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SOUND AND TELEVISION RECEIVING SYSTEM

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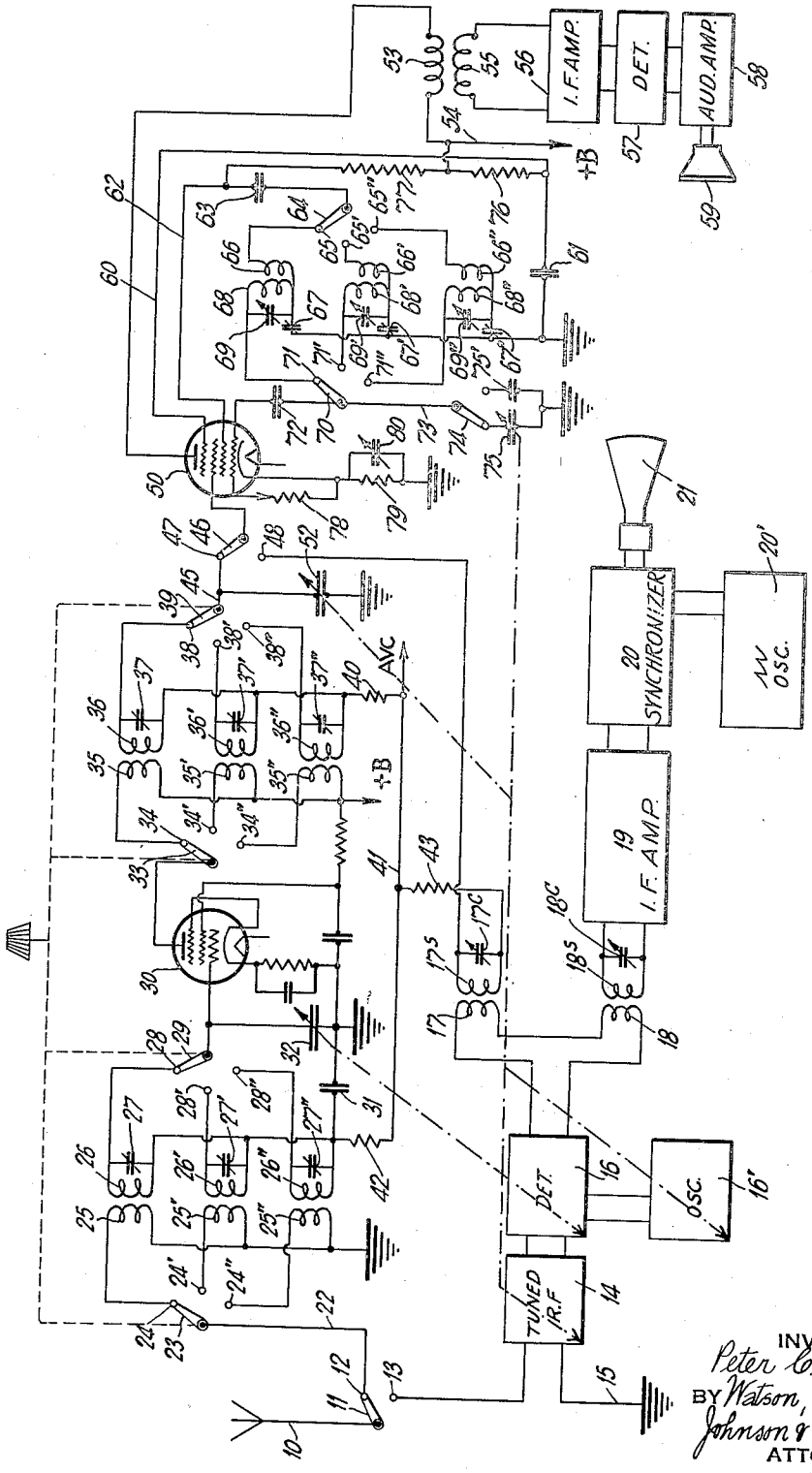

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SOUND AND TELEVISION RECEIVING SYSTEM

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This invention relates to a combined sound and television receiver and to a sound and television receiving system which is also adapted for receiving a plurality of broadcast bands, and particularly to an arrangement which permits of so-called "all-wave" reception.

