

Aug. 10, 1937.

G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 1

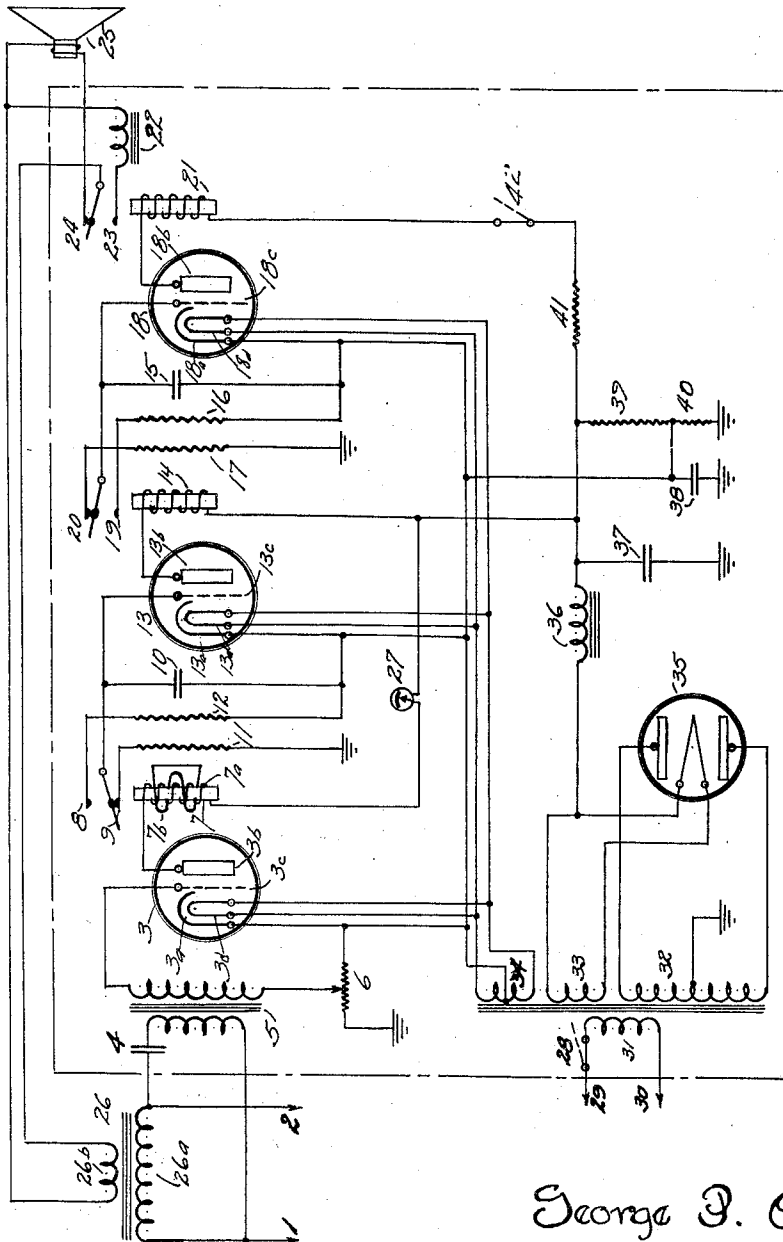


FIG. 1

Inventor

George P. Adair

By John B. Brady
Attorney

Aug. 10, 1937.

G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 2

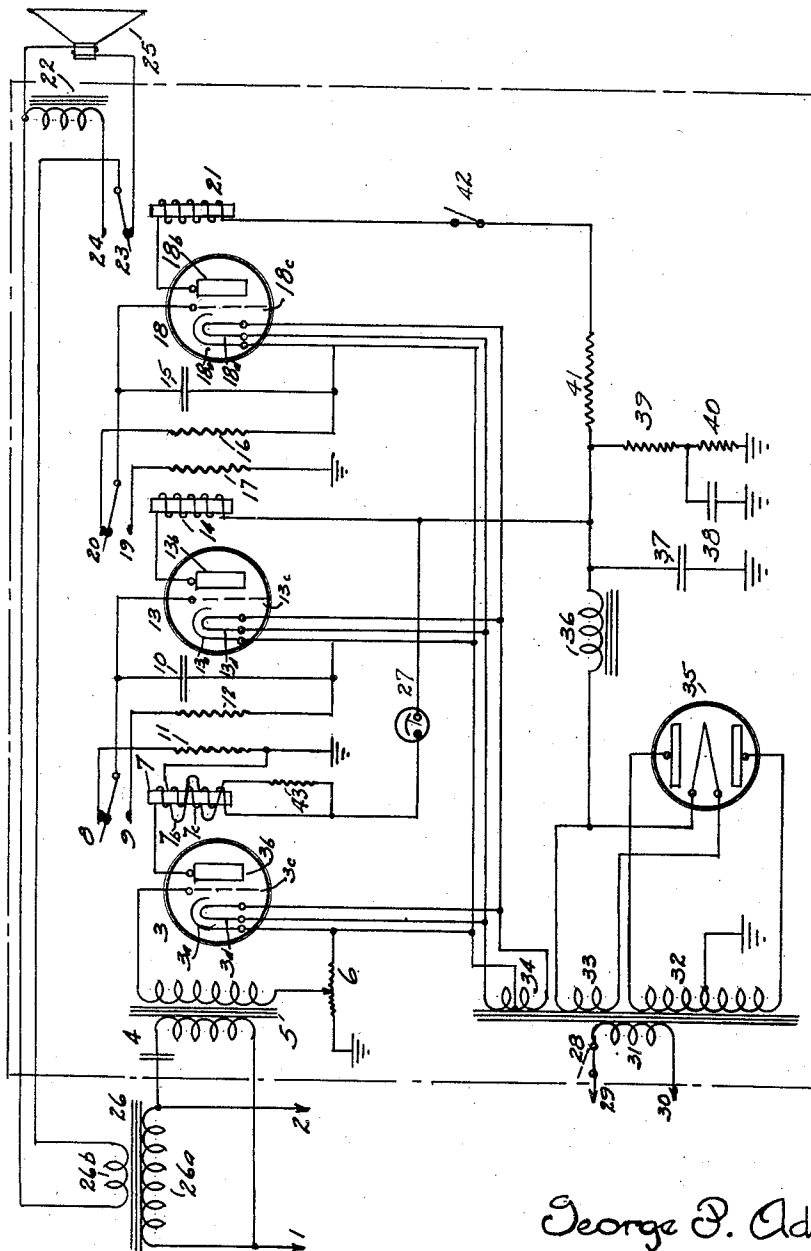


FIG. 2

Inventor

George P. Adair

By John B. Brady Attorney

Aug. 10, 1937.

