Oct. 16, 1934. H. RODER 1,977,595

KEYING CIRCUIT

Filed Sept. 10, 1930

Fig. 1

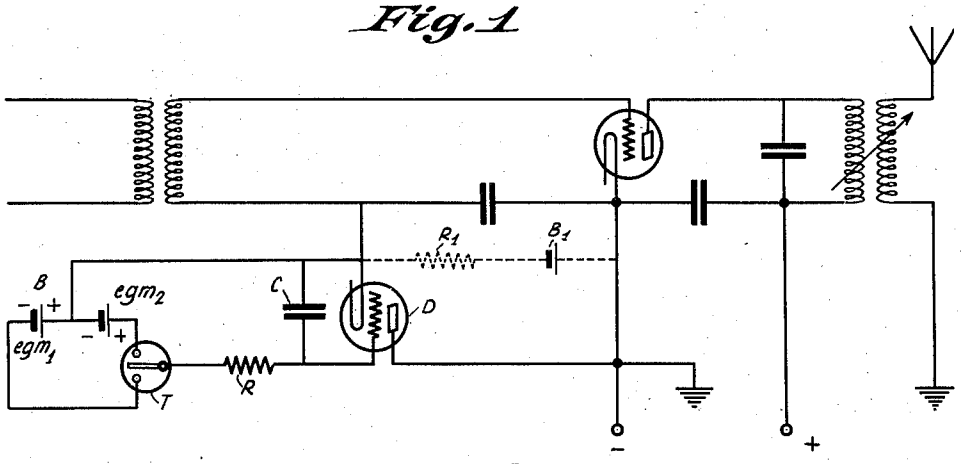


Fig. 2

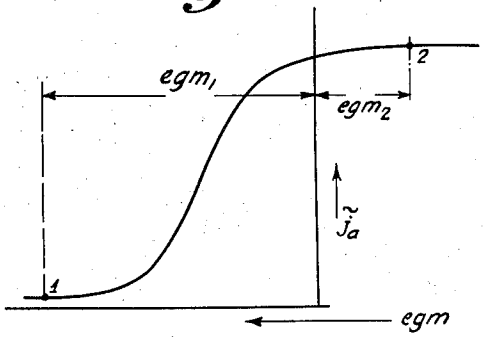
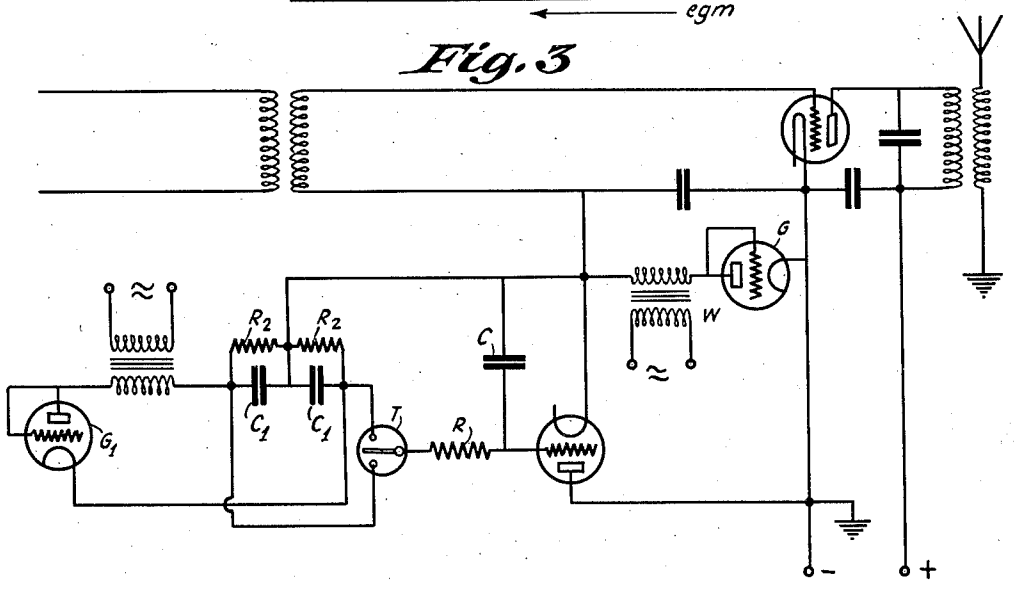


Fig. 3



INVENTOR
HANS RODER
BY
ATTORNEY

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KEYING CIRCUIT

Hans Roder, Scotia, N. Y., assignor to Telefunken Gesellschaft fur Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

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9 Claims. (Cl. 250—8)

When a receiver equipment is mounted in the neighborhood of a transmitter, the operation of the former is disturbed to a more or less serious degree by the transmitter. In each signal sent off from the transmitter the rise and fall of the signal is audible in the receiver in the form of a crackling noise known as clicks or key shocks. If the transmitter and the receiver are mounted in the same room, and if the transmitter and the receiver antennae are arranged at close proximity or even where one is disposed above or below the other, then reception becomes practically impossible as long as the transmitter is working. An attempt to eliminate these clicks by radio frequency stoppers in the receiver is unsuccessful since the rapid initial stage of the oscillation contains a practically continuous frequency spectrum or band. Hence, ways and means must be found for the transmitter which are adapted to limit this frequency band. This end can be realized by that the sharp edges of the key signals are, as it were, "ground off".

The present invention discloses ways and means in connection with tube transmitter equipment in which the keying in the grid direct current circuit is effected by the interruption of the grid direct current by means of a triode tube.

