March 3, 1931. B. WASHINGTON ET AL 1,794,935

REMOTE CONTROLLED RADIORECEIVER

Filed April 30, 1927 2 Sheets-Sheet 1

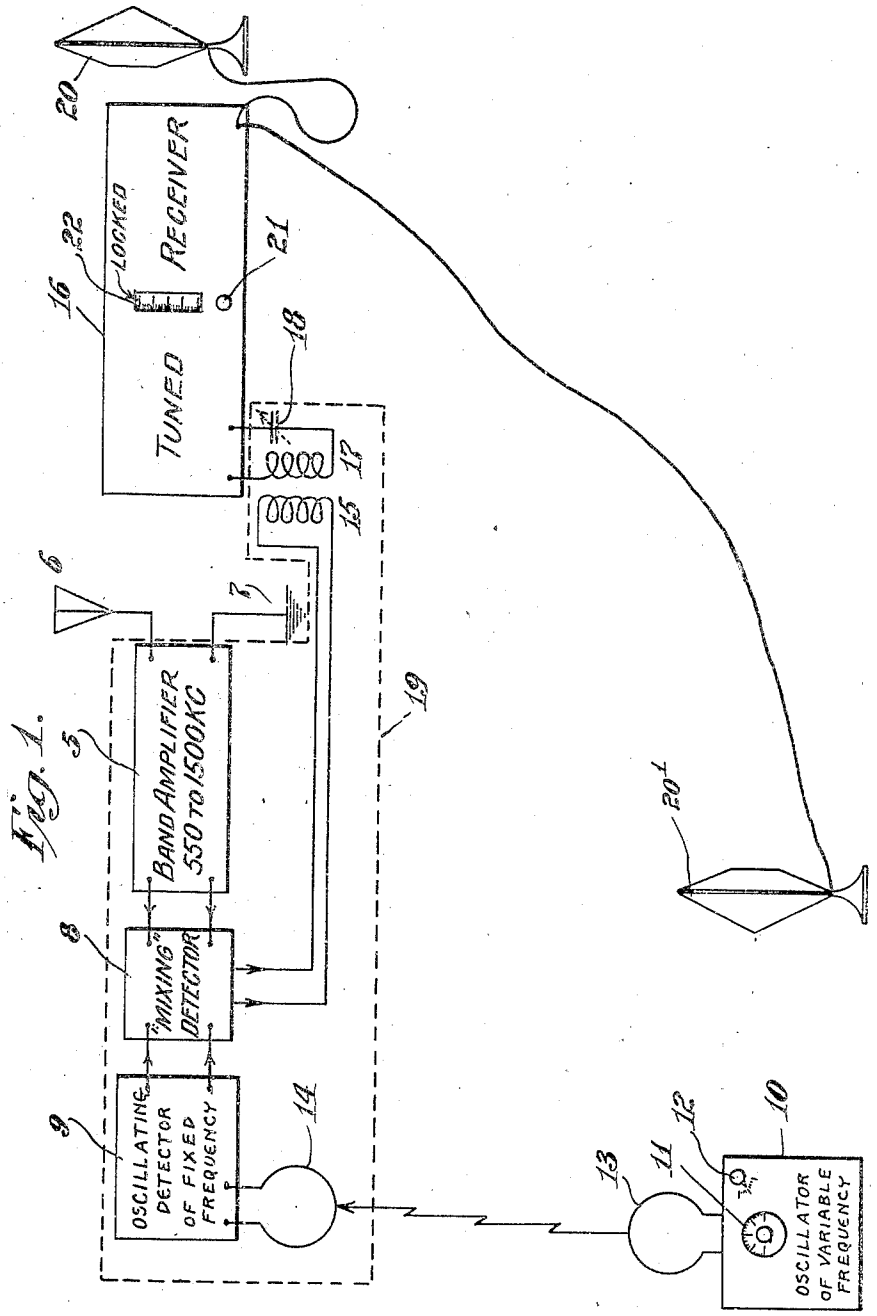


Fig. 1.