The invention has for its object generally the provision of a construction and arrangement of parts for receivers of the character indicated with a small number of stages so as to receive either ultra short wave signals of the combined sound and television variety or ordinary broadcast signals at will.

More specifically, an object of the invention is to provide a receiving system adapted to heterodyne an ultra short wave signal of the combined sound and television variety so as to give an intermediate frequency from which the sound component may be separated, amplified and reproduced in a set of stages commonly employed for amplifying and reproducing ordinary broadcast sound signals.

Still another object is to provide an arrangement of amplifying and reproducing stages for receiving ultra short wave signals of the combined sound and television variety with ordinary broadcast signal receiving and reproducing devices in a manner such that the sound reproducing stages may be used in common for either the ordinary broadcast reception or the ultra short wave reception.

Still another object is to provide a system of amplifying and reproducing combined sound and television signals and ordinary broadcast signals by means of substantially a minimum number of stages, which is achieved by having the finally amplifying sound reproducing stages in common and adapted to be housed in a single cabinet or console.

Still another object is to provide a sound and television receiver employing double detection with an all-wave radio frequency amplifying stage connected in parallel with the ordinary radio frequency stages commonly employed for sound and television reception, the arrangement being such as to provide a relatively low standard beat frequency for any one of the broadcast bands received by the all-wave receiver.

Still another object is to provide an improved coupling in an all-wave superheterodyne receiver between the radio frequency amplifying stages and an intermediate frequency amplifying stage by introducing a so-called "mixing tube" of a character adapted to serve as a combined detector and oscillator and which has connections whereby a relatively low intermediate frequency may be had irrespective of the broadcast band being received.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

The figure is a view showing schematically the circuit and component elements of a combined sound and television receiving system, arranged in accordance with the invention.

Referring now to the drawing, 10 denotes a connection which leads from an antenna or other source of incoming signal energy and has in series a switch 11 arranged to engage with either of poles 12 and 13 whereby partially separate paths through amplifying and detecting stages may be chosen at will. The path connected to pole 13 comprises a system connected to include an amplifying stage 14, having a ground connection 15, together with subsequent stages, at some point of which there is an arrangement for supplying a signal that may be separated into components adapted to actuate sound reproducing devices and television devices respectively. The system illustrated is shown as a series of coupled stages that operate in accordance with the double detection principle to give a signal at a so-called "intermediate frequency" that is divided in sound and television components. Thus, it may be taken, by way of example, that stage 14 is one of tuned radio frequency, which is coupled to a first detecting stage 16, which is heterodyned with a locally generated oscillation provided by an oscillator 16' to give an amplified impulse of intermediate frequency that is passed to an output circuit having windings 17 and 18 connected in series and which serve respectively as couplings for the subsequent sound reproducing and television stages. Accordingly, there is shown adjacent the winding 17 a secondary 17^s, and adjacent the winding 18 a secondary 18^s, each of which preferably has an associated condenser, as shown at 17^c and 18^c, respectively. These provide a pair of resonant circuits that are con-

nected respectively across the input of the sound amplifying stages, provided as hereinafter more fully described, and across the television amplifying stages which amplify this first intermediate frequency. An amplifying stage for this latter purpose is shown at 19 and is coupled to a synchronizing stage 20, the output of which is connected to a suitable picture reproducing device, such as a cathode ray tube 21, the synchronizing stage being supplied with suitable locally generated oscillating current, preferably having a saw-toothed characteristic, for oscillating the cathode ray; such an oscillator being symbolically indicated at 20'.

From the pole 12 of switch 11 leads a conductor 22 which has a selector switch 23 in series therewith for selecting one of a group of circuits resonant to a corresponding number of bands of frequencies that carry desired sound signals. These several circuits are connected respectively to the poles 24, 24' and 24'' associated with switch 23. To pole 24 is connected one terminal of primary winding 25 which has its other terminal grounded. In like manner, pole 24' is connected to one terminal of primary winding 25' and to pole 24'' is connected one terminal of primary winding 25''; these windings preferably having a common ground. With each of these windings is preferably associated inductively another winding that serves as an element of inductance in a resonant circuit that also has an element of adjustable capacitance connected as shown for band selecting purposes; the inductance provided being shown at 26, 26' and 26'', while the capacitances are shown at 27, 27' and 27''. One terminal of each of these resonant circuits is connected respectively to one of the three poles 28, 28' and 28'' of another selector switch 29 to provide a common input connection to the control grid of a tube 30 of an amplifying stage which may be arranged for tuned radio frequency amplification. The other terminal of each of these oscillating circuits has a common connection through a fixed capacitance 31 to ground. A variable capacitance 32 to effect the main tuning is connected in parallel to the capacitances 27, 27' and 27'' across the conductor leading from the switch 29 and that from the capacitance 31 to ground.

