60, 61, 62 and 63 operate switches for closing circuits for different types of tubes.

Button 60 operates the circuits for an amplifier tube, button 61 the circuits for a battery tube, button 62 the circuits for a rectifier tube, and button 63 for a diode tube. Button 59 controls the short test. Button 60 controls an amplifier test, button 61 controls the battery test; button 62 controls a rectifier test, and button 63 controls a diode tube test.

The buttons in column 56 are designated 64, 65, 66, 67, 68, 69, 70, 71 and 72.

Turning to the diagram in Figure 9, the incoming A. C. lines 6 and 7 are connected to a suitable source. The line 7 is connected to a transformer having a primary winding 75, from core 76, and secondary windings 73, 74 and 86, which are connected to the tube under test. The windings of the primary 75 are connected respectively by the lines 77, 78, 79, 80, 81, 82, 83, 84 and 85 to the terminals for the switches 64, 65, 66, 67, 68, 69, 70, 71 and 72. The other side of these switches is connected to the A. C. line 6.

The filament secondary 86 is connected by the wire 87 and 88 to the emission load transformer secondary 73. The secondary winding 74 is the short secondary. The line 89 which is connected to the line 87 is connected to the switch terminals 90 of switch 36a, 91 of switch 36b, 92 of switch 36c, 93 of switch 36d, terminal 94 of switch 36e, terminal 95 of switch 36f and terminal 96 of switch 36g. The remaining terminals of these several switches are connected as follows. Terminal 97 is connected to switch 39; terminal 98 is connected to switch 41; terminal 99 is connected to switch 42; terminal 100 is connected to switch 43, and terminal 101 is connected to switch 43a. Terminal 102 is connected to switch 43b, while terminal 103 is connected to switch 43c.

The other terminals of switches 39 to 43c inclusive are connected together by the wire 104 so that the respective switches 39 to 43d are provided with terminals 105, 106, 107, 108, 109, 110, 111 and 112 respectively. The opposite terminals of such switches are arranged as follows: terminal 113 is connected to switch 48; terminal 114 is connected to switch 49; terminal 115 is connected to switch 50; terminal 116 is connected to switch 50a; terminal 117 is connected to switch 50b; terminal 118 is connected to switch 50c; and terminal 119 is connected to switch 50d.

The line 104 is connected to the respective switches 52, 53, 54, 55, 55a, 55b, 55c, 55d and 55e. These switches, in turn, are adapted to be connected to the terminals connected to the lines 120, 121, 122, 123, 124, 125, 126, 127 and 128 respectively. These lines are tapped in on the windings of the transformer secondary 86.

The A. C. line 7 has connected therein a resistor 129 for 50 volt tubes. This resistor may not be used, but instead the transformer can have an additional 50 volt secondary tap. This line 7 is connected to the switch 43d. The switch 46 is connected to the grid cap 46a.

The wire 104 is connected to the switches 52, 53, 54, 55, 55a, 55b, 55c, 55d and 55e. The wire 130 is adapted to be brought in circuit with the switches 46, 48, 49, 50, 50a, 50b, 50c and 50d. The other end of this wire 130 is connected at 131 to the wire 153, these two wires interconnecting the switches 62c and 62d.

The indicating instrument 37 is connected, on one side through wire 166 to the switch 63d. This instrument is connected on the other side through wire 132 to the meter compensator for battery tubes 133 that is, in turn, connected to the switch 61b. It is also connected to the meter compensator for amplifier and rectifier tubes 134, that is connected to the switch 62b. This switch is connected by the wire 135 to the switch 60b. The line 132 is also connected to the meter compensator for diode tubes 136, that is connected to switch 63b.

The switches 60b, 61b, 62b and 63b are connected by a common line 137, one end of which adjustably engages the amplifier and rectifier tube load and tube calibration 138. This device 138 is connected by the wire 139 to switches 60a, 61a, 62a and 63a. The other side of the resistance 138 is connected by the wire 140 to the switch 61c. The other side of this switch is connected by the wire 141 to the battery tube load resistance 142 which is also connected to the wire 140. There is connected to one side of 142 the line voltage indicator 143, one end of which is connected by wire 144 to 141 and 142 and the other side is connected through the line indicator adjustment 145 to the wire 146, as connected to the switch 63c.

The switch 59 is adapted to engage the terminal 147 of the line 148, in which is a direct current blocking condenser 149, and a neon tube 58 for short tests. 150 indicates a short test sensitivity adjustment.

The switch 61a is connected by the wire 151 to the switches 62c and 62d through the wire 152 and also to the switch 50d. The switches 62c and 63c are interconnected through the wire 154, while the switches 62d and 63d are interconnected through the wire 155, and switches 63d and 63a are interconnected through wire 167.

