March 27, 1934. E. L. KOCH 1,952,924

STATIC KEYING DEVICE FOR RADIO TRANSMITTING CIRCUITS

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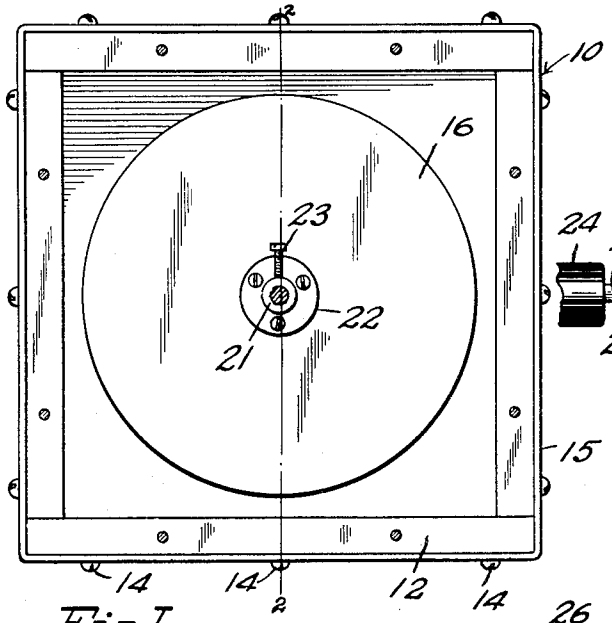


Fig. 1.

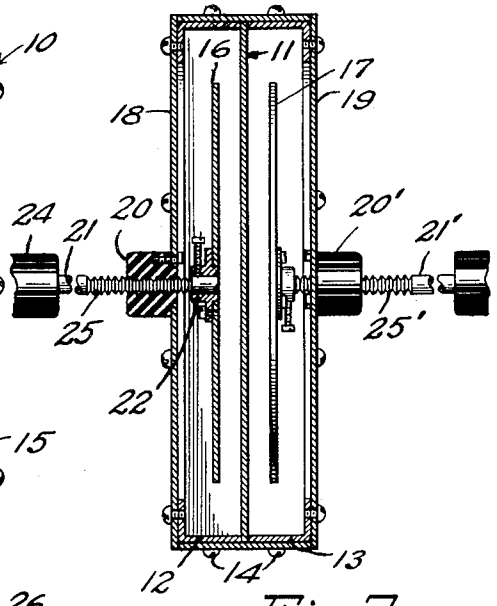


Fig. 2.

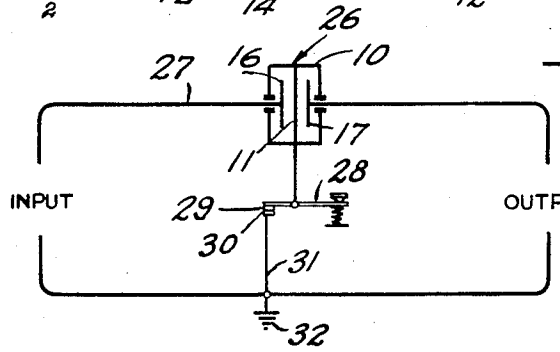


Fig. 3.

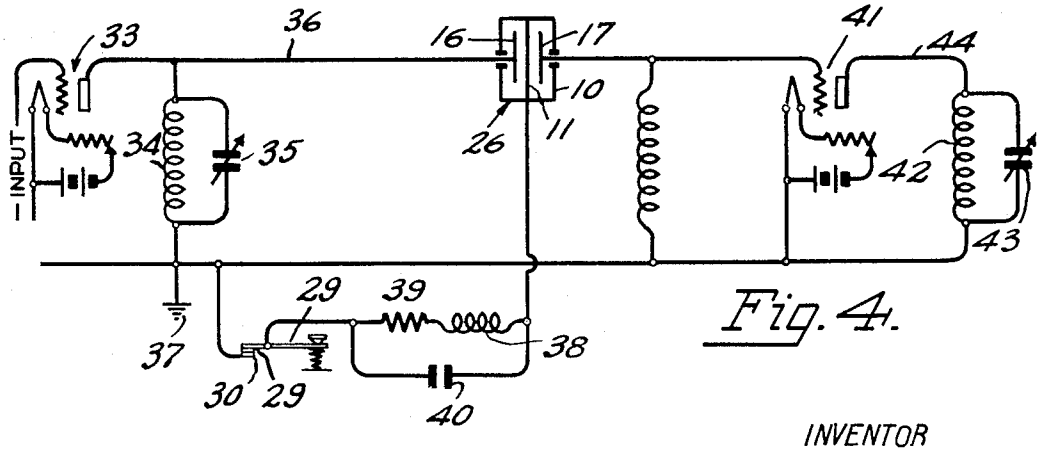


Fig. 4.

