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MODULATING ARRANGEMENT

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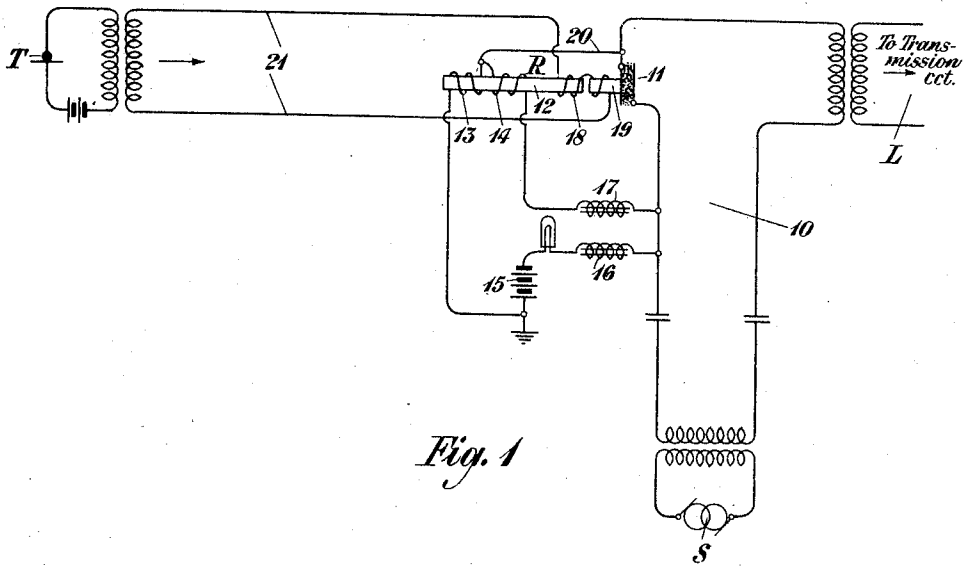


Fig. 1

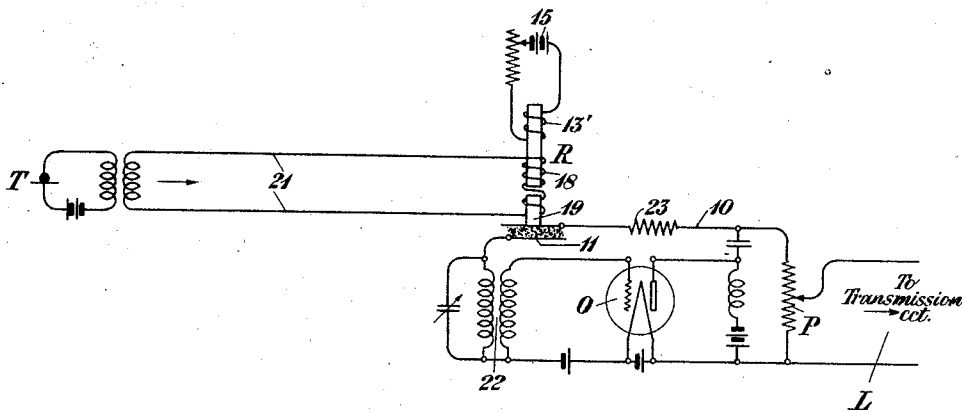


Fig. 2

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MODULATING ARRANGEMENT.

Application filed May 26, 1923. Serial No. 641,705.

This invention relates to carrier transmission and more particularly to modulating means for use in connection with carrier transmission systems.

One of the principal objects of the invention is the provision of a modulating circuit arrangement employing as the modulating element a mechanical type of repeater, although other and further objects of the invention will be clear from the following description when read in connection with the accompanying drawing, in which Figure 1 is a circuit diagram illustrating one form of the invention and Fig. 2 is a circuit diagram illustrating another form of the invention.

Referring to Fig. 1, S designates a conventional source of alternating current for supplying the carrier frequency to be used either in connection with a wire carrier system or in connection with a radio system. The carrier current is supplied from the source S to a transmission circuit L through a suitable tuned circuit 10. In order to modulate the amplitude of the carrier frequency supplied to the circuit 10, a mechanical repeater R is provided, said repeater comprising a granular resistance button 11 and magnetic core element 12. The granular resistance button 11 is included serially in the circuit 10. The magnetic core element is provided with magnetizing winding 13 and compensating winding 14 which are energized by a battery or other source of direct current 15, connected to said windings through choke coils 16 and 17. The voice currents or other currents in accordance with which the carrier frequency is to be modulated are impressed upon the modulating device through an additional winding 18 wound upon the core 12 in such a manner as to partially enclose a stud-like armature member 19 mounted upon the resistance button 11. To complete the compensating effect, direct current is caused to flow through the resistance element 11 from the source 15 by means of a connection 20 between one terminal of the resistance element 11 and the junction point of the windings 13 and 14.

The operation is as follows: Voice currents supplied by the telephone transmitter T are transmitted over a circuit 21 and actuate the winding 18 of the repeater R, thereby causing the resistance of the resistance element 11 to vary in a well known manner in accordance with the voice currents. The

variation in the resistance 11 produces corresponding variations in the amplitude of the carrier current supplied by the source S so that the message originating at the transmitter T will be impressed upon the carrier current transmitted over the line L.

A modified form of circuit arrangement employing the principles of the invention is illustrated in Fig. 2, in which the carrier current is supplied by an oscillator O of the well-known vacuum tube type, the oscillator being provided with a feedback connection 10 leading to a transformer 22 for coupling the grid and plate circuits together in a well known manner. The output or plate circuit of the vacuum tube oscillator O is connected to the transmission circuit L through a potentiometer P, whereby the steady amplitude of the carrier current may be adjusted. The feed-back circuit 10, as is well known, includes a certain amount of resistance which is provided in the circuit illustrated by means of a fixed resistance element 23 and the granular carbon resistance element 11 of the mechanical repeater R. The repeater R is substantially the same as that illustrated in Fig. 1 but is simplified somewhat by combining the magnetizing windings 13 and 14 of Fig. 1 into a single magnetizing winding 13', which is energized by a direct current source 15. The connection 20 of Fig. 1 is omitted so that no direct current flows through the granular carbon resistance element 11.

The operation is as follows: Telephone currents supplied by the transmitter T and transmitted over the circuit 21 energize the winding 18 of the mechanical repeater R to vary the resistance of the granular carbon resistance element 11. Since the amplitude of the oscillations generated by the oscillator O will be determined by the resistance in the feed-back connection 10, it will be obvious that the variations in resistance of the granular carbon resistance element 11 will produce amplitude variations in the oscillations generated by the oscillator O so that the carrier currents transmitted to the circuit L will be modulated in amplitude in accordance with the voice currents supplied from the transmitter T.

It will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from those illustrated without departing

from the spirit of the invention as defined in the appended claim.

What is claimed is:

A modulating arrangement comprising a vacuum tube oscillator having a feed-back connection between its plate and grid circuits, and means for modulating the oscillations generated by said oscillator, said means comprising a mechanical repeater having a variable resistance element included in the feed-back circuit so that all of the current

transmitted through said feed-back circuit flows through said resistance element, an operating winding energized by modulating currents to vary said resistance element and a magnetizing winding energized by a direct current source. 15

In testimony whereof, I have signed my name to this specification this 25th day of May, 1923.

OWEN H. LOYNES.