The tube 30 of the first amplifying stage, while it may be a simple triode, is preferably a high gain tube of the multi-grid type, for example, a pentode, which is connected in a conventional way. The output circuit of the tube 30 leads from its plate to a third selector switch 33 that has poles 34, 34' and 34'' to which are respectively connected one of the terminals of the windings 35, 35' and 35'', the other terminal of each winding being connected through a common conductor to the B-supply at appropriate potential. Associated with each winding 35, 35' and 35'' is another winding 36, 36' and 36'', each of which has an associated element of adjustable capacitance, as shown at 37, 37' and 37'', to provide a set of inductively coupled resonant circuits. Conductors from one side of each of these resonant circuits lead to the poles 38, 38' and 38'' of another selector switch 39; the other side of each of these resonant circuits having a common connection through a suitable resistance element 40 to a conductor 41 that preferably leads to an automatic volume control, in the usual way. Conductor 41 is shown as having a connection through a resistance element 42 with the common terminal of resonant circuits 26—27, 26'—27' and 26''—27''. One side of the resonant circuits 17^s—17^c is also preferably connected to conductor 41 through a resistance element 43. The selector switches 23, 29, 33 and 39 are actuated together and hence are preferably mechanically connected for simultaneous actuation.

A conductor 45 leads from the selector switch 39 to another switch 46 to provide coupling to the subsequent sound amplifying stages. In order that these stages may also be in service when switch 11 is connected to the pole 13 for giving combined sound and television signals, switch 46 makes contact with two poles 47 and 48, the first of which is connected to the conductor 45, the second with the other side of resonant circuit 17^s—17^c.

A special detecting stage is coupled at this point for sound reproduction. As shown, this comprises a tube 50, the control grid of which is connected to the blade of switch 46, the input being alternatively supplied from poles 47 and 48. The input, when switch 46 is on pole 47, is tuned by another main tuning condenser 52 connected between conductor 45 and ground and operates in parallel with the adjustable elements of capacitances 37, 37' and 37''.

The tube 50 is of a character adapted to heterodyne the incoming frequency with a locally generated oscillation to give an intermediate frequency that is supplied to the subsequent stages. This gives an intermediate frequency that is supplied from the plate to the primary winding 53 which has its other terminal connected to the B-supply through conductor 54 and is inductively coupled to a winding 55 that feeds amplifying stage 56. To this latter are coupled a detecting stage 57, and an audio amplifying stage 58 that has connected thereto a loudspeaker 59. The intermediate frequency had at this point is a relatively low frequency, and is a second intermediate frequency when the signal received at 10 comes in by way of the path which includes stage 14.

In order that the desired heterodyning may take place at the tube 50, this latter is preferably connected to be of the self-generator or mixing type. To this end, a hexode is advantageously employed, the grids being arranged for effecting electron coupling in a grid controlled oscillation generator. Accordingly, a conductor 60 leads from the grid next to the plate and is connected to ground through a condenser 61. From another grid, between which and the plate grid is the input control grid above referred to, leads a conductor 62 that is connected through a condenser 63 to a selector switch 64 that engages with poles 65, 65' and 65''. From each of these poles lead conductors to one terminal of windings 66, 66' and 66'', the other terminal of each of which is grounded through condensers 67, 67' and 67'', respectively; it being advantageous to make these connections through a common conductor to which the ground side of condenser 61 is also preferably connected, as shown. Inductively associated with each of the windings 66, 66' and 66'' is a second winding 68, 68' and 68'' connected to have one terminal grounded respectively through condensers 67, 67' and 67'', the other terminals being connected to poles 71, 71' and 71'' of a selector switch 70 that has its blade connected through a condenser 72 with a grid adjacent the cathode of tube 50. Across each winding 68, 68' and 68'' is respectively connected an element of adjustable capacitance 69, 69' and 69'', whereby resonant circuits are provided to control the locally generated oscillations and pro-

vide controlled frequencies suitable for heterodyning with each of the sound bands passed.