The terminals of the sockets 8, 9, 10, 11 and 12 are connected as follows: the switch 36c is connected to the terminals 156 by the wire 157. The terminals 158 are connected by the wire 159 to the switch 36d. The wire 160 connects the switch 36e to the terminals 161. The wire 162 connects the switch 36f to the terminals 163. The wire 164 connects the switch 36g to the terminal 165.

The terminals 168 are connected by the wire 169 to the switch 36a. The terminals 170 are connected by the wire 171 to the switch 36b. The terminal 172 is connected to the wire 169 in tube socket 12.

The wire 173 is connected to the switch 47, the other side of which is connected to the wire 174 that taps the wire 87.

Thus the circuit consists broadly of sockets for different types of tubes with a bank of circuit selector switches 59 to 63, a bank of control filament switches 36a to 36g, a second bank of control filament switches 39 to 43c, a third group of switches such as the circuit return switches 46 to 50d to establish a proper return for the cathode and other elements to the transformer secondary and to test shorts and to place other necessary elements at the opposite transformer voltage; a fourth bank of filament voltage selector switches 52 to 55e, and a final group of line voltage selector switches 64 to 72. It also includes a line voltage indicator, a good or bad

indicator, and a short indicator together with a load indicator and adjuster.

The several columns of switch buttons designated 34, 36, 38, 45 and 51 in Figure 1 are arranged directly over the moving scale with its transversely aligned indications for each tube supported directly beneath the column of switches to which the indications refer.

Referring to the modification of the switching mechanism shown in Figures 11 to 14, the various independent switches consist of a button head 175. 176 designates the switch plate which is provided with a marginal notch 177 for receiving the reciprocating locking plate 178 that is spring pressed by the plate spring 179 in one direction. The switch plate 176 is provided with a cam 180 which is adapted to ride through the slot 181 in the locking plate 178 and move it backwardly against the spring 179.

When the key is in its depressed position, the plate 178 returns and enters the notch 177 to lock the key in its lowered position so that the switch is "on." As the movement downwardly of any one of these keys and switch plates 175 and 176 moves the locking plate 178 backwardly, all other depressed keys and switch plates will be released so that they can move upwardly under the impetus of the spring 182 which is supported upon the support 183.

This same result is accomplished by pressing the master release button 184 which forces downwardly its cam releasing plate 185 so that the cam 186 thereof engages the swinging plate 187 which engages the ends of all of the plates 178 across the switchboard. In this way all of the depressed keys and switch plates are unlocked and they return to their home position with the positions open under the influence of the springs 182. This applies to nearly all of the switches. In some instances, a few switches which it is not desired to lock, and a few which it is not desired to unlock each time are not connected to the release shaft. All such buttons would be placed in the same row, or be entirely detached in their normal locking position.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a radio tube testing instrument, a container having a panel, a plurality of push button switches mounted on said panel, and a rotary indicator mounted on said panel having individual indicia thereon in line with the switches so as to indicate the selection of the push button switches as the indicator is rotated.

2. The combination, in a radio tube tester, of a panel with sockets mounted thereon to receive a tube under test, a source of electromotive force, a plurality of switches on said panel arranged in groups to connect the tube to said source through different electrical circuits depending on the switches which are closed, a movable indicator secured to the panel and having identifying indicia thereon for the type of tube to be tested and the preselected switch in each group to be actuated, a meter connected to said circuits for measuring the current passing through said tube whereby the quality of the tube is determined when the proper circuits are established through said switches.

3. The combination, in a radio tube tester, of a panel with sockets mounted thereon to receive a tube under test, a source of electromotive force, a plurality of switches on said panel arranged in rows to connect the tube to said source through different electrical circuits depending on the switches which are closed, said panel having a cut-away portion in the face thereof, means for supporting and moving an indicating means beneath said cut-away face, said means comprising a roll which carries identifying indicia for the type of tube to be tested and the preselected switch in each row to be actuated for successively establishing connections between said tube and said electrical circuits, said indicia comprising a plurality of reference characters arranged in successive lines along said row, the cut-away portion in said panel being sufficiently small to disclose only one line of reference characters at a time.

4. The combination, in a radio tube tester, of a panel with sockets mounted thereon to receive a tube under test, a source of electromotive force, a plurality of switches on said panel arranged in rows to connect the tube to said source through different electrical circuits depending on the switches which are closed, a movable indicator secured to the panel and having identifying indicia thereon for the type of tube to be tested and the preselected switch in each row to be actuated, said indicia being in the form of reference characters which are individually arranged directly under that respective row of switches to which the character applies.

5. The combination, in a radio tube tester, of a panel with sockets mounted thereon to receive a tube under test, a source of electromotive force, a plurality of switches on said panel arranged in rows to connect the tube to said source through different electrical circuits depending on the switches which are closed, a movable indicator secured to the panel and having identifying indicia thereon for the type of tube to be tested and the preselected switch in each row to be actuated, said indicia being in the form of reference characters which are individually arranged directly under that respective row of switches to which the character applies, said panel having a cut-away portion for viewing only one series of reference characters on said indicator at a time.

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