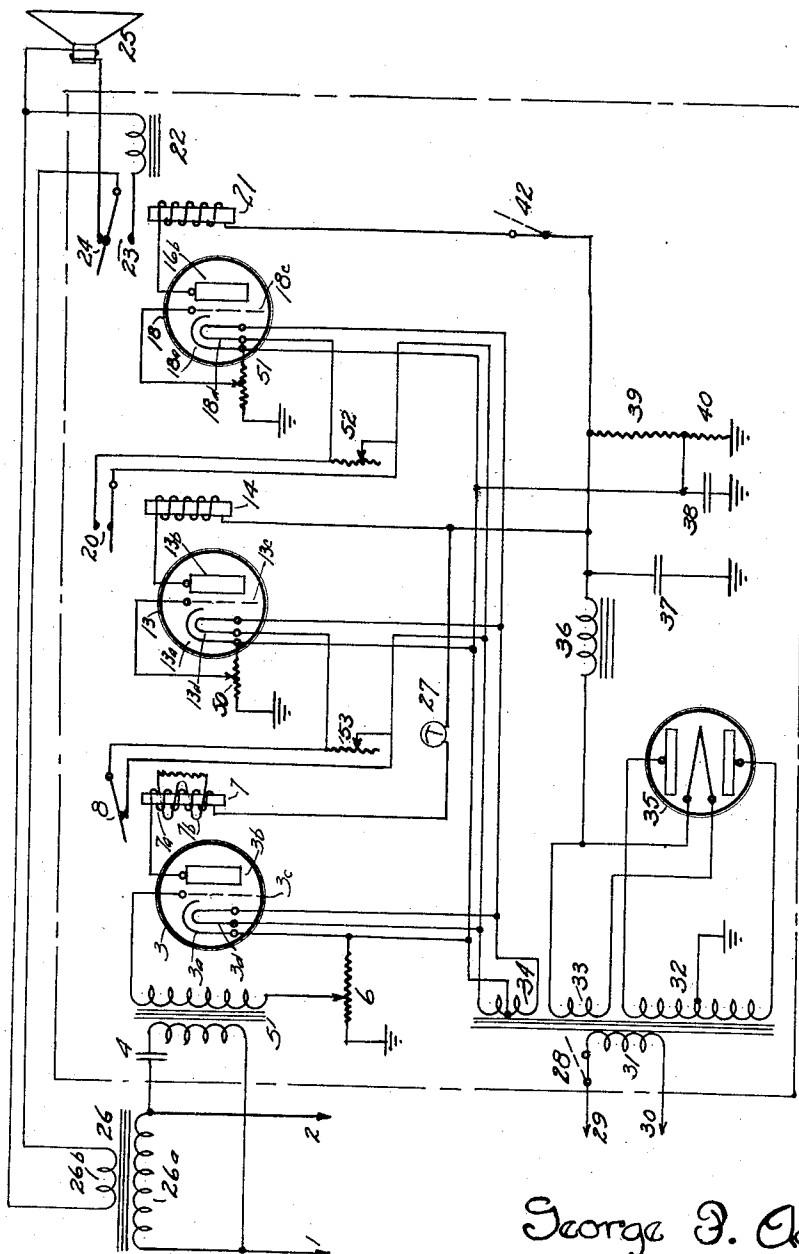
G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 3



Inventor

George P. Adair

By

John B. Brady

Attorney

Aug. 10, 1937.

G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 4

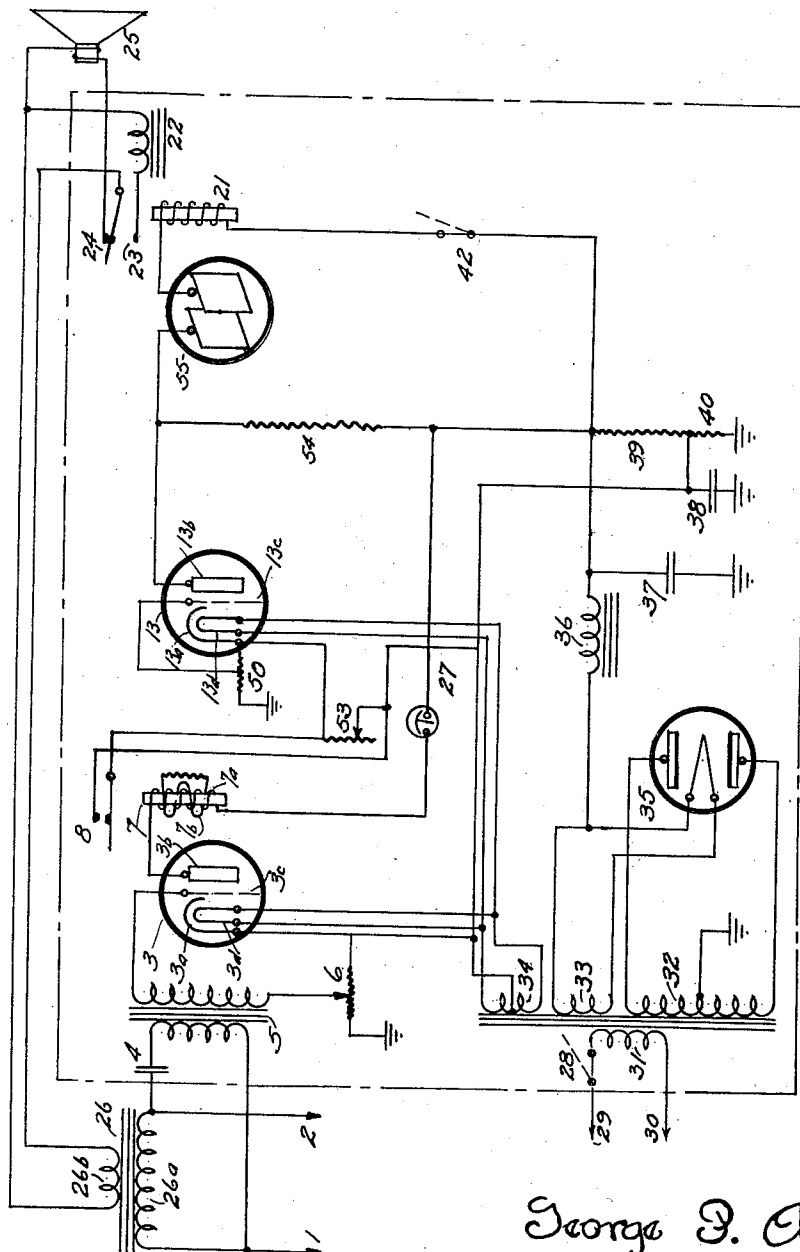


Fig. 4

Inventor

George P. Adair

By

John B. Brady

Attorney

Aug. 10, 1937.

