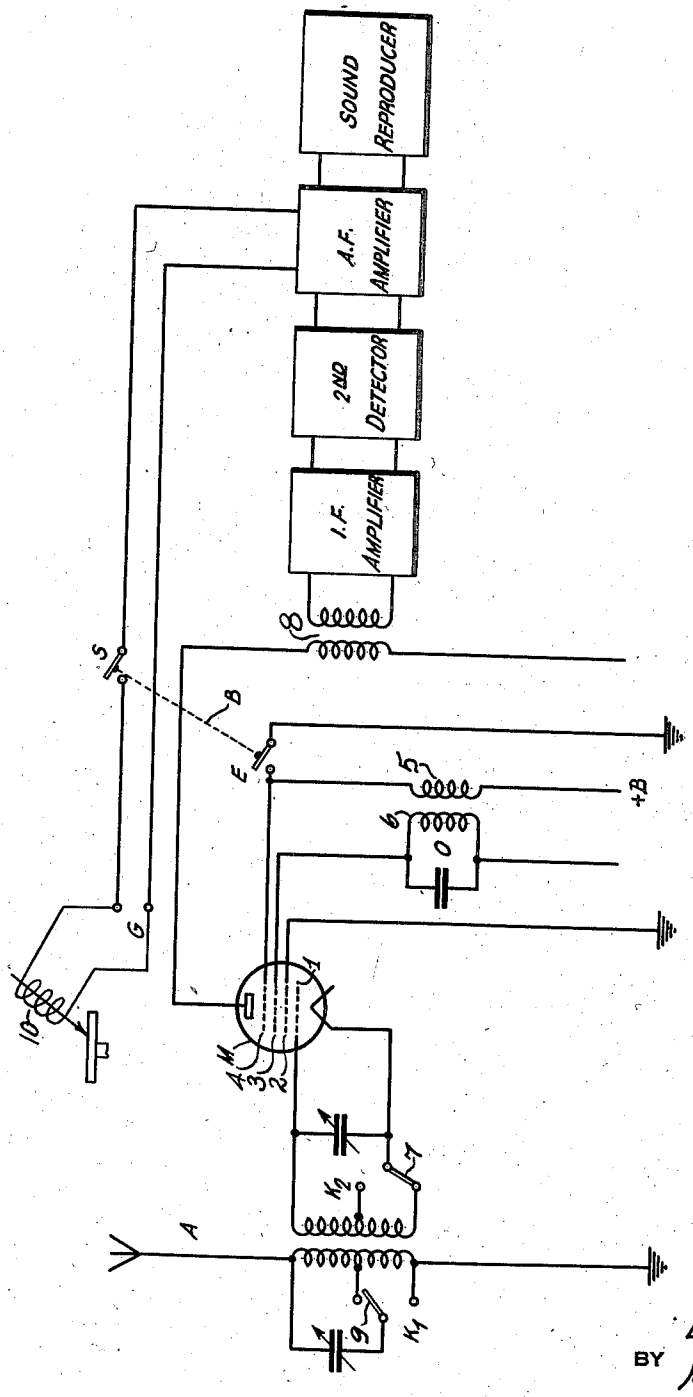
May 25, 1937. E. KLOTZ 2,081,277

RADIO RECEIVER

Filed May 7, 1934




INVENTOR
ERNST KLOTZ
BY
ATTORNEY

Patented May 25, 1937 2,081,277

# UNITED STATES PATENT OFFICE

2,081,277

## RADIO RECEIVER

Ernst Klotz, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie, m. b. H., Berlin, Germany, a corporation of Germany

Application May 7, 1934, Serial No. 724,261
In Germany May 11, 1933

2 Claims. (Cl. 179—100.11)

This invention relates to radio receiver sets with intermediate frequency amplification useful for phonograph record reproduction. The object of the invention is to provide a broadcast receiver which may be employed at will for broadcast reception and for the reproduction of phonograph records, and which operates upon the principle of heterodyne reception.

It is known in the prior art to provide ways and means whereby the radio frequency amplifier tubes used during actual broadcast reception are rendered non-responsive and non-operative when changing the set to the reproduction of phonograph records in order to make conditions such that, especially during the playing of low passages on a phonograph record, the effect of signals coming in from powerful sending stations upon the reproducer may be avoided.