In order more accurately to control this regulating effect, the conductor leading to the cathode grid, or more properly, the condenser 72, is connected to ground through conductor 73, a switch 74 and alternate elements of capacitance 75 and 75'. The latter is preferably of fixed value, while the former is variable, its value being preferably adjustable simultaneously with changes in the variable elements of capacitance 32 and 52. To this end, these capacitances are preferably mechanically connected or ganged together for simultaneous actuation, such mechanical connection being indicated by the broken line in the drawing and is extended to include the actuation of the tuning elements of the stages 14, 16 and 16'. Means for fixing the potential of conductors 60 and 62 are also preferably provided. To this end, a resistance 76 is indicated as connected between B-supply conductor 54 and the conductor 60 at a point between condenser 61 and tube 50; in like manner, a resistance 77 is connected between conductor 54 and conductor 62 at a point between condenser 63 and tube 50.

In connection with tube 50, a bias for the cathode grid may be advantageous. Accordingly, an element of resistance 78 is indicated as interposed between the cathode grid and the cathode. This latter is also shown as connected to ground through another element of resistance 79 which is shunted by an element of variable capacitance 80 for by-passing certain high frequencies.

In operation, when it is desired to receive a sound signal on an ordinary broadcast carrier, switches 11, 46 and 74 are moved to the positions shown in full lines in the drawing; i. e., switch 11 is in contact with pole 12, switch 46 is in contact with pole 47 and switch 74 is in contact with the terminal of capacitance 75. The three sets of windings shown in the radio frequency amplifying stage of the sound path are preferably made to pass such bands as to adapt the set for so-called "all-wave" reception. Assume that the band passed by the unaccented elements of this circuit is from 540 to 1600 kilocycles, that the band passed by the accented elements is from 1600 kilocycles to 5 megacycles and that passed by the double accented elements is from 5 megacycles to 18 megacycles, then by moving the switches 23, 29, 33 and 39 together a desired band is selected, for example, when moved to the position shown in full lines, the band of 540 to 1600 kilocycles may be assumed to be passed. In the mixing stage, the switches 64 and 70 are similarly adjusted to select a circuit giving a range of oscillating frequencies that may be heterodyned with the incoming frequency to which the set is tuned to get a desired intermediate frequency by moving the ganged capacitances or condensers 32, 52 and 75 to desired positions. The resulting intermediate frequency is one of relatively low value, for example, 456 kilocycles, which is amplified, detected and reproduced as sound in stages 56, 57 and 58 and loud-speaker 59.

When it is desired to receive a combined sound and television signal, or one with two components which are on a carrier of a frequency in the ultra short wave region and cannot be amplified without many stages of the character used in the first path, then switches 11, 46 and 74 are moved to establish the second path; i. e., switch 11 is moved into contact with pole 13, switch 46 is moved into contact with pole 48 and switch 74 is moved into contact with the terminal of capacitance 75'. Assume now, by way of example, that the sound signal is on a carrier of 60 megacycles and that the television signal is on a carrier of 63 megacycles, then both of these signals may be picked up when the path is established through stage 14. Then, if the oscillator 16' generates a local frequency of 65 megacycles, an intermediate frequency of 5 megacycles is produced in the stage 16 which carries the sound signal and is selected in that branch of the circuit 17—18 by adjusting the condenser 17^c so that only this frequency is fed by its resonant circuit 17^s—17^c to the mixing stage which has tube 50. Here, further heterodyning takes place to give a signal of 456 kilocycles that is further amplified and reproduced in the loud-speaker 59 as before. Also, an intermediate frequency of 2 megacycles results in stage 16 which carries the picture signal and may be similarly selected in the resonant circuit 18^s—18^c and fed into the amplifying stage 19 for reproduction in the cathode ray tube 21.