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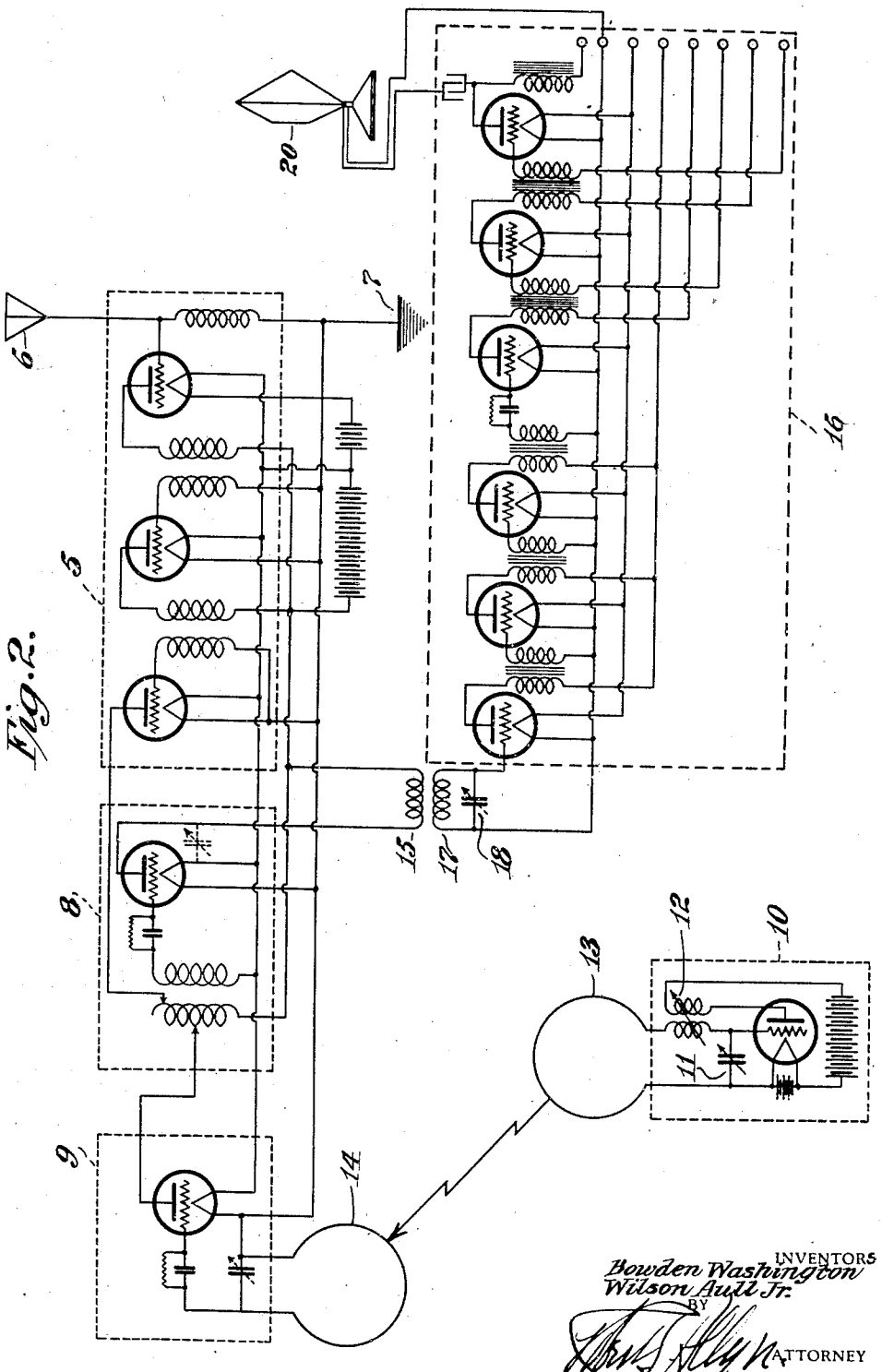


Fig. 2.

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UNITED STATES PATENT OFFICE

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REMOTE-CONTROLLED RADIORECEIVER

Application filed April 30, 1927. Serial No. 187,879.

One object of our invention is to produce a receiver whose frequency response and/or intensity of output may be controlled from a distance by a small, light and preferably self-contained portable control unit.

Another object is to produce a system by which one may remote control the output volume or received frequency of any modern receiver regardless of its normal range of frequencies.

