Aug. 30, 1932. W. BUSCHBECK 1,874,891

KEYING CIRCUIT ARRANGEMENT FOR TRANSMITTERS

Filed Aug. 24, 1929

Fig. 1

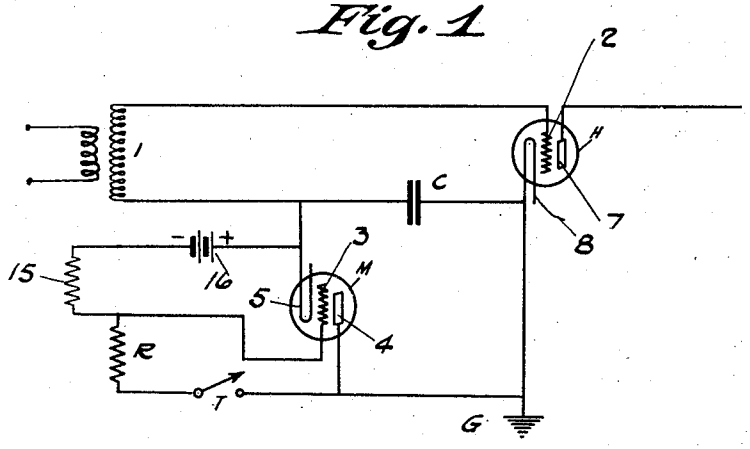
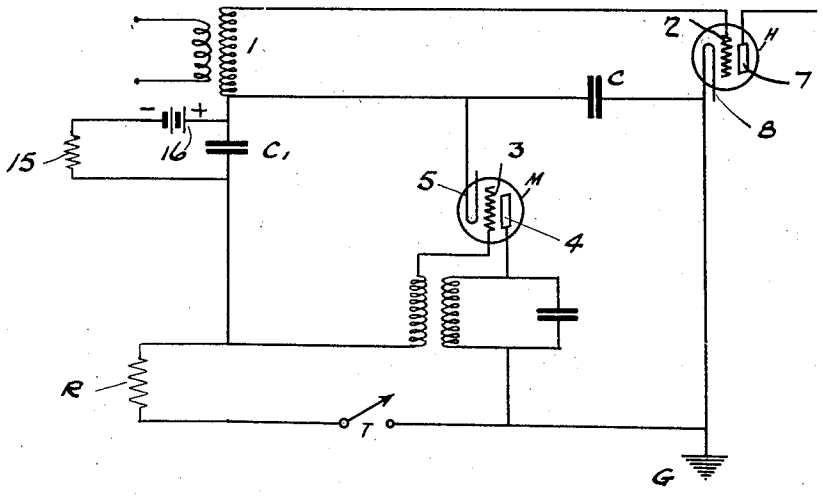


Fig. 2



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KEYING CIRCUIT ARRANGEMENT FOR TRANSMITTERS

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Application for this invention was filed in Germany, June 30, 1928.

This invention relates to transmitters and in particular to a novel keying means for transmitters of thermionic type.

In transmitters of average and larger power, the energy to be handled by the keying relay is so large that operation with standard telegraph relays is no longer possible. Since for reasons of high working speed and of cost it is not desirable to use large relays and large "strokes," the keying arrangement heretofore used in connection with transmitter tubes is of a kind in which the tubes were connected for grid modulation. The grid of these tubes was rendered so markedly negative by means of a potential applied through a high resistance that the tube would be blocked. The key was disposed between the grid and the filament of the modulator tube.

In these schemes, the relay, in the first place, had the full grid direct current potential to ground (crest value of grid alternating current potential of the pilot tube, or even more when a biasing potential was employed). In the second place, the internal resistance of the modulator tubes, when grid and filament are united, is rather high, so that, to insure the desired direct current grid resistance, it was mostly necessary to provide a larger number of paralleled tubes.

The primary object of this invention is to provide a novel keying system which will overcome the above defects.

Numerous other objects and advantages of my novel arrangement will be had from the specification and therefrom when read in connection with the attached drawing in which Figures 1 and 2 each show different modifications of the novel keying system as applied to a transmitter.

The circuit arrangement herein disclosed involves a transmitter relay tube H which has a high frequency input circuit 1 on which oscillations to be modulated are impressed. Keying or modulating of the high frequency oscillations is accomplished through a keying tube M in the direct current input circuit of H as shown. The arrangement of the present invention differs from the scheme shown in the prior art the key T is inserted between the grid 3 and the plate 4 of the modulator or keying tube M as shown rather than between the grid and the filament of the said tube. The key T may be either direct between the plate 4 and grid 3 of M or else through a resistance R as shown. When key T is in opened position, the keying tube M is blocked. When T is closed, the grid 3 of M assumes a positive biasing potential with relation to its filament 5. The value of said biasing potential is governed by the value of the resistance R_1 connected in series with the key. In some cases the grid 3 may have a maximum value equalling that of the plate potential. Under this condition, the tube naturally has a far lower internal resistance, and as a consequence, a smaller number of keying tubes M will suffice. Another advantage of the present arrangement is that the keying relay is grounded as shown. This feature is desirable in case of re-adjustment of the circuit elements during operation. Even in case of a direct short-circuit of grid 3 and plate 4 of M, only a small portion of the entire grid direct current necessary to key H will flow by way of the key T. In this manner large powers can be handled with a small sized keying relay. The oscillations modulated as set forth above appear on the output electrodes 7 and 8 of H and may be utilized in any known manner.

The same keying circuit is suitable also for indicating modulated continuous wave transmission. This is accomplished by the use of an oscillating modulator or keying tube M of Figure 2. Here, as in the prior figure, the grid direct current resistance R of the oscillating modulator or keying tube is connected at the plate 4 of the modulator tube instead of at the filament according to former practice. In practice the said resistance R must be chosen so high that the grid direct current flowing through it will compensate the plate potential. Oscillation of tube M and the associated circuits is insured by the coupling between the tuned plate circuit 10 and the inductance 11 in the grid circuit when the key T is closed. Closing of the

key T decreases the negative potential on the grid 3 of the tube M and renders said tube more conductive. This results in a large amount of rectified direct current flowing in the grid circuit of the tube H to pass between the cathode and plate of tube M. This direct current flowing in this circuit raises the positive potential on the plate. This positive potential is transmitted through the closed key T and resistance R to the grid of the tube M to overcome the negative potential applied thereto from the battery 16.

In both modifications biasing potential for the grid electrode 3 of tube M is supplied from a source 15 through a resistance 15. In both modifications the high frequency oscillations relayed in H are shunted around the keying circuits by a condenser C.

In Figure 2 the keying oscillations produced in M are passed around the battery 16 and resistance 15 by a condenser C_1.

I claim:

1. In a modulating means for an oscillation amplifier including, a thermionic tube having input and output elements, means for modulating the oscillations repeated in said amplifier including, a thermionic keying tube having anode cathode and grid electrodes, means for connecting the anode cathode impedance of said keying tube in parallel with the impedance between the input elements of said amplifier, an impedance and a source of potential connected in parallel with the input impedance of said keying tube, and a keying circuit including, a fixed impedance and a key connected in parallel with the impedance between the anode and grid electrode of said keying tube.

2. An arrangement, as claimed in claim 1, in which the circuit connected in parallel with the input elements of said keying tube includes an inductance and in which the keying circuit includes an inductance coupled to said first named inductance.

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