Dec. 19, 1939. A. A. LINSELL 2,183,718
MODULATED CARRIER WAVE RECEIVING INSTALLATION
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Fig. 1

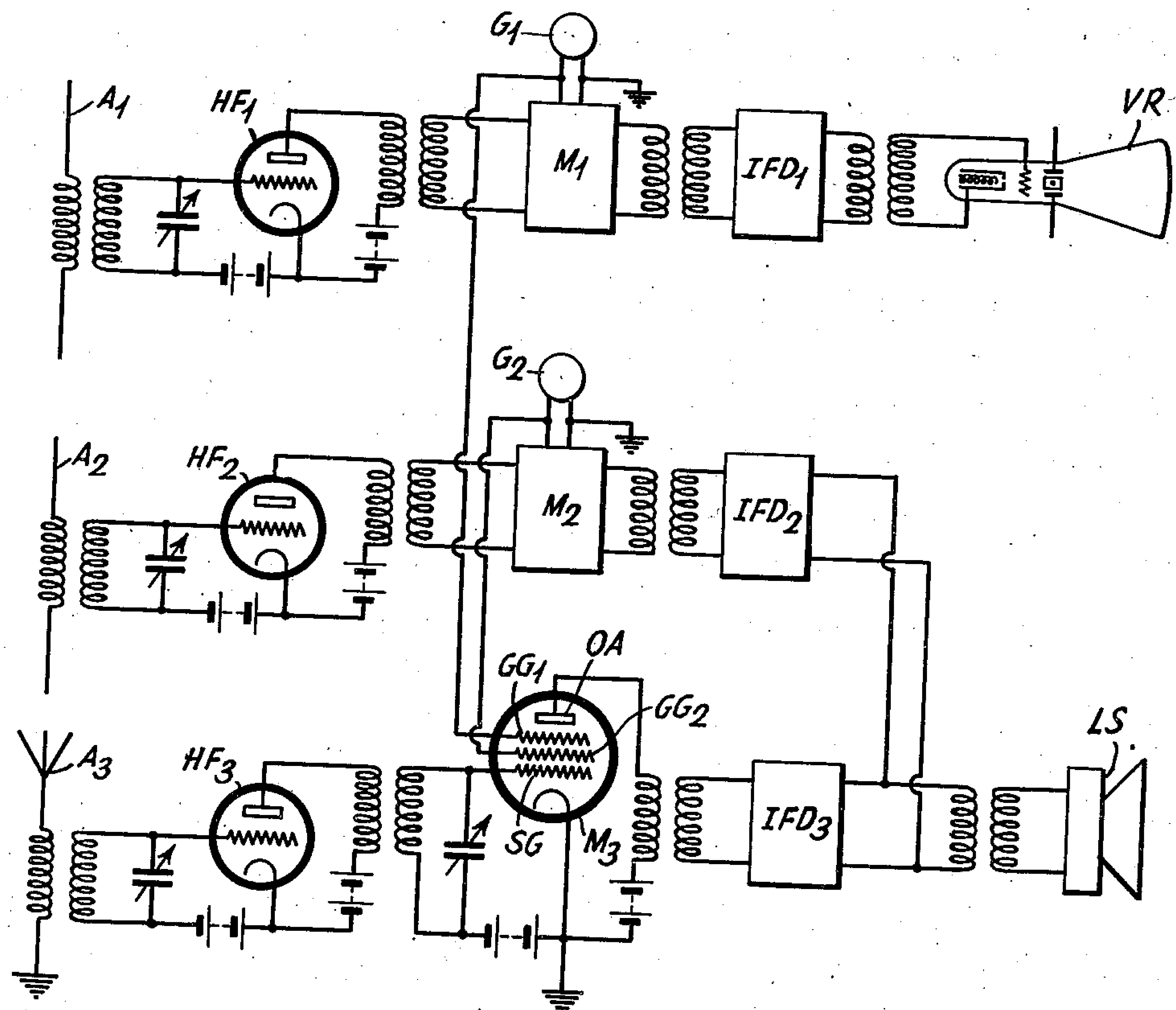
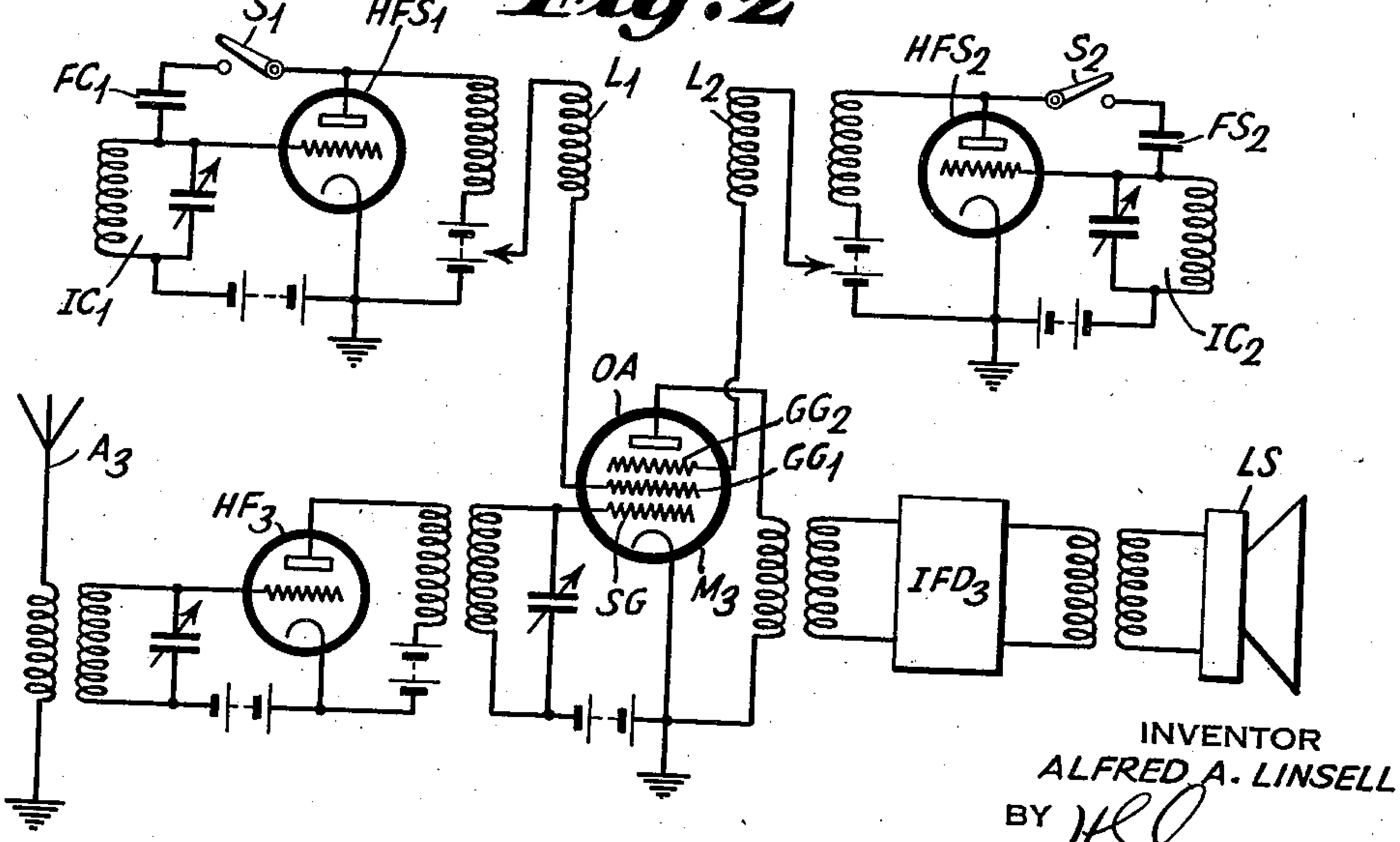