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STATIC KEYING DEVICE FOR RADIO TRANSMITTING CIRCUITS

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6 Claims. (Cl. 250—17)

This invention relates to improvements in static keying devices, and more particularly to such devices when used in connection with a high frequency amplifier system as used in radio transmitters.

An object of the invention is the provision of a device which permits the transmission of impulses of current to an antenna system without disturbing the constancy of the high frequency oscillations delivered to the amplifier system.

The keying of an amplifier by the usual keying means in the plate circuit of the amplifying stage at the input end of the amplifier system has a tendency to affect the frequency delivered which is detrimental to efficient operation, as it is most desirable to maintain the frequency constant.

To provide for a more efficient operation and for maintaining the frequency constant, the present invention comprises a keying device including a stationary plate in association with a pair of adjustable plates which are positioned in spaced relation to the stationary plate to form in effect a condenser, the plates positioned relative to the stationary plate being adjustable to vary the air gap between the plates.

An object of the invention is the application of the keying device to an amplifier system wherein the keying device is serially connected between the input end and the output end of an amplifier which normally by-passes the current delivered by the amplifier at the input end of the amplifier while the transmitting key is in its normal position to ground due to the condenser effect between one of the adjustable plates and the stationary plate, and to permit the flow of current to the output end of the amplifier due to the capacity existing between the plates of the keying device when the transmitting key is depressed.

Another object of the invention is the provision of a suitable balancing circuit associated with the keying device so that when the transmitting key is depressed to transmit impulses of current to the antenna system associated with the output end of the amplifier, the said balancing circuit provides means for maintaining the frequency constant and without disturbing load conditions.

The objects above, as well as others not particularly pointed out, will be more fully hereinafter described.

For a more complete understanding of the invention, reference may be had to the accompanying drawing in which like reference characters in the several views denote like parts, and in which:

Figure 1 is a view in elevation of the static keying device comprising this invention with one of the cover plates removed to clearly illustrate one of the adjustable plate members in association with the stationary plate;

Figure 2 is a sectional view along the line 2—2 of Figure 1;

Figure 3 is a simplified circuit, comprising input and output terminals with the static keying device operatively associated with the same; and

Figure 4 shows the static keying device operatively associated with a circuit arrangement including amplifying stages at the input and output ends.

The static keying device as illustrated comprises an adjustable condenser, the capacity of which may be varied by manually adjustable means in combination with a suitable keying device per se, such as the usual manually operated interrupter and the invention consists substantially in the construction, combination, location and relative arrangement of the parts or instrumentalities in combination with the circuits in which the said instrumentalities are used, all as will be more fully hereinafter set forth and as finally pointed out in the appended claims.

The static keying device may comprise a middle framework 10 of suitable shape to support a stationary plate 11 which may be positioned in the center of the framework as shown in Figures 1 and 2 and which is secured in position against movement by means of the angular strips 12 and 13 which may be secured by means of screws 14 to the side walls 15 of the frame. This structure forms in effect a rectangular box adapted to hold the adjustable circular discs or condenser plates 16, 17 which are rotatably supported by cover plates 18 and 19 secured to the box in any suitable manner, the plates 16 and 17 being insulated from the box.

In order to insulatedly support the plates 16 and 17 bushings 20, 20′ of insulating material are attached to the cover plates 18, 19 in any suitable manner and in these bushings are supported the adjusting rods 21, 21′. The movable plates 16, 17 and their associated adjusting rods are identical in construction and operation.

Each rod is secured to its associated plate by any suitable means such as the flange 22 and set screw 23. The outer end of each rod is provided with a knob 24 of insulating material and by turning these knobs the rods (which are in threaded engagement with the bushings 20, 20′) will cause the plates 16, 17 to rotate and thereby advance or recede from the center plate 11.

The foregoing device constitutes an adjustable coupling condenser having two movable plate members. Obviously these movable plates may be positioned on the same side of the fixed plate 11, or arranged in any suitable manner provided they are relatively adjustable and both adjustable in relation to the fixed plate member. Also, one of these plates may be fixed relative to 11 and only one movable plate used provided proper tuning of one side of the circuit is accomplished.

Having described in detail the structure and the arrangement of parts of the static keying de-

vice, its function and operation when associated with circuit arrangements illustrated in Figures 3 and 4 will now be described.

Referring to Figure 3, a simple circuit arrangement is shown provided with an input end for receiving a high frequency current supply and an output end which may be associated with a suitable antenna system. The static keying device or condenser is indicated as a whole by the numeral 26 and is illustrated diagrammatically and connected serially in the conductor 27 between the input and output ends of the circuit, and a key 28 provided with a pair of normally closed contacts 29 and 30 is bridged between the conductor 31 and the stationary plate 11 of the keying device 26 and ground 32.