By means of our system, we collect and amplify all incoming signals, within the desired frequency band, a substantially equal amount. The output of this band amplifier device used for the above purpose is associated with the input of a "mixing detector". The input of said mixing detector is also associated with the output of a fixed oscillating detector which is resonant to and oscillates at preferably a high frequency such as 30,000 k. c. or some frequency preferably above or below the band of frequencies it is desired to receive.

Loosely coupled to this fixed oscillating detector is a portable control oscillator of which both the output power and frequency are variable. This control oscillator may have a comparatively large fixed capacity and a comparatively small variable capacity so that the range of its difference in frequency with the fixed oscillating detector may be approximately the frequency band it is desired to receive. Therefor, by the adjustment of the frequency of the control unit the beat frequency output of the fixed oscillating detector may be adjusted with the output of the band amplifier and the output of said detector can be brought at all times to any desired fixed frequency. This output may be associated with the input of any ordinary modern radio receiver adjusted to a frequency within its band or to a receiver having a proper fixed frequency.

Referring to the drawings, Fig. 1 diagrammatically shows one embodiment of our invention.

Fig. 2 shows one form of schematic wiring diagram for one form of our invention.

In Fig. 1 the band pass amplifier 5 may have a loop or a suitable antenna 6 and ground 7 connected in any well known manner. This band amplifier may be capable of amplifying substantially uniformly either the usual present broadcast band of 550 to 1500 kilocycles or any other band of reception desired.

The output of this amplifier 5 is introduced into the grid circuit of the mixing detector 8 as is also the plate output of the fixed oscillating detector 9.

The output of the control oscillator 10 whose frequency may be adjusted by the control 11 and whose power may be adjusted by the control 12 in any usual manner is coupled by suitable coupling means such as the loop 13 to the pick-up 14 of the oscillating detector 9. It then produces beats with the fixed oscillating detector 9 at a suitable frequency so that in conjunction with the output of the band-pass amplifier 5 a frequency is produced in the coupling device 15 to which the receiver 16 is tuned. The secondary 17 of the coupler and its condenser 18 will be connected to the usual input terminals of the receiver 16. This coupling device 15 is associated with the out-put of the mixing detector 8. The receiver 16 may be almost any broadcast receiver tuned to a given wave length and locked or fixed, or may be any suitable radio receiver, either short wave or long wave tuned or designed to respond to a given frequency.

In other words, by means of mixing detector 8, the fixed oscillating detector 9 and the control oscillator 10 almost any modern receiver may be converted into a remote-controlled and single control receiver operating over any desired band of wave lengths. For instance if the reception at a frequency of 1,000 k. c. is desired and the receiver 16 is set to 530 k. c., the frequency delivered to 8 from 9 should be 470 k. c. If 9 is fixed at say 30,000 k. c., then 10 will be adjusted to 30,470 k. c. producing with 9 a beat of 470 k. c. which with the incoming 1,000 k. c. produces 530 k. c. which is resonant with the receiver 16.

It should, of course, be understood that the transmission from the control oscillator 10 to the fixed oscillating detector 9 may be at almost any desired frequency and it should also be understood that the frequency range

of the receiver 16 may also be that of any normal frequency band receiver.

The coupling means 13 and 14 may be placed within or without the cabinets and if loops may preferably have their axes in a vertical plane so as to prevent radiation polarized in the direction normally used for the transmission of radio signals.

In Fig. 2 we have shown more or less typical circuits for the various parts of the system or apparatus. It will be understood that such systems may employ the usual so-called vacuum tubes for detection, amplification and oscillation and that any number of stages of radio and/or audio frequency amplification may be used.

The apparatus may be assembled and sold in various combinations. For instance, the band amplifier 5, mixing detector 8 and fixed oscillating detector 9 and the coupler 15 may all be made and sold as a unit 19 for association with an ordinary broadcast receiver 16 and the loud speaker 20.

The receiver will, of course, have a suitable switch 21 for turning its filaments on or off as desired. The drum 22 is merely typical of any suitable control or controls of modern broadcast receivers. The control oscillator 10 will ordinarily be built and sold as a separate unit.