Fig. 2



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MODULATED CARRIER WAVE RECEIVING INSTALLATION

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2 Claims. (Cl. 250—20)

This invention relates to modulated carrier wave receiving installations and more particularly to superheterodyne receiving installations of the kind comprising apparatus enabling the simultaneous reception of programmes transmitted upon two short wave lengths and apparatus enabling the reception of a programme upon a relatively long wave length such as a wave length within one of the present so-called broadcast ranges.

According to the invention a superheterodyne receiving installation of the kind referred to is characterized in that superheterodyne action for reception upon a relatively long wave length is accomplished by employing as the local oscillator frequency therefor, a frequency obtained by beating together two oscillations derived from circuits in the apparatus for receiving the short wave lengths.

The primary, though not the exclusive, application of the invention is to radio receiving installations for receiving short wave television and accompanying sound programmes and ordinary broadcast sound programmes, and the invention will be particularly described with reference to its application to such a receiving installation.

It is proposed shortly to commence in England programme services of television and accompanying sound upon adjacent short wave lengths; it is probable that vision signals will be transmitted on a wave length of 6.6 metres and accompanying sound signals upon a wave length of 7.2 metres. These proposed services, are, of course, additional to the existing broadcast services.

The invention envisages the simplification of a superheterodyne receiving installation adapted to take advantage of these services by utilizing as the local oscillation for the broadcast part of the installation, a beat frequency derived by beating together two oscillations obtained from circuits in the portions of the receiving installation provided for the two short wave receptions.

In the accompanying drawing, Fig. 1 illustrates a preferred embodiment of the present invention wherein the energy generated by the oscillators of two short wave receivers is used to provide the local frequency for the broadcast frequency superheterodyne receiver; and,

Fig. 2 illustrates a modification of the invention where two amplifier tubes of the short wave receivers are used to generate the heterodyning frequency when broadcast reception is wanted.