With the key 28 in its normal position and its contacts 29 and 30 closed, a high frequency current impressed upon the input end of the circuit will be by-passed to ground 32 through the normally closed contacts 29, 30 of the key because of the capacity existing across the adjustable plate 16 and the stationary plate 11 of the keying device.

When the key 28 is depressed, the normally closed contacts 29 and 30 are opened to disconnect ground 32, which permits current to flow to the output end of the circuit due to the capacity existing between the respective adjustable plates 16 and 17 and the stationary plate 11.

Thus the opening and closing of the contacts 29, 30 of the key 28 will send impulses of current from the high frequency source at the "input" end to the "output" end of the circuit, Fig. 3.

In Figure 4, the input end of the circuit is associated with an amplifying stage comprising the usual audion tube 33 and a coupling device including an inductance 34 and variable condenser 35 connected in parallel between the conductor 36 and ground 37. The keying device 26 is connected serially in the conductor 36 with its stationary plate 11 connected to ground 37 through a tuned circuit arrangement, which includes an inductance 38, resistance 39 and condenser 40 in parallel, as shown, and the normally closed contacts 29 and 30 of a key 28. The output end of the circuit has associated with it an amplifying stage including the usual audion tube 41 and coupling arrangement including an inductance 42 and variable condenser 43 connected in parallel to the conductor 44 and ground 37.

With the key 28 in its normal position and its contacts 29, 30 closed, a high frequency current impressed upon the "input" end of the circuit will be amplified by the amplifying stage associated with the "input" end and by-passed to ground 37 through the tuned circuit including inductance 38, resistance 39 and condenser 40 and the normally closed contacts 29, 30 of the key due to the capacity existing across the adjustable plate 16 and the stationary plate 11 of the keying device 26.

When the key 28 is depressed, the normally closed contacts 29, 30 are opened to disconnect ground 37, thus permitting current to flow to the output end of the circuit (due to the capacity existing between the adjustable plates 16 and 17 and the plate 11) and be amplified by the stage of amplification associated with the "output" end.

Thus, the alternate opening and closing of the contacts 29, 30 of the key 28 will transmit impulses of current from the high frequency source at the "input" end of the circuit to the "output" end of the circuit, Fig. 4.

The impedance of tuned circuit associated with key 28 and which is connected to the stationary plate 11 of the keying device 26 is substantially equal to the input impedance of the audion tube 41 of the amplifier stage associated with the "output" end of the amplifier. This prevents the disturbing of load conditions of the high frequency generator associated with the amplifier circuit, and thus maintains the frequency constant during the operations of the transmitter key 28 which controls the impulses to the antenna system associated with the output end of the amplifier.

While manually operated keys are shown and described any form of transmitting device, sending key, relay or interrupter may be used in place thereof.

It will now be seen that the static coupling device 26 having a transmitting device of any suitable character such as the key 28 will, upon the operation of the key cause the circuit connected thereto to vary its operating characteristics without however adversely affecting the constant frequency so necessary in connection with radio transmitters.

What is claimed is:

1. In a radio transmitter, an input circuit, a condenser having a plate connected to said input circuit, a second plate in said condenser connected to a keying device, a connection between said keying device and said input circuit, a third plate in said condenser and an output circuit connected to said plate.

2. The radio transmitting circuit as claimed in claim 1 in which a plate of the condenser is adjustable.

3. The radio transmitting circuit as claimed in claim 1 in which a tuned circuit is serially included in circuit with the keying device.

4. In a radio transmitter, a condenser having three separately insulated plates, an input circuit connected to one of said plates, an output circuit connected to another of said plates, a common ground connection for said circuits, and a keying device connected to the remaining plate of said condenser and adapted to make and break contact with said ground.

5. A radio transmitting circuit comprising an input circuit adapted to receive a high frequency current, an output circuit adapted for connection to and operation with an antenna system, a condenser having a pair of plates insulated from each other and connected respectively to said input and output circuits whereby one side of each of said circuits is capacitively coupled, a third plate in said condenser insulated from said first plates, and a keying device connected between said last plate and said circuits.

6. A radio transmitting circuit comprising an input circuit, including a thermionic amplifier, an inductance and a variable capacitance connected in parallel with the plate and filament circuits thereof, an output circuit including a thermionic amplifier, a condenser having separately insulated plates, said plates being connected respectively to said input and output circuits whereby same are capacitively coupled, a third plate in said condenser, and a keying device connected to said last plate and said circuits.

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