In the drawing throughout which like reference numerals indicate like parts;

Fig. 1 shows an embodiment of the invention

Fig. 2 shows a characteristic curve while;

Fig. 3 shows a modification of Fig. 1.

Referring to the drawing, Fig. 1 shows a circuit scheme adapted therefor. For the interruption of the grid direct current recourse is had in well-known manner to a triode tube D, key T controlling the grid potential of this tube. The key relay therefore works in this arrangement with low potentials and practically no current. The inter-relationship between grid potential e_{gm} and the antenna current J_a is shown in Fig. 2. The grid potential is varied alternately between the values e_{gm1} and e_{gm2}, in other words, the tube D is overmodulated.

Between the grid battery B and the grid of the tube D is inserted a filter chain R and C adapted to retard the change from e_{gm1} to e_{gm2}, and vice versa. In parallel relation to tube D a battery B_1 may be connected by way of a high-ohm resistance R_1 in order that the oscillator tube may be completely blocked during spacing periods. As shown in the modification illustrated in Fig. 3 a rectifier G could be used instead of R_1 and B_1, said rectifier being fed from an audio frequency alternating current source W. Also the battery B of Fig. 1 could be replaced by a rectifier G_1, as shown in Fig. 3, which rectifier is fed with audio frequency energy. The compensating or equalizing condensers C_1 of this rectifier are shunted by high-ohm resistances R_2 whereby the voltage distribution across the condensers is maintained.

Having thus described my invention, I claim:

1. In signalling apparatus the combination with a thermionic oscillation repeater having a control grid electrode and a cathode of a keying circuit including key shock preventing means comprising, a thermionic tube having its anode connected to the cathode of said thermionic oscillation repeater and its cathode connected to the control grid of said thermionic oscillation repeater, a capacity connected directly between the anode and cathode of said thermionic tube, a capacity connected directly between the control grid electrode and cathode of said thermionic tube, a key, a resistance connecting said key to the control grid electrode of said last named tube, a resistance, a source of potential comprising a rectifier having its input electrodes connected with a source of alternating current and its output electrodes connected with the terminals of said resistance, a connection between a point intermediate the terminals of said resistance and the cathode of said thermionic tube, and a contact connected with each terminal of said resistance, said contacts being associated with said key so that potentials of unlike polarity may be applied to the control grid electrode of said last named thermionic tube.

2. An arrangement as claimed in claim 1 in which series capacities are connected in parallel with said resistance, and in which an additional rectifier has one of its output terminals connected to the cathode of said thermionic tube, the other of its output electrodes connected to the anode of said thermionic tube, and its input electrodes connected with a source of alternating current.

3. In combination with a radio frequency amplifier tube having input and output circuits, a thermionic tube having its anode to cathode impedance in series with one of said circuits for modulating the currents in said circuit at signal frequency, a source of signal potentials connected with the input of said second named thermionic tube, and means in said connection for introducing a time lag in said signal potentials, whereby the modulating currents do not rise or fall abruptly.

4. In combination with a radio frequency re-

peater tube, a source of modulating potentials, a thermionic tube having input and output electrodes, a circuit connecting the output electrodes of said thermionic tube in series with the input electrodes of said repeater tube, a circuit connecting the input electrodes of said thermionic tube to said source of modulating potentials to modulate the radio frequency currents in said repeater tube at signal frequency, and a filter circuit interposed in said last named circuit between said thermionic tube and said source for introducing a time lag in said modulating action.

5. Signalling means comprising a thermionic multi-electrode tube adapted to relay high frequency oscillations, means for modulating said oscillations at signal frequency comprising a second thermionic tube having its output electrodes in series with the impedance between two of the electrodes in said first named tube, keying means adapted to be associated with the input circuit of said second tube, and means for preventing abrupt rise and fall of keying current in said tubes including a filter circuit interposed between said keying means and said second thermionic tube.

6. Signalling means comprising a thermionic tube adapted to relay high frequency oscillations, means for modulating said oscillations at signal frequency comprising a second thermionic tube having its output circuit in series with the impedance between two of the electrodes in said first named tube, means for rendering said second named tube conducting or non-conducting at signal frequency, and a time lag circuit operatively interposed between said last named means and said second named thermionic tube.

7. Signalling apparatus comprising a thermionic radio frequency relay, a modulation potential amplifier tube having input electrodes, said tube also having output electrodes connected with said radio frequency relay, a circuit including keying means for keying said modulation potenital amplifier tube at signal frequency, said circuit being connected to the input electrodes of said modulation potential amplifier tube, and means for preventing key clicks in said tubes including a filter circuit interposed in said circuit between said keying means and the input electrodes of said modulation potential amplifier tube.

8. In combination with a high frequency thermionic relay tube having a plurality of electrodes and a thermionic modulating tube, a circuit for connecting the internal impedance of said modulator tube in series with the impedance between two electrodes in said relay tube, said impedances each being connected in parallel with a source of potential, a keying circuit connected with the input electrodes of said modulator tube, and a filter network comprising series resistance and parallel capacity interposed between said keying circuit and the input electrodes of said modulator tube.

9. Signalling means comprising, a thermionic repeater tube having input electrodes which may be energized by alternating currents, means for keying said tube comprising an additional thermionic tube having input and output electrodes, a circuit connecting the output electrodes of said additional tube in series with the input electrodes of said first named tube, a key and a source of potential, a circuit connecting said key and source of potential to the input electrodes of said additional tube, and means for preventing shocks in said circuit when said key is manipulated comprising, a filter including a capacity and a resistance in said circuit connecting said key and source of potential to the input electrodes of said additional thermionic tube.

HANS RODER.