When receiving the combined sound and television signal the switch 74 is connected to condenser 75' and the switch arm 70 so adjusted that it rests on the contact which selects the coil whose tuning range includes the frequency of the incoming high intermediate frequency of the sound component plus or minus the low intermediate frequency (for example, 456 kilocycles) employed for broadcast sound reception only. For example, coil 68' may be designed to receive broadcast sound on carrier frequencies between 2 and 7 megacycles. If the incoming television-sound intermediate frequency should be 6 megacycles, then the switch 70 is moved to engage contact 71'. The connection of switch 74 to condenser 75' adds a desired amount of fixed capacitance to the circuit including coil 68'. The same is, of course, true when either of coils 68 or 68'' is put in circuit by switch 70. The frequency to which each of these coils is thus tuned is then the high intermediate frequency passed, such as 6 megacycles, plus or minus the low intermediate frequency, such as 456 kilocycles. At the same time that the switch 70 is moved into engagement with contact 71', the switch 64 is moved to engage contact 65'. Switches 64, 70 and 74 consequently may be ganged so as to take care of these movements as desired.

It is seen, of course, that the first intermediate frequency carrying the sound signal, as described above, is of an order well adapted for passing in the mixing stage and for further heterodyning to the desired low intermediate frequency, and that, if a suitable value for the mixing stage were not obtained by once heterodyning the incoming signal in an antecedent stage as was done in stage 16, then two or more heterodyning operations may be effected in suitable antecedent stages, when provided, as here indicated, in parallel with first stages of the ordinary sound path. In simpler sets requiring less selectivity and sensitivity, the tuned radio frequency stage of the sound path may be omitted altogether when desired, the connections in such case being made in a manner well understood in the radio art.

In the system here provided, it is seen that the sound signal component from the ultra short wave receiver after passing through the first heterodyning stage is separated from the vision component and introduced as a comparatively high valued intermediate frequency signal into a suitable stage, such as a second heterodyning

and detecting stage of an ordinary sound broadcast signal receiver for detecting, amplifying and reproducing the sound.

As a result, the broadcasting signal and the sound component of the ultra short wave signal are given a common amplifying treatment and may have a common intermediate frequency. It is seen, of course, that the sound component of the combined television and sound signal with the ordinary broadcast signal are supplied alternately to the common amplifying and reproducing stages.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

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

1. Apparatus for the reception of both sole sound broadcast signals and combined sound and vision signals comprising in combination, means for receiving sole sound broadcast signals and reproducing them as audible signals, said means including a heterodyning stage adapted to produce sound intermediate frequency signals, means for receiving combined sound and vision signals and for reproducing the vision components of said combined signals as visible signals, the second-mentioned means including heterodyning means for converting the sound components of said combined sound and vision signals to an intermediate frequency other than that of the first-mentioned sound intermediate frequency signals but to which the first-mentioned heterodyning stage is responsive to convert it to the frequency of the first-mentioned sound intermediate frequency signals, and means for transferring the sound components of said combined sound and vision signals to the first-mentioned heterodyning stage at the sound intermediate frequency produced by the second-mentioned heterodyning stage.

2. A radio receiving system for the reception of either sole-sound signals or combined sound and vision signals comprising, in combination, a set of coupled stages for amplifying, detecting and reproducing the sole sound signals as audible signals, said set of coupled stages including a heterodyne-detector stage for converting the received sole-sound signals to a selected intermediate frequency, another set of coupled stages including a detecting stage for amplifying and detecting the combined sound and vision signals, heterodyning means associated with the second-named detecting stage for converting the sound and vision components of the received signals to different respective intermediate frequencies, the intermediate frequency of the said sound component being other than the first-named intermediate frequency but of a value to which the first-named heterodyne-detector stage is responsive to convert it to the first-named intermediate frequency, a selector coupling circuit interposed in said other set of stages at a point beyond the second-named detecting stage having portions adapted to separate and transmit separately the sound components and the vision components of said combined signals, amplifier, detector and vision signal reproducer stages coupled to the vision signal transmitting portion of said coupling circuit, means for connecting the sound signal portion of said coupling circuit to said first-named set of stages at a point antecedent to the first-named heterodyne-detector stage, whereby the sound component of the combined sound and vision signals may be reproduced, and switching means for applying an incoming signal either to said first named set or to said second named set of stages.