G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 5

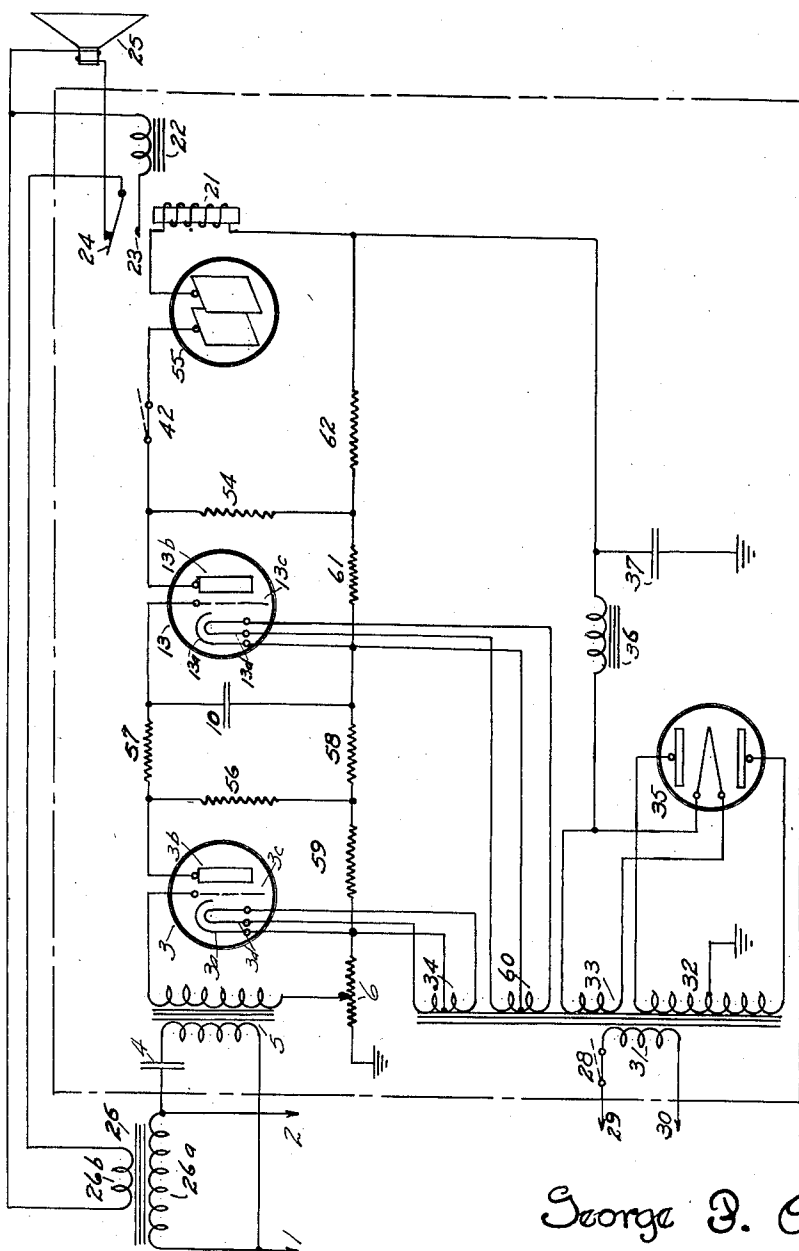


FIG. 5

Inventor

George P. Adair

By

John B. Brady

Attorney

Aug. 10, 1937.

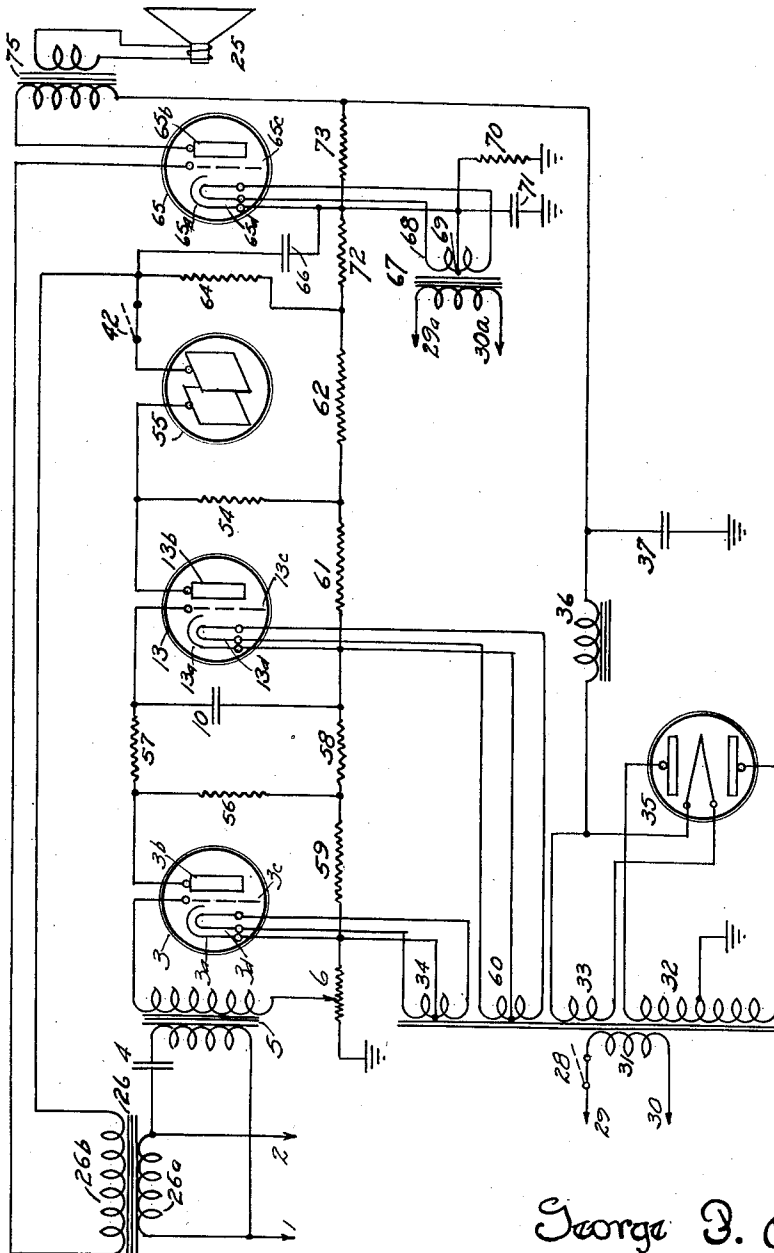
G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 6



Inventor

George P. Adair

By

John O. Brady
Attorney

Aug. 10, 1937.

