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OSCILLATION CIRCUIT

Filed Aug. 18, 1925

Fig. 1

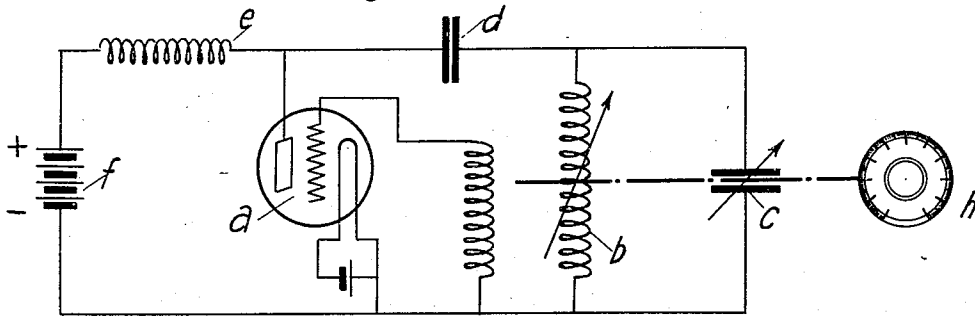


Fig. 2

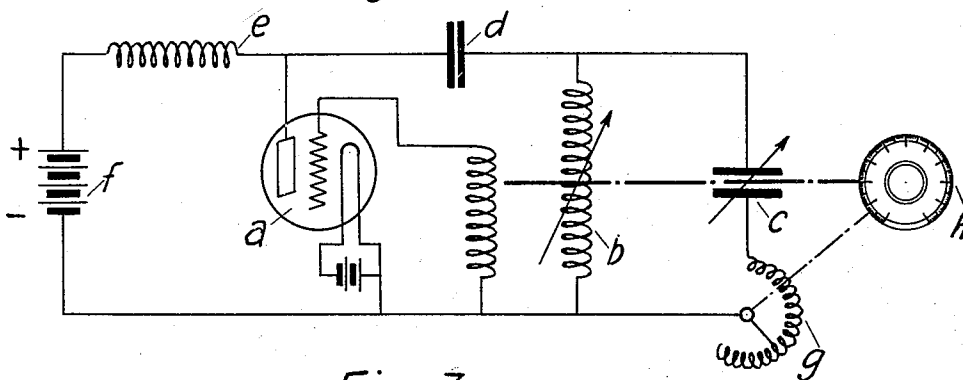


Fig. 3

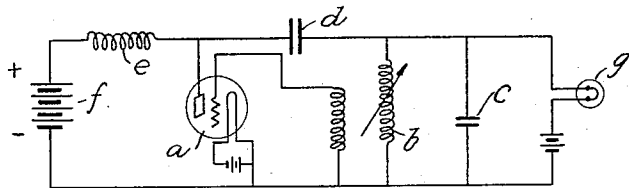
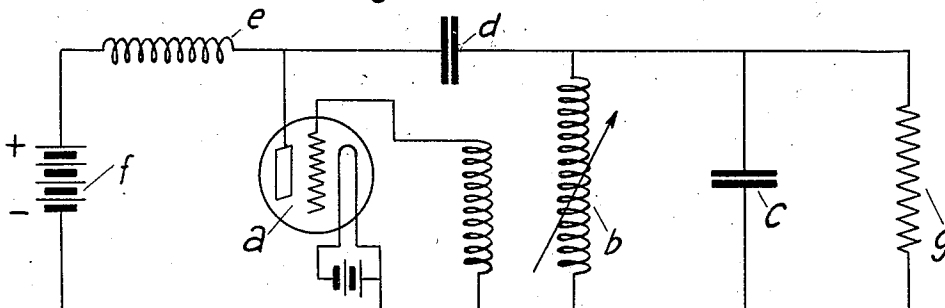


Fig. 4

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OSCILLATION CIRCUIT

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The present invention relates to an arrangement for use in a circuit for the variation of the wave length of tube transmitters which work upon a closed oscillation circuit. This case arises, for instance, in controlling (modulator) transmitters for separately excited tube transmitters. In such a case a comparatively large wave range is usually required and in the majority of known arrangements, it has been necessary for the anode coupling to be correspondingly altered.

The present invention has for its object the provision of a circuit in which the proper anode coupling for the oscillation tube is always automatically preserved.

For a further description of the invention, reference to the accompanying drawings will be made, in which

Fig. 1 shows a fundamental diagram of connections as embodied in this invention.

Fig. 2 shows a fundamental diagram of connections as embodied in this invention having in addition a variable resistance.