3. Apparatus for the reception of either a sole sound signal in a relatively long wave broadcast band or simultaneously associated sound and vision signals in an ultra short wave band, comprising, in combination, a radio frequency receiving and amplifying stage having a group of selectively connectable couplers each adapted to select and pass a sole sound signal in a different band of relatively long wave broadcast signals, a heterodyning detecting stage having an input circuit connectible to said radio frequency amplifying stage and adapted to convert the signals from said amplifying stage to a selected intermediate frequency, intermediate frequency amplifying and detecting and sound reproducing stages coupled in cascade to said heterodyning-detecting stage, another radio frequency receiving and amplifying stage adapted to receive and pass associated sound and vision signals in an ultra short wave band, a heterodyning-detecting stage coupled to the second-named radio frequency receiving and amplifying stage adapted to provide respective different sound and vision intermediate frequency signals, the sound intermediate frequency of the second-named heterodyning-detecting stage being substantially higher than the first-named intermediate frequency but of a value to which the first-named heterodyning-detecting stage is responsive to convert it to said first-named intermediate frequency, a coupling connected to the second-named heterodyning-detecting stage having separate portions, one of said portions being adapted to transmit only the vision component of said ultra short wave signals as heterodyne-detected and other of said portions being adapted to transmit only the sound component of said ultra short wave signals as heterodyne-detected, vision signal amplifying and reproducing means coupled to said one portion, means for connecting said other portion to the input circuit of the first named heterodyning-detecting stage, whereby the sound component of the associated sound and vision signals may be reproduced, ganged means for simultaneously tuning the several amplifying and heterodyning-detecting stages, switching means for determining the reception either of said sole-sound broadcast signals or of said ultra short wave sound and vision signals, and additional switching means for determining which of said groups of selectively connectible couplers shall be operative.

4. In apparatus for the reception of sole sound signals and combined sound and vision signals, the combination of a receiver for a plurality of sound broadcast bands, said receiver including selectively connectible tuned circuits and variable condensers for tuning, a receiver for combined sound and vision signals having variable condensers for tuning and having means for reproducing the vision components of said combined signals, said variable condensers of both said receivers being mechanically connected for simultaneous tuning, an intermediate frequency amplifier, sound reproducing means coupled to said intermediate frequency amplifier, and a wave change switch for alternatively connecting said intermediate frequency amplifier to said sound

broadcast receiver and to said combined sound and vision receiver, whereby ordinary broadcast signals and combined sound and vision signals may be tuned with the same knob in different positions of the wave change switch.

5. In the radio broadcast reception of both sole sound broadcast signals and combined sound and vision signals, in the alternative, by means including a sole sound broadcast receiver having a heterodyning stage, an intermediate frequency amplifier stage and sound reproducing means, said combined sound and vision signals comprising two carrier waves slightly relatively separated in frequency and modulated by the sound and vision signals respectively, the method which comprises heterodyning said combined sound and vision signals to provide two substantially relatively separated intermediate frequency signals, the sound intermediate frequency signal being of a frequency other than that to which the intermediate frequency amplifier of said sole sound broadcast receiver is responsive but to which the heterodyning stage of the sole sound broadcast receiver is responsive to convert it to the intermediate frequency to which the said intermediate frequency amplifier is responsive, supplying said sound intermediate frequency signal to the heterodyning stage of said sole sound broadcast receiver for audible reproduction, and amplifying, detecting and reproducing the vision intermediate frequency signal as a visible signal.

6. A radio receiver for the reception, in the alternative, of both sole-sound broadcast signals and of associated sound and vision broadcast signals comprising, means for receiving sole-sound broadcast signals and reproducing them as audible signals, said means including a heterodyne-detector stage adapted to produce sound intermediate frequency signals and an intermediate frequency amplifier for amplifying said sound intermediate frequency signals, means for receiving associated sound and vision broadcast signals and for reproducing the vision components thereof, the second-mentioned means including a heterodyne-detector stage adapted to convert the sound component of the received sound and vision signals to an intermediate frequency to which the said intermediate frequency amplifier will not respond but which the first-mentioned heterodyne-detector stage is adapted to convert to an intermediate frequency to which the said intermediate frequency amplifier will respond, and means for supplying the sound components of said associated sound and vision signals to the first-mentioned heterodyne-detector stage at the said intermediate frequency produced by the second-mentioned heterodyne-detector stage for reproduction thereof.