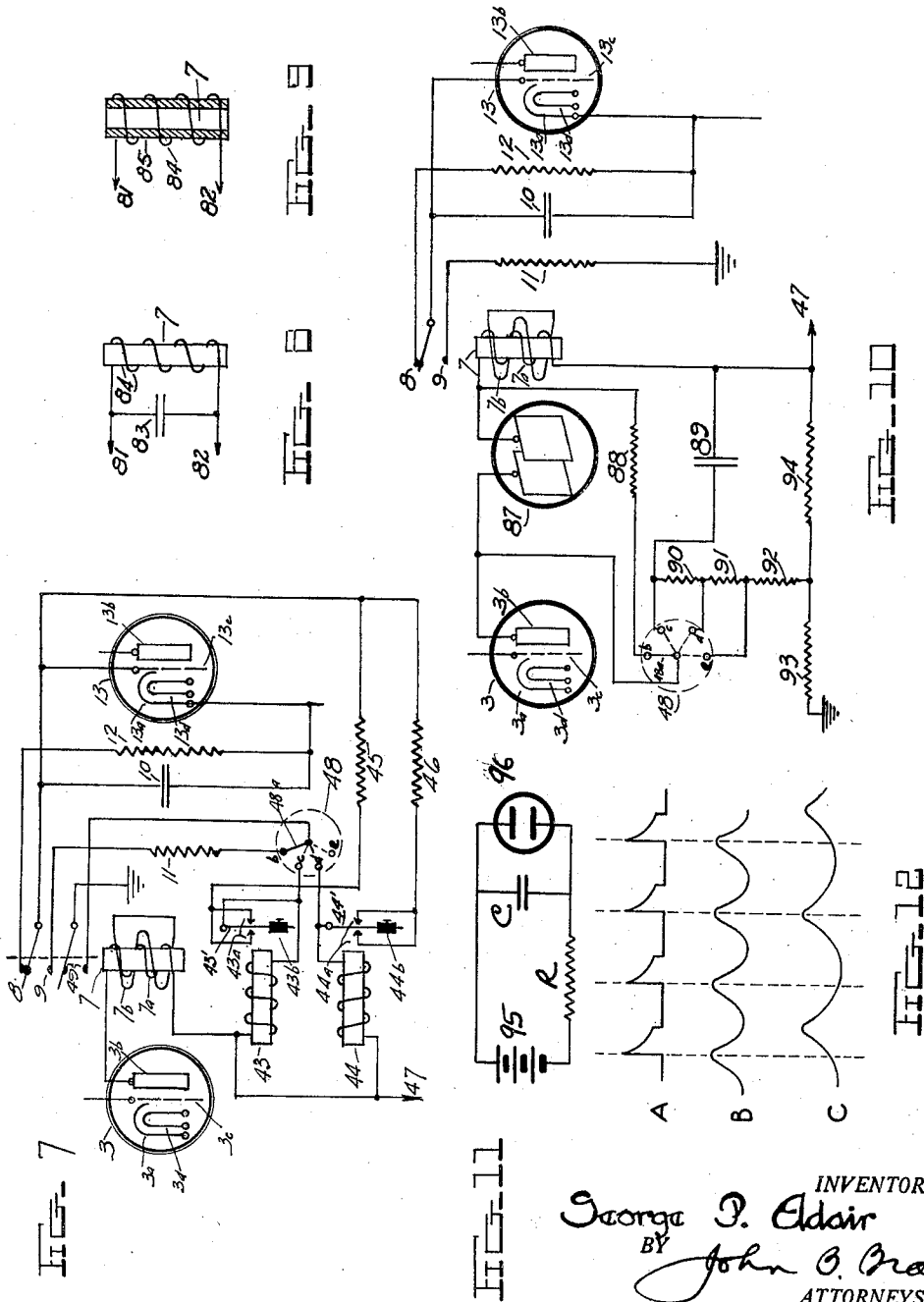
G. P. ADAIR

2,089,637

SIGNAL RECEIVING SYSTEM

Filed Feb. 26, 1934

7 Sheets-Sheet 7



INVENTOR.
George P. Adair
BY John O. Brady
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,089,637

SIGNAL RECEIVING SYSTEM

George P. Adair, Takoma Park, Md.

Application February 26, 1934, Serial No. 713,053

21 Claims. (Cl. 179—1)

My invention relates broadly to radio receiving systems and more particularly to a selective circuit arrangement for radio receiving apparatus whereby a radio receiver functions automatically to select the character of the program which is reproduced.

This application is a continuation-in-part of my application Serial No. 561,758, filed September 8, 1931, entitled Radio receiving system, now Patent 1,949,136, granted Feb. 27, 1934.

One of the objects of my invention is to provide a circuit arrangement which is automatically selective in the reproduction of radio broadcast programs according to the character of the program.

Another object of my invention is to provide a circuit arrangement for a radio receiver which is highly discriminatory with respect to the character of the radio broadcast program for selectively receiving the musical portions of the program while eliminating any extended speech portions of the program.

Still another object of my invention is to provide a selective receiver of the type set forth in my aforesaid copending application Serial No. 561,758, filed September 8, 1931, now Patent No. 1,949,136, for Radio receiving system, of which this application is a continuation-in-part in which predetermined time lags may be introduced in the actuating circuits for controlling the time period of operation of the circuits which control the connection of the sound reproducer with the receiving apparatus.

Another object of my invention is to provide a circuit arrangement for a radio receiver which distinguishes between rhythm of the broadcast program for the automatic and selective reception of a desired type of program.

A further object of my invention is to provide a circuit arrangement for controlling the effective connection of a sound reproducer with the receiving apparatus in accordance with the character of the received program without the interposition of any mechanical relays in the control circuit.

A still further object of my invention is to provide a bias control circuit automatically operative in accordance with the character of the received program for controlling the effective connection of the sound reproducer with respect to the output of a radio receiving system.

Other and further objects of my invention reside in the circuit arrangement for the control system of a program discriminating receiver, as set forth more fully in the specification herein-

after following by reference to the accompanying drawings, in which:

Figure 1 diagrammatically illustrates a control circuit arrangement for a radio receiver constructed in accordance with my invention; Fig. 2 shows a modified circuit arrangement embodying the principles of my invention; Fig. 3 illustrates a further modified form of control circuit constructed in accordance with my invention; Fig. 4 illustrates the control circuit for a radio receiver of a class to which my invention relates in which a glow discharge tube is employed for securing precision operation of the control circuit; Fig. 5 illustrates a control circuit in which composite bias and mechanical relay control are employed in controlling the circuit to the sound reproducer of the receiver in accordance with the character of the received broadcast program; Fig. 6 illustrates a control circuit arrangement embodying my invention in which mechanical relays are wholly eliminated from the circuit and control effected through a system of bias without the interposition of mechanical relays; Fig. 7 illustrates a circuit employed to distinguish between two or more classes of music and speech for increasing the selectivity and adaptability of a radio receiver with respect to the types of programs which are reproduced; Fig. 8 is a theoretical view explaining one means of obtaining the required delay in relay action in the control circuit of my invention; Fig. 9 illustrates a modified method of securing delay in operation of a relay according to my invention; Fig. 10 shows an electrical circuit operative to distinguish between different classes of music having different periods of rhythm in which the separation functions are carried out by electrically timed circuits; Fig. 11 is a simplified circuit for explaining the theory of operation of the circuits of Fig. 10; and Fig. 12 shows a series of curves for further explaining the theory of operation of the circuit of Fig. 10.