If desired the entire combination of elements 5, 8, 9 and 16 may be made and sold as a unit in which event of course it would not be necessary to provide any adjustable tuning element in the receiver part 16.

By this method of reception it is possible to provide a simple compact apparatus for remote and for single control of multiple stage amplification either combined with or physically separate from the detector and amplification elements of the system.

In some cases it may be advantageous to incorporate the control unit in the same cabinet with the other elements of the system.

The sound reproducer or loud speaker may be of any type and located either near the receiver as at 20 or near the control unit as at 20′, or both, or in any other desired locality or it may be incorporated with the receiver or with the control unit if desired.

We claim:

1. The method of selecting and reproducing signals which comprises simultaneously receiving and amplifying a number of signals within a predetermined range of frequencies, producing two different oscillations one at a certain fixed frequency and the other at a controllable frequency outside the said range of received frequencies, causing said two frequencies to interact in a common circuit and thereby producing a controllable beat frequency, mixing said beat frequency with the desired amplified signal frequency to produce a certain predetermined radio frequency and then redetecting and amplifying said predetermined frequency.

2. The combination of a radio frequency band pass amplifier for simultaneously receiving signals of various frequencies, an oscillating detector having means for providing oscillations at a certain predetermined frequency, a controllable oscillator unit for producing a control frequency, a transmission system for conveying this control frequency to said oscillating detector, means for combining the control frequency and the predetermined frequency to produce a beat frequency, a mixing detector connected to receive the output of the band pass amplifier and the beat frequency from the oscillating detector to produce a certain desired fixed frequency and a reproducer unit having a tuned radio frequency input coupled to the output of the mixing detector, said controllable oscillator unit being separate and portable independently of the other elements.

3. The combination of a radio frequency band amplifier for simultaneously receiving signals of various frequencies, an oscillating detector for providing oscillations at a predetermined frequency, a separate portable controllable oscillator unit having a radiating device to transfer a portion of its oscillatory energy to said oscillating detector, an absorbing device at said oscillating detector to absorb a portion of the control oscillatory energy for producing with the fixed oscillation, a beat frequency of controllable amplitude and frequency, a mixing detector connected to receive the output of the band pass amplifier and the beat frequency from the fixed oscillating detector and produce a desired fixed frequency and a reproducer remote from the portable control oscillator unit and having a tuned radio frequency input coupled to the output of said mixing detector.

4. Radio receiving apparatus comprising three units, viz., a receiver unit, an amplifier-heterodyne unit and a separately portable control unit, said receiver unit comprising a tuned radio frequency input circuit, a demodulator and an audio-frequency system, said amplifier-heterodyne unit comprising signal pick-up means, a radio frequency band amplifier for simultaneously receiving signals throughout a predetermined range of broadcast frequencies, a non-oscillating demodulator whose input is connected to the output of the band amplifier, an oscillating demodulator of fixed frequency whose beat note output is connected to the input of said non-oscillating demodulator, said independently portable control unit comprising an oscillator variable as to its frequency and energy amplitude, the portable control and amplifier-heterodyne units adapted to coact with one another and with the incoming sig-

nal oscillations to produce in the output of the non-oscillating demodulator a fixed and predetermined frequency, and the receiver unit coupled and tuned to accept the beat note output of the non-oscillating demodulator.

5. A radio receiving system for household use comprising a band amplifier having pick-up means, an oscillating detector of predetermined frequency including demodulating means, a mixing detector connected to said oscillating detector and to said band amplifier, a radio amplifying system connected to the output of the mixing detector, a demodulating detector connected to the output of the radio amplifying system, an audio amplifying system connected to the output of the demodulating detector and a portable control unit comprising an oscillator of variable frequency and energy amplitude and transmission and reception means connected respectively to the output of the control unit and the input of the oscillating detector of predetermined frequency, said elements having characteristics such that a portion of the output of said portable control unit will be transferred to said oscillating detector and coact with the oscillating energy thereof to produce a certain frequency, which certain frequency will be transferred to the mixing detector and therein will coact with the amplified incoming signal frequency to produce a predetermined frequency, which latter frequency will be transferred to said radio amplifying system, will be amplified therein, will be demodulated by said demodulating detector and the resultant signal bearing audio frequencies will be amplified by said audio amplifying system.

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