Fig. 1 of the accompanying drawing illustrates diagrammatically one way of carrying out this invention, the receiving installation therein shown comprising what may be regarded as three superheterodyne receiving portions, two for the two short wave receptions, and the other for broadcast reception. Each of the short wave receiving portions comprises a dipole aerial A1 or A2 feeding into a high frequency stage HF1 or HF2 which in turn feeds into a mixing stage M1 or M2 to which a locally generated oscillation from a generator G1 or G2 is also applied, the mixing stage M1 or M2 being followed by an intermediate frequency stage which is in turn followed by a demodulating stage. The intermediate frequency and demodulating stages are represented by single rectangles IFD1 and IFD2 in each case. The demodulating stage of one short wave portion feeds directly or indirectly into a cathode ray tube or other vision reproducer VR and that of the other feeds directly or indirectly into a loudspeaker LS. The broadcast receiving portion of the installation comprises a receiving aerial A3 a high frequency stage HF3 followed by a mixing stage M3 to which is applied a locally generated oscillation the mixing stage being followed by an intermediate frequency stage in turn followed by a demodulating detector feeding directly or indirectly into the loudspeaker. The intermediate frequency and demodulating detector stages are represented by the rectangle IFD3.

In the preferred embodiment illustrated in Fig. 1 the local oscillations fed to the mixing stage in the broadcast portion of the installation is obtained by beating together two oscillations, one derived from the local oscillator G1 in one short wave receiving portion and the other derived from the local oscillator G2 in the other short wave receiving portion. The beating together may be accomplished before application to the broadcast mixing stage, but preferably it is accomplished in that stage itself. For example, as shown, the broadcast mixing stage may comprise a multi-grid valve M3 to the innermost grid SG of which are applied signal oscillations derived from the carrier frequency stage HF3 of the said broadcast receiving portion. There are at least two other grids GG1 and GG2, arranged in succession between the innermost grid of the said multi-grid valve M3 and the anode OA thereof and to one of these grids (GG1) are applied oscillations from the local oscillator (G1) of one short wave receiving portion while to the other (GG2) are applied oscillations from the local oscillator (G2) of the other short wave portion.

The invention is not limited to the deriving of the local oscillations for superheterodyne action in the broadcast portion of the receiver by beating together local oscillations from the local oscillators in the two short wave receiving portions, for, if desired, other carrier wave stages in the short wave receiving portions may be adapted to operate (when required) as oscillators for providing frequencies which are then beaten together. For example in the embodiment partly shown in Figure 2 two stages HFS1 and HFS2—one in each of the high frequency amplifier portions of the two short wave receiving portions (the remainder of these portions are not shown in Figure 2)—may be provided with means whereby said stages may be caused to act as oscillators when it is required to accomplish broadcast reception. To take the specific construction of this nature represented in Figure 2 in which each of the short wave receiving portions includes a high frequency amplifier valve HFS1 or HFS2 having a tuned input circuit IC1 or IC2 between its control grid and cathode, a feedback condenser FC1 or FS2 in series with a switch S1 or S2 is provided between the anode and the control grid of each of the said valves HFS1 or HFS2 so that when these switches are closed the two said valves operate as local oscillators to generate oscillations which are taken from the anode circuits of the two said valves and fed to the mixing valve M3 of the broadcast receiving portion of the installation. These oscillations may be taken to the said mixing valve in any convenient way, e. g., as shown by inductances L1, L2 coupled to the anode circuits in question and each of the local oscillations thus taken may be fed to a different grid in a multi-grid mixing valve after the manner of Figure 1. With this arrangement when the switches are closed the installation is adapted for broadcast reception but when the switches are open the installation is adapted for reception of the two short wave programmes.

In a further way (not illustrated) of carrying out the invention one of the local oscillators in the two short wave receiving portions is made to beat with an oscillation derived from what is normally a carrier amplifier stage in the other of the two short wave receiving portions the said carrier amplifier stage being changed over to operate for the time being as an oscillator.

One or both of the circuits from which the oscillators which are to be beaten together are taken, is or are made adjustable for the broadcast wave ranges and the arrangement is preferably made such that when the main tuning control handle of the installation as a whole is moved to a position marked "television" or is moved until it comes up against a stop, the whole installation is adapted for reception upon the two predetermined short wave lengths. The various circuits are, of course, pre-set or pre-adjusted by the manufacturer of the installation, so that when the said main tuning control handle is moved to the said "television" mark, or against the said stop, television and accompanying sound reception will be effected on the two predetermined wave lengths and the operator of the installation will have no need to perform any tuning operation (for short wave television and accompanying sound reception) other, of course, than that involved in moving the tuning control to the said mark or stop. The range of movement of the tuning control handle away from this mark or stop provides the tuning range or ranges for broadcast reception.

I claim:

1. In a radio receiving installation a first receiver circuit including an electronic tube circuit normally operating as an amplifier, a second receiver circuit operating on the superheterodyne principle and including a combining tube and means including a switching device for altering the characteristics of said amplifier tube circuit and cause the same to operate as an oscillator and to couple the same to said combining tube to supply said second receiver circuit with local oscillations.

2. In a superheterodyne receiver, a mixer tube having an anode, a cathode and at least three grid electrodes, a source of signal frequency energy, means for impressing signal energy from said source on one of said grid electrodes, a first source of local oscillations and a second source of local oscillations, means for impressing oscillations from said first source on one of the other grid electrodes and oscillations from the second source on still the other of said grid electrodes, an intermediate frequency amplifier, and means for coupling said amplifier between the anode and cathode of said tube.

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