The receiver of my invention successfully operates to distinguish between classes of programs embodying composite musical and speech programs. As set forth more fully in my Letters Patent 1,949,136 dated Feb. 27, 1934, for Radio receiving system, there are characteristic differences between the speaking voice and musical programs. There are numerous and definite pauses between syllables and words as well as pauses between phrases and sentences in the speaking voice, whereas in vocal and instrumental music (except in very exceptional cases) there

are few definite pauses. When the electric waves, corresponding to a composite program are rectified, it is found that in the case of speech a pulsating current is obtained while in the case of music, a direct current of moderately varying amplitude is obtained. There is also a characteristic frequency difference between speech and music. A selective filter may, therefore, be arranged so that the average frequency of speech which is lower than the average frequency of music produces different conditions in the operation of the relay system which correspondingly controls the connection of the sound reproducer with the output circuit of the radio receiver. In my present invention, I provide means for controlling the time of operation of the connecting means which controls the connection of the sound reproducer with the output of the radio receiver. I introduce the delay from stage to stage in the control circuit which facilitates the discrimination between musical and speech programs. I have found that it is highly desirable to control the time delay in the operation of the connecting means and the circuits of my present invention provide very precise means for controlling such delayed operation. I also provide circuit arrangements for wholly eliminating mechanical relays and employ a system of bias control which increases the precision of operation of the control circuit according to the character of the received program and at the same time eliminates mechanical moving parts which are subject to wear after continued periods of operation usually caused by dust particles and corroded contacts.

Referring to Fig. 1 of the drawings, connections 1 and 2 are made to the plate circuit of the output stage of the audio frequency amplifier of a radio receiving set or other device wherein it is desired to differentiate between programs of music and extended speech. Connections 1 and 2 extend to the terminals of transformer 26 having primary winding 26a connected at opposite ends with terminals 1 and 2 and secondary winding 26b connected directly to the armature winding of sound reproducer 25 through relay contact 24, as shown.

The grid circuit connected with grid 3c of electron tube 3 is coupled to the above output circuit through connections 1 and 2 by means of condenser 4 and transformer 5. The constants of this coupling device are so chosen as to form a filter circuit discriminating to a greater extent against low audio frequencies than against high audio frequencies. The reason for this is that the energy in speech is in the lower frequencies to greater extent than in music as is fully set forth in my Patent 1,949,136 supra. The filter circuit shown is of the simplest type and is used for illustrative purposes only and it will be understood that for certain applications a more effective filter may be necessary. This simple filter is shown for the sake of clarity and it is not desired to limit the scope of this invention in this respect as there are many types of filter circuits suitable for this service which are well known and in common use by the art.

As further explained in my copending application Serial No. 561,758, now Patent 1,949,136, another difference between speech and instrumental and vocal musical programs is that the pauses are more pronounced in the speech programs.

Therefore, when signals are applied to the grid circuit 3c of electron tube 3 which is normally

negatively biased through resistor 6 to such an extent as to render the current in the plate circuit 3b zero or nearly so, the plate current will increase to such an extent that relay 7 will be energized and actuated in accordance with the said signals. Winding 7b on relay 7 is provided as a shading coil to prevent chattering of the relay 7. A shunt condenser may be employed across the winding 7a for the same purpose.

I have found that by properly designing and adjusting relay 7, the condenser 10, the charge and discharge resistors 11 and 12 respectively, contacts 8 of relay 7 will remain closed for a greater part of the time than contacts 9 when the actuating signal is speech. This may be only relatively speaking, depending on the ratio of the time constants of the charge and discharge circuit. This operation allows the negative charge on the condenser 10 and hence, the negative bias on grid 13c of electron tube 13 to be reduced to such an extent as to allow a current of sufficient value to flow through plate 13b and relay winding 14 as to actuate said relay. After a given time, depending on the time constant of condenser 15 and discharge resistor 16 and the negative charge on condenser 15, the negative bias on electron tube grid 18c will be reduced to such a value as to permit sufficient current to flow to actuate relay 21 opening contacts 24 disconnecting the armature winding of the sound reproducer 25 and closing contacts 23 placing dummy reproducer or load 22 in the circuit, as shown. This dummy reproducer is electrically equivalent to reproducer 25 or of slightly lower impedance so that the load on transformer 26 and the source 1 and 2 will not be changed or will be slightly greater as conditions require. This prevents the signal input to the grid of electron tube 3 being greater when the reproducer is in an operating condition than when it is not.

When the actuating signal is music, contacts 9 will be closed a relatively greater time than contacts 8 thereby allowing a negative charge to accumulate on condenser 10 and grid 13c, thereby reducing the current in relay 14 to a value where it releases the armature, thereby closing contacts 20 which permits a charge to accumulate on condenser 15, grid 18c, thus reducing the current in relay 21 to a value where it releases opening contact 23 and closing contact 24 which renders reproducer 25 operative again.

I provide a tuning meter 27 in the output circuit of electron tube 3 for the purpose of facilitating adjustment of the control apparatus to insure proper functioning of the control apparatus to cut off during extended speech programs while enabling the receiver to function for instrumental and vocal musical programs.

The power supply for the apparatus is obtained either from the power transformer of the radio receiving apparatus or from a separate power supply unit, as illustrated. The power supply for the separate power supply unit is shown connected to terminals 29 and 30 through power switch 28 to primary winding 31 of the power transformer which includes secondary winding 32 connected to supply plate potential through the full wave rectifier 35 and secondary windings 33 and 34 connected to supply, respectively, the filament of the full wave rectifier 35 and the filaments of electron tubes of the control apparatus designated at 3, 13, and 18. The full wave rectifier tube 35 connects to the filter system which includes the smoothing reactor 36 and the smoothing condensers 37 and 38. Voltage divider

resistors 39, 40, and 41 are connected to the output of the filter system for supplying the required potentials for the operating circuits of the electron tubes 3, 13, and 18. A switch 42 is provided for rendering the discriminating circuits ineffective when it is desired to have the radio broadcast receiver function as usual and without the discriminating functions. The type of power supply apparatus is conventional and I desire that it be understood that any form of power supply circuit may be employed for the apparatus and that I intend no limitations by the particular representation of the power supply circuit shown. In the several modified forms of the circuits of my invention, I have identified corresponding parts by similar reference characters throughout the several views.