Fig. 3 shows a fundamental diagram of connections as embodied in this invention having an additional resistance inserted in parallel with an inductance.

Fig. 4 represents a modification of my invention wherein a resistance lamp is substituted for the variable resistance of Fig. 3, for example, although the application of the lamp is applicable to any of the other figures of the drawing.

Referring to Fig. 1, *a* is the oscillation tube, *b* is a coil of variable self inductance (variometer), *c* is a condenser of variable capacity, *d*, an anode blocking condenser intended to shut off the direct current, *e*, an anode choking coil which is designed to prevent a short circuit by way of the direct current source *f*. Coil *b* jointly with the condenser *c* constitute the oscillation circuit which, as is well known, offers an impedance of high ohmic resistance for the frequency to which it has been tuned. With close approximation the resultant virtual resistance of the impedance circuit when tuned

can be expressed by the following equation:—

$$Z = \frac{L}{C \cdot R} = \frac{L/C}{R}$$

where *R* represents the total ohmic resistance of the circuit in terms of ohms, *L* and *C* represent the self-inductance and capacitance, respectively, in terms of henries and farads, respectively. The value of *Z* at which a definite type of tube is made to operate properly, is constant within wide limits on varying the wave length. The ohmic resistance of the circuit (damping resistance), however, as a general rule varies with the wave length in this sense that the resistance of the coils grows steadily and continuously as the length of the wave decreases; more particularly speaking, below a certain wave length the high frequency resistance of the coil grows markedly. Now, according to the present invention, by the aid of a convenient mechanical drive indicated generally by the letter *h*, the condenser *c* is to be united with coil *b* in such a positive manner that the relationship between *L* and *C* remains always the same with reference to the resistance *R* of the oscillation circuit. For instance, if the ohmic resistance of the oscillation circuit were constant, then upon the wave length being increased, *L* and *C* would have to be increased in like proportion with the consequence that also the ratio *L*:*C* is preserved. However, since this presupposition is not fulfilled in most cases, one has to proceed in such a way that the damping resistance of the circuit is predetermined either by actual measurement or else by calculation, the drive being thereupon so determined and fixed that the ratio *L*:*C* changes in the same manner as the ohmic resistance *R*.

However, in the practical performance of the idea it may happen that, especially within the range of short waves, the resistance variation of the coils with the wave length becomes so pronounced that unfavorable ratios *L*:*C* or undesirable currents in the oscillation circuit may arise. Another desirable point is to make the mechanical gearing or drive between the coil and the con-

denser as simple in design as possible but in so doing certain restrictions may be imposed as regards the adjustment of the ratio $L:C$. Now, in order that the transmitter may be properly coupled in spite of this situation, a variable ohmic resistance, as shown in Fig. 2 is also inserted in the circuit before referred to, the said ohmic resistance g being actuated conjointly with the setting or variation of L and C . The said resistance g having, for instance, the rotary form, is mounted upon the axis or spindle of the rotary condenser, and the same is to be so connected that upon the capacitance being decreased, in other words, in the presence of decreasing wave-length, the said resistance is gradually cut out whereby the increase in the total resistance is reducible in any desired extent.

Another form of construction of the said variable resistance consists in that an unvariable ohmic resistance is inserted in the circuit to which a condenser is connected in parallel as shown in Fig. 3, the size of this condenser being so calculated and chosen that in the presence of long waves, the capacitive reactance is high comparatively with the ohmic resistance, so that the major part of the oscillation-circuit current is caused to flow across the virtual resistance, whereas at short waves the condenser constitutes a bridge free from loss for the virtual resistance.

Another embodiment of the same idea consists in that an ohmic resistance in the circuit characterized by a marked positive temperature coefficient is inserted. For this purpose there could be used, for instance, a metal-filament glow-lamp of suitable amperage and voltage the resistance of which, as is well-known changes at the ratio of 1:10. If the circuit resistance at short waves is very high and the current flowing in the circuit low as a consequence, the lamp is caused to burn rather dull and dark, or does not burn at all, and its resistance is but low. If, then, the resistance of the circuit decreases while the current grows, it follows that the resistance of the lamp increases also in proportion as the filament temperature rises.

Having thus described my invention, what I claim is:—

In a tube transmitter, the method of maintaining alternating current potential of a proper amount for the anode coupling for varying conditions of wave length which consists in varying the inductance and capacitance of the circuit simultaneously in a fixed ratio, and simultaneously inserting or cutting out resistance from the circuit including the inductance and capacity at such a rate that a fixed ratio of the inductance to the product of capacitance and resistance of the circuit is maintained at all times.

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