7. A radio receiver for the reception, in the alternative, of both sole-sound broadcast signals on relatively low frequency carriers and of associated sound and vision broadcast signals on relatively high frequency carriers which comprises, means for receiving sole-sound broadcast signals and reproducing them as audible signals, said means including a heterodyne-detector stage adapted to produce sound intermediate frequency signals and an intermediate frequency amplifier for amplifying said sound intermediate frequency signals, means for receiving associated sound and vision broadcast signals and for reproducing the vision components thereof, the second-mentioned means including a heterodyne-detector stage adapted to convert the sound component of the received sound and vision signals to an intermediate frequency substantially higher than that which said intermediate frequency amplifier will amplify effectively but which the first-mentioned heterodyne-detector stage is adapted to convert to a lower intermediate frequency which the said intermediate frequency amplifier will amplify effectively, and means for supplying the sound components of said associated sound and vision signals to the first-mentioned heterodyne-detector stage at the said higher intermediate frequency for reproduction thereof.

8. A radio receiver for the reception, in the alternative, of both sole-sound broadcast signals on relatively low frequency carriers and of associated sound and vision broadcast signals on relatively high frequency carriers which comprises, means for selectively receiving sole-sound broadcast signals within a selected frequency range and for reproducing them as audible signals, said means including a tunable heterodyne-detector stage tunable to convert the received sole-sound signals to a selected intermediate frequency and an intermediate frequency amplifier for amplifying the sound intermediate frequency signals so produced, means for receiving associated sound and vision broadcast signals and for reproducing the vision components thereof, the second-mentioned means including a heterodyne-detector stage adapted to convert the sound component of the received sound and vision signals to an intermediate frequency substantially higher than the first-mentioned intermediate frequency but lying within the tuning range of the first-mentioned heterodyne-detector stage so that the said first-mentioned heterodyne-detector stage is adapted to convert it to a lower intermediate frequency signal which the said intermediate frequency amplifier will amplify effectively, and means for supplying the sound components of said associated sound and vision signals to the first-mentioned heterodyne-detector stage at the said higher intermediate frequency for reproduction thereof.

9. A radio receiver adapted to receive both sole-sound broadcast signals and associated sound and vision signals comprising, means for receiving sole-sound broadcast signals at radio frequencies and for reproducing them as audible signals, said means including a heterodyne-detector stage adapted to convert received sole-sound signals to a selected intermediate frequency, means for receiving associated sound and vision signals at radio frequencies, heterodyne-detecting means for converting the sound and vision components of the received sound and vision signals to respective different selected intermediate frequency signals, the intermediate frequency of the said sound component being of a value substantially higher than the first-mentioned intermediate frequency but to which the first-mentioned heterodyne-detector stage will respond to convert it to said first-mentioned intermediate frequency, means for supplying said sound component at its said respective intermediate frequency to the first-mentioned heterodyne-detector stage, whereby the sound component of the associated sound and vision signals may be reproduced, and means for receiving the said vision component at its respective intermediate frequency and for reproducing said vision component.

10. In a radio broadcast receiver for the reception, in the alternative, of both sole-sound signals on relatively low frequency carriers and of associated sound and television signals on rela-

tively high frequency carriers, by means including a sole-sound broadcast receiver having a heterodyne-detector stage, an intermediate frequency amplifier stage and sound reproducing means, the method of reproducing associated sound and television signals which comprises heterodyning said associated sound and television signals to provide two relatively separated intermediate frequency signals, the intermediate frequency of the sound component being substantially higher than that which the intermediate frequency amplifier of said sole-sound broadcast receiver will effectively amplify but to which the said heterodyne-detector stage is responsive to convert it to the intermediate frequency which the said intermediate frequency amplifier will effectively amplify, supplying said sound component at said higher intermediate frequency to the said heterodyne-detector stage for audible reproduction, and reproducing the vision intermediate frequency signal as a visible signal.

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