Fig. 2 is identical with Fig. 1 except that the relay activities are reversed. Electron tube 3 may be biased so that it is operating on the upper knee of the grid voltage plate current characteristic curve. This has the effect of reducing the plate current when a signal is received, reversing the relay operation shown in Fig. 1. Or, as illustrated, a magnetizing current may be passed through resistor 43 and relay winding 7b. This will render the relay normally energized when a signal is received, the windings 7a and 7b being wound to counteract each other. The relay is deenergized on receiving a signal which will be the reverse of the action of the circuit of Fig. 1 which is desirable under certain conditions.

Fig. 3 shows an arrangement similar to the circuit of Fig. 1 except that biases on the tubes are held constant and the plate currents are controlled by the heating of filaments of tubes 13 and 18. When speech is being received, the filament circuit 13d of tube 13 is closed intermittently through contact 8 which prevents the emission being of sufficient value to open relay contacts 20 which close the filament circuit 18d of tube 18, thereby keeping relay 21 energized and the reproducer 25 inoperative. When music is received, contacts 8 are closed which, in turn, close the circuit which heats filament 13d causing relay 14 to open contacts 20 which allows filament 18d of tube 18 to cool deenergizing relay 21 and rendering reproducer 25 operative. Electron tube 13 is selectively biased through an adjustable tap on resistor 50. Electron tube 18 is independently biased by adjustable tap on resistor 51. The effective resistance which is retained in series with the filament 13d when relay contacts 8 are open is adjusted by means of resistor 53. The effective resistance in series with filament 18d when relay contacts 20 are open is adjusted by means of the adjustable tap on resistor 52.

Fig. 4 shows a circuit similar to that of Fig. 3 up to the plate circuit of electron tube 13. The relay 14 and electron tube 18 of Fig. 3 are replaced by resistor 54 and (neon) glow tube 55 in Fig. 4.

When speech or no signal is received, the filament 13d of electron tube 13 is heated permitting a plate current to flow. When the IR voltage drop across resistor 54 reaches a certain value, the glow tube 55 will be operated permitting a current, of sufficient strength to operate relay 21, to flow, opening contacts 24 and closing contacts 23 rendering the reproducer 25 inoperative.

When music is received, the filament 13d is permitted to cool reducing the plate current until the voltage drop across resistor 54 falls a value where the glow tube 55 is not operative which

allows contacts 23 to open and contact 24 to close rendering the reproducer 25 operative.

Fig. 5 shows a circuit similar to Figs. 1 and 4, but instead of using a relay to control the bias on the second tube 13, the charge on condenser 10, since on the grid, is controlled entirely by the time constants of resistors 56, 57, and 58 which comprise the charge and discharge circuits. In order to provide for the supply of proper plate potentials for electron tubes 3 and 13, I provide a series path from the output of the rectifier to the return connection for the cathodes which includes resistors 59 and 61. The drop across these resistors is applied to the plate circuits of tubes 3 and 13, respectively. The filament heating current for tubes 3 and 13 is supplied from separate windings which I have represented at 34 and 60 each having mid-tap connections for the return plate circuit paths for tubes 3 and 13. This series circuit also includes resistor 62 which is connected to supply potential to the glow discharge tube 55 through resistor 54. Switch 42 is moved to another position in the circuit diagram of Fig. 5 but serves to cut off the discriminating portion of the set as in the previous circuit arrangements described.

When speech is received, the average current through resistor 56 is so low that the charge which accumulates on condenser 10 and grid 13c is so slow that sufficient plate current is allowed to flow through resistor 54 to operate glow tube 55 in the same manner as in Fig. 4.

When music is received, the plate current through resistor 56 increases so that the voltage drop builds up sufficient bias on grid 13c to reduce the plate current through resistor 54 to such a value as to render the glow tube 55 inoperative, deenergizing relay 21 and rendering the reproducer 25 operative.

Fig. 6 illustrates a modification of the circuit of Fig. 5 in which resistor 64 is substituted for relay 21. This resistor 64 is common to the circuit of the glow tube 55 and the grid circuit of electron tube 65 driving the reproducer 25. Therefore, when speech is received, as explained in connection with Fig. 5, current flows through glow tube 55 and resistor 64 producing a voltage drop across resistor 64 of such value as to bias electron tube 65 below cut off thereby rendering the reproducer 25 inoperative.

When music is received, the current through glow tube 55 and resistor 64 is reduced to zero which reduces the bias to the normal operating bias of tube 65 which renders the reproducer 25 operative. Reference character 66 designates an audio frequency by-pass condenser. Electron tube 65 has an independent heater transformer 67 for its cathode. The primary winding of transformer 67 has terminals 29a and 30a connected to the power source in the same manner as terminals 29 and 30 of the main power transformer. The secondary winding 68 of transformer 67 connects to the filament 65d. Cathode 65a is connected to the mid-point of secondary winding 68, as shown at 69. A bleeder resistor 70 is connected between mid-tap 69 and the ground for circuit stabilization. A condenser 39 is connected in shunt with bleeder resistor 70, as shown. Other units of this type may be necessary under certain conditions, but are omitted in the diagram for purposes of simplification.

The series path which supplies the required plate potentials for tubes 3 and 13 and the required operating potential for glow discharge tube 55 also contains resistors 72 and 73. Resistor 72

is arranged to supply the proper operating potential for the grid circuit of tube 65. Resistor 73 is arranged in the output circuit of tube 65 for supplying the required plate potential for tube

5 65. The sound reproducer 25 is coupled through transformer 75 with the output circuit of tube 65.

Fig. 7 shows a further modified form of my invention comprising a circuit which will distinguish between two or more classes of music and speech. Except for the changes shown, this circuit is in accordance with the circuit of Fig. 1 and the parts are similarly numbered so that the additions will be readily apparent. The circuit of Fig. 7 may be incorporated in all of the other circuits I have illustrated and is shown in relation to Fig. 1 only for clearness. I provide separate discriminatory relays 43 and 44 in the output circuit of electron tube 3 in series with control relay 7. Each discriminatory relay has an independent armature represented at 43' and 44' having different periods of vibration and loaded with separate adjusting weights 43b and 44b. Each armature operates with respect to sets of contacts 43a and 44a. The sets of contacts are connected through separate resistors with the control grid circuit of tube 13. That is to say, contacts 43a connect through resistor 45 with control grid 13c of tube 13. Resistor 46 connects from contacts 44a to the control grid 13c of tube 13. I provide a selector switch 48 which has a switch arm 48a which is manually controllable to select any one of the contacts b, c, d or e.