According to this invention a heterodyne receiver set is so designed that when changing it over to phonograph record reproduction, the regenerative means of the local heterodyne oscillator are rendered inoperative. Furthermore, in order to preclude all chances of any possible existent powerful transmitter whose sending wave is close to the intermediate frequency wave, from being received and being further amplified in the intermediate frequency cascade, it is also advisable to detune the input circuits at the same time the local oscillator circuit is changed. This may be accomplished by tuning part of the input circuit to short wave reception and another part to long wave reception.

One exemplified embodiment of the invention is illustrated in the drawing. Referring to the drawing, A denotes the antenna. The latter is in coupling relation with the input circuit of a so-called hexode (i. e. amplifier equipped with four grid electrodes). Upon the grid 1 closest to the cathode is impressed the input potential. The second grid 2 acts as a screen grid. The third grid 3 serves for the generation of the heterodyne frequency, and is connected to an oscillation circuit —O— tuned to the heterodyne frequency. In the external circuit of the fourth grid 4 is included the regeneration or tickler coil 5 coupled with the coil 6 of the tuned circuit —O—. The plate circuit is coupled with the intermediate frequency amplifier cascade by the transformer 8. According to this invention, by the aid of the ground switch E the fourth grid which contains the tickler coil in its external circuit, is grounded and in this manner the mixer tube M is prevented from oscillating so that heterodyning of the incoming waves and thus conversion into the intermediate frequency may not be brought about. It will be seen that when grid 4 is grounded, its potential remains constant and therefore no variable current flows through coil 5 to cause circuit O to oscillate, the oscillator portion of the tube no longer functioning to produce the local oscillation frequency. However, in this condition the tube may still act as a triode amplifier to amplify currents of the intermediate frequency which may be received on the antenna and impressed on grid 1, the steady potentials of grids 3 and 4 not destroying the amplifying properties of the tube.

Moreover, the input circuits K—1 and K—2 which are to be tuned to the incoming waves by the variable condensers shown and which are designed so as to be changed to short-wave and long-wave reception as by the switches 7 and 9, are arranged for different wave length ranges in order that the action of powerful transmitters whose wave is, for instance, close to that of the intermediate frequency, may be avoided.

The socket G for plugging in the electric pick-up 10 is united by means of a switch S with the input circuit of the first audio frequency tube (not shown). The switches S and E are mechanically interconnected by positively acting means indicated diagrammatically by the dotted line B. It will be understood that when the switch S is closed for phonograph reproduction, one of the switches, such as 7 of the grid circuit, will be closed in its lower position to tune this circuit within the long wave band while at the same time the switch 9 will also be closed in its upper position to tune the coil of the antenna circuit to a frequency within the short wave band. Under these conditions these two circuits act very effectively as a filter to prevent any currents which may be picked up by the antenna from a station transmitting on the intermediate frequency from being transmitted to the grid 1 and amplified by tube M and the intermediate frequency amplifier and thus interfering with the phonograph reproduction.

The tubes following the first intermediate frequency have been omitted because they are here unimportant.

What I claim is:

1. A radio phonograph device comprising in combination, the cascade connection of a first detector tube, an intermediate frequency amplifier, a second detector, an audio frequency amplifier and a sound reproducer, said first detector tube having a grid-cathode circuit including a tuning means and a switching device arranged

to cause said tuning means to tune said circuit to either a long wave band or a short wave band, an input circuit coupled to said grid-cathode circuit and including a second tuning means and a second switching device arranged to cause said second tuning means to tune said input circuit to either a long wave band or a short wave band, means for modulating the current within said detector tube at a local oscillation frequency, means for rendering said modulating means inoperative while one of said switching devices is adjusted for reception within the long wave band and the other of said switching devices is adjusted for reception within the short wave band, a phonograph pickup and a circuit including a switching device connecting said pickup to said audio frequency amplifier.

2. The combination defined in the preceding claim in which the means for modulating the detector tube current at the local oscillation frequency includes two additional grids within said tube, a circuit tuned to the local oscillation frequency connected to the first of said grids, a circuit connected to the second of said grids including a feedback connection to said last named circuit and means arranged to ground said second grid to thereby render said modulating means inoperative.

ERNST KLOTZ.