When contact arm 48a of selector switch 48 is on contact b, the circuit operation is identical with that of Fig. 1 and discrimination between speech and music alone is obtained, as in Fig. 1. When on contact with c, contacts 49 close the circuit through relay 43. The armature 43' of this relay is adjusted so as to have a natural period of the rhythm of a certain class of music, for example, "foxtrots". When music of this nature is played, the contacts 43a will be closed on each swing of the armature which will permit a charge to accumulate on the condenser 10 as is the case in Fig. 1. When any other class of music or speech is received, contacts 43a are not closed often enough to permit this charge to accumulate which eventually renders the reproducer 25 inoperative. The action when on contact d is identical except that the relay armature 44' is adjusted for the rhythm of other music such as "waltz". As many additional relays may be added as there are different rhythms in music. When on contact e, the discriminating circuits are inoperative rendering the reproducer 25 responsive to any signal.

Tuned electrical circuits may be used in place of relays 43 and 44 but development at this time indicates that such circuits would be excessively bulky and costly for such low frequencies as the rhythm of music.

Fig. 8 represents another means of obtaining desired time delay in relay action. A large condenser 83 is shunted across the winding 84 of relay 7. The terminals 81 and 82 connect to the control tube plate circuit.

Fig. 9 shows another means for obtaining time delay by the use of a heavy copper sleeve 85 between the winding 84 and the iron core of relay 7.

There are many other methods of obtaining delay. Further development may indicate that certain electron tubes employed in the accompanying circuits may be replaced by mechanical

devices such as the timed relays of Fig. 8 and Fig. 9 or dash pot controlled relays. However, the most stable operation appears to be obtainable by reducing moving parts and contacts to a minimum.

Fig. 10 shows a circuit arrangement similar to Fig. 7 except that timing of the rhythm selecting circuit is obtained by an electrical oscillating circuit instead of the mechanical oscillators or pendulums. This oscillating circuit is of the glow discharge type consisting of units 87, 89, 90, 91, and 92. The units 93 and 94 comprise part of the high voltage power supply and are so called voltage divider resistors. The other units are identical with similarly numbered units shown in Figs. 1 and 7. When contact arm 48a is moved to contact b, the action is identical with that of Fig. 1. On contacts c, d, and e, the above timing circuit is operative for the chosen rhythm. Resistors 93 and 94 are of such value that the normal voltage across the plates of glow tube 87 is just below the breakdown value so that no current flows through this tube or relay 7. When a signal is received, the voltage will be increased so that current flows for an instant actuating the relay. If the signal is of the preselected rhythm, the peaks will coincide with the peak voltage on condenser 89 on each cycle keeping relay 7 actuated a greater percentage of the time. If it is not of the proper rhythm, these voltages will not coincide every cycle, therefore, relay 7 will be actuated a smaller percentage of the time, discriminating against this rhythm.

Fig. 11 diagrammatically illustrates the principle of operation of the circuit of Fig. 16. In this diagram, 95 designates a source of potential connected to supply energy to a glow discharge tube oscillator circuit which includes glow discharge tube 96, condenser C, and resistance R. The frequency of the glow discharge tube oscillator circuit depends on the relative values of R and C. Resistance R allows a charge to accumulate on condenser C which discharges through glow discharge tube 96 when a certain value is reached. Condenser C is then charged again and is subsequently discharged. The process repeats successively.

Fig. 12 shows characteristic curves by which the operation of the circuits of Figs. 10 and 11 may be explained. Curve A illustrates the characteristic of the glow discharge tube oscillator circuit. Current flows at successive time intervals, as represented by the repeating characteristic curve. If the superimposed signal has a rhythm of the characteristic represented by curve B, this signal of the desired rhythm will be selected and employed to act upon the relay circuit. In the curve illustrated, the relay circuit functions four times in step with the rhythm of the selected music. However, where the received signal energy is of improper or undesired rhythm, as represented by curve C of Fig. 12, this undesired energy will not be transferred to the sound reproducing circuit. In the example illustrated in curve C, the relay acts but one time which is not sufficient to transfer the energy of undesired rhythm to the sound reproducing circuit.

The characteristics of speech and music are more clearly detailed in my Patent 1,949,136 supra to which reference is made for a clear understanding of the principles involved in the system of my invention. I desire that it be understood that the several embodiments of my invention herein described are to be considered in the illustrative sense and that I intend no limitations

upon my invention other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a signal receiving system, means for receiving signaling energy, an electron tube device connected with said means, a sound reproducing system, time delay means connectible with said electron tube device, and means connected with said time delay means and responsive to energy of predetermined character integrated over a given time period for controlling the connection of said sound reproducing system with said first mentioned means according to the character of the received signaling energy integrated over a given time period.

2. In a signal receiving system, means for receiving signaling energy, an electron tube device connected with said means, a sound reproducing system, an electrical network constituting means for integrating signal energy connectible with said electron tube device, and means controlled by said electrical network and responsive to energy of predetermined character integrated over a given time period for controlling the connection of said sound reproducing system with said first mentioned means according to the character of the received signaling energy integrated over a given time period.

3. In a signal receiving system, means for receiving signaling energy, an electron tube device connected with said means, a sound reproducing system, an electrical network constituting means for integrating signal energy connectible with said electron tube device, and a potential operated device connected with said network responsive to energy of predetermined character integrated over a given time period for controlling the connection of said sound reproducing system with said first mentioned means according to the character of the received signaling energy integrated over a given time period.

4. In a signal receiving system, means for receiving signaling energy, an electron tube device connected with said means, a sound reproducing system, a multiplicity of successively operating time delay devices controlled by said electron tube device, and means connected with the last of said time delay devices and responsive to energy of predetermined character integrated over a given time period for controlling the connection of said sound reproducing system with said first mentioned means according to the character of the received signaling energy integrated over a given time period.

5. In a signal receiving system, means for receiving signaling energy, an electron tube device connected with said means, a sound reproducing system, means for integrating signal energy connected with said electron tube device, and a glow discharge tube connectible with said integrating means and responsive to energy of predetermined character integrated over a given time period for controlling the connection of said sound reproducing system with said first mentioned means according to the character of the received signaling energy integrated over a given time period.

6. In a signal receiving circuit, a sound energy transfer channel, a sound reproducing system, and means for connecting or disconnecting said sound reproducing system with respect to said sound energy transfer channel according to the character of the received signaling energy comprising a frequency discriminating circuit, an electron tube connected with said frequency discrim-

inating circuit, a time delay network connected with said electron tube, said network being operative to integrate and to differentiate between the energy of speech and the energy of music received over similar periods of time, and a device responsive to energy of predetermined character integrated over a given time period controlled by said time delay network and interposed in circuit between said sound energy transfer channel and said sound reproducing system.

7. In a signal receiving system, a sound energy transfer channel, a sound reproducing system, and means for controlling the effective connection or disconnection of said sound energy transfer channel to said sound reproducing system according to the character of the received signaling energy integrated over a given time period comprising a multiplicity of coupled electron tube circuits, energy integrating means interconnected therewith, and a device interposed in said circuits and selectively responsive to energy of predetermined character integrated over a given time period.

8. In a signal receiving system, a sound energy transfer channel, a sound reproducing system, means for controlling the connection or disconnection of said sound energy transfer channel to said sound reproducing system comprising a multiplicity of coupled electron tube circuits and time delay circuits interconnected therewith, and a potentially operated glow discharge device connected with said circuits and operative according to the character of the incoming signaling energy.

9. In a signal receiving system, means for receiving signal energy, a sound reproducing circuit, and means for connecting or disconnecting said sound reproducing circuit with said means according to the character of the received signaling energy comprising a frequency discriminating circuit, an electron tube connected therewith, a time delay network connected with said electron tube, said network being operative to integrate and to differentiate between the energy of speech and the energy of music received over similar periods of time, electron tube means connected with said time delay network, and selectively responsive to energy of predetermined character integrated over a given time period and means in the output circuit of said electron tube means controlling elements common to said sound reproducing circuit and said first mentioned means.

10. A signal receiving system comprising a sound energy transfer channel, a sound reproducing circuit, a load circuit substantially equal to the load offered by said sound reproducing circuit, means for integrating the signal energy over a given time period, and electro-magnetic means operative according to the character of the received signaling energy integrated over a given time period for automatically switching said sound energy transfer circuit to said sound reproducing circuit or to said load circuit depending upon the character of the energy incident upon said sound signaling energy transfer circuit and integrated over a given time period.

11. A signal receiving system comprising a sound energy transfer channel, a sound reproducing circuit, a load circuit substantially equal to the load offered by said sound reproducing circuit, a time delay circuit including energy integrating means connected with said sound energy transfer channel, and means operative according to the character of the received signaling energy integrated over a given time period connected between said time delay circuit and a

portion of said sound energy transfer channel for controlling the connection of said sound energy transfer channel to either said sound reproducing circuit or said load circuit according to the character of the energy incident upon said sound energy transfer circuit and integrated over a given time period.

12. In an apparatus for reproducing selected programs from composite programs, a sound energy transfer circuit, a sound reproducing circuit, means for controlling the effective circuit between said sound energy transfer circuit and said sound reproducing circuit comprising an electron discharge tube, means for integrating the signal energy over a given time period, and means for controlling the bias potential on said electron tube according to the character of the received signal energy integrated over a given time period for determining the transfer of energy from said sound energy transfer circuit to said sound reproducing circuit without interrupting the continuity of said circuit.

13. In an apparatus for reproducing selected programs from composite programs, a sound energy transfer circuit, a sound reproducing circuit, an electron tube having input and output circuits, a connection between said output circuit and said sound reproducing circuit, a connection between said input circuit and said sound energy transfer circuit, means for integrating the signal energy over a given time period, and means controlled by the character of the signal energy integrated over a given time period for determining the bias potential on said electron tube for correspondingly controlling the operation of said sound reproducing circuit without interrupting the continuity of the circuit between said electron tube and said sound reproducing circuit.

14. In an apparatus for reproducing selected programs from composite programs, a sound energy transfer circuit, a sound reproducing circuit, an electron tube having input and output circuits, a connection between said output circuit and said sound reproducing circuit, a connection between said input circuit and said sound energy transfer circuit, and time controlled means operative according to the character of the energy incident upon said sound energy transfer circuit for determining the bias potential and time period of impression thereof upon said electron tube for correspondingly controlling the operation of said sound reproducing circuit without interrupting the continuity of the circuit between said electron tube and said sound reproducing circuit.

15. In a signal receiving system, a sound energy transfer channel for intermittently transmitting speech signal energy and music, a sound reproducing circuit, means interconnecting said channel with said circuit, a multiplicity of signaling energy integrating means, a multiplicity of bias controlled electron tube circuits selectively responsive to signaling energy of predetermined characteristic integrated over a predetermined time period for interrupting the effective circuit between said channel and said circuit according to the character of the signal energy, and means for determining the potential on said bias controlled electron tube circuits by differences between the energy of the speech signal integrated

over a given time period and that of music integrated over a similar time period.

16. In a signal receiving system, a sound energy transfer channel, a sound reproducing circuit, means interconnecting said channel with said circuit, means selectively responsive to signal energy of continuous or of intermittent character, and a glow discharge tube circuit operative to interrupt the effective connection between said channel and said circuit according to the character of the received signaling energy for discriminating between classes of programs constituted by said signaling energy incident.

17. In a signal receiving system, a sound energy transfer channel, a sound reproducing circuit, means interconnecting said channel with said circuit, a multiplicity of bias controlled electron tube circuits, electrical network elements and a glow discharge tube coacting to interrupt the effective connection between said channel and said circuit according to the character of the signal energy upon said channel.

18. In a signal receiving system, a sound energy transfer channel, a sound reproducing circuit, means interconnecting said channel and said circuit, and means coacting with the aforesaid means for discriminating against continuous signal energy of predetermined rhythm while selecting continuous signal energy of desired rhythm and maintaining the continuity of the circuit between said channel and said circuit so long as a program of desired rhythm is incident upon said channel.

19. In a signal receiving system, a sound energy transfer channel, a sound reproducing circuit, means interconnecting said channel and said circuit, and means coacting with the aforesaid means comprising a multiplicity of mechanically tuned relay devices responsive to continuous signal energy of predetermined rhythm and operating to select continuous signal energy of desired rhythm for impression upon said sound reproducing circuit to the exclusion of energy of other rhythm.

20. In a signal receiving system, a sound energy transfer channel, a sound reproducing circuit, means interconnecting said channel and said circuit, and means coacting with the aforesaid means comprising a glow discharge oscillator circuit operative at a frequency selective to programs of corresponding rhythm for maintaining the continuity of the circuit between said channel and said sound reproducing circuit so long as a program of corresponding rhythm is incident upon said channel.

21. A signal receiving system comprising an audio frequency amplifier circuit including an electron tube having a control electrode therein, a sound reproducing circuit connected with the output of said electron tube, a circuit for storing a biasing potential, an ionizable path interconnecting said last mentioned circuit and the control electrode of said electron tube, said last mentioned circuit having means proportioned to differences between the energy of speech signals integrated over a given time period and that of music energy integrated over a similar time period for building up a potential operative to ionize said ionizable path for impressing a blocking potential on the control grid of said electron tube.

GEORGE P. ADAIR.