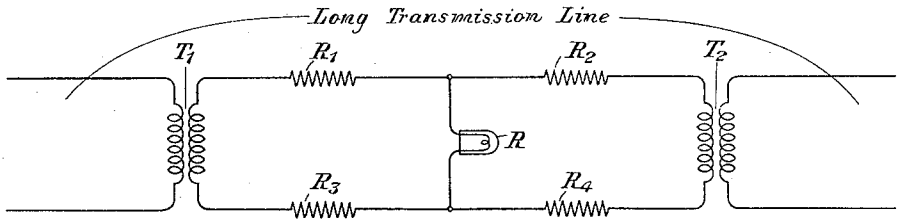
Aug. 30, 1932. L. C. ROBERTS 1,875,156

METHOD AND MEANS FOR PRODUCING LOSS VARYING WITH ENERGY LEVEL

Filed June 29, 1929



R is short, fine tungsten filament in an evacuated bulb.

Fig. 1

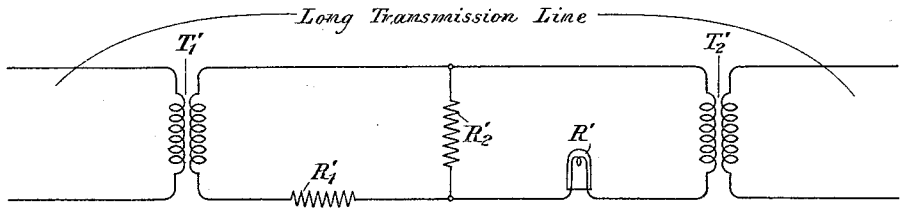


Fig. 2

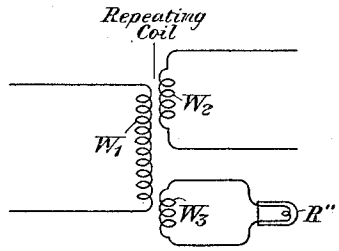


Fig. 3

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1,875,156

UNITED STATES PATENT OFFICE

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METHOD AND MEANS FOR PRODUCING LOSS VARYING WITH ENERGY LEVEL

Application filed June 29, 1929. Serial No. 374,919.

This invention relates to circuits for the communication of intelligence, and more particularly to methods of and means for controlling the loss in transmission over wire circuits.

The object of the invention is to eliminate or reduce to a minimum the distortion occuring in transmission over wire circuits because of the fact that currents of low energy level—echoes, crosstalk and noise, for instances—are transmitted with less loss than currents of higher energy level, such as voice currents.

In general, I attain the above-stated object by placing in the transmission line a network in which are arranged resistances having in one or more instances a low temperature coefficient and in one or more instances a high temperature coefficient.

The invention will be clearly understood when the following description is read with reference to the accompanying drawing. Figure 1 of the drawing shows diagrammatically my circuit arrangement in one desirable form; Fig. 2 shows a modified form of the circuit arrangement of Fig. 1; and Fig. 3 shows a somewhat different arrangement for accomplishing the result of Fig. 1.

With reference to details of Fig. 1, there is shown an artificial line inserted in a transmission line and inductively connected therewith through the transformers T_1 and T_2. This connection through the transformers causes the impedance of the artificial line to match the impedance of the transmission circuit.

The artificial line is made up of a plurality of series impedances R_1, R_2, R_3 and R_4. These impedances take the form of resistances of low temperature coefficient. In addition to these series resistances, a resistance R of high temperature coefficient is connected across the artificial line as shown. This shunt resistance takes the form of a short, fine, tungsten filament in an evacuated bulb. Another suitable form of a resistance of high temperature coefficient would be a hydrogen-iron ballast lamp designed to consume less energy than the ordinary commercial lamp of that type.

The resistance R presents a low impedance to currents of low energy level and a considerably higher impedance to currents of higher energy level. Accordingly, for currents of low energy level, there is a relatively high current flow through the shunt and a relatively high loss introduced in the circuit by the artificial line, while in the case of currents of high energy level, there will be a relatively low current flow through the shunt and a relatively low loss introduced by the artificial line.

In the arrangement shown in Fig. 2 of the drawing, the artificial line is connected in the transmission line through transformers T_1' and T_2'. The series impedances are the resistance R_1' of low temperature coefficient and the resistance R′ which corresponds to the resistance R of Fig. 1 and has a high temperature coefficient. A resistance R_2' of low temperature coefficient is connected in shunt across the artificial line. The effect of this arrangement is the opposite of the effect produced by the arrangement of Fig. 1. Specifically, the currents of low energy level have a relatively low attenuation, while in the case of currents of high energy level a relatively high loss is introduced.

A result similar to the result reached with the arrangement of Fig. 1 may be brought about by bridging a resistance of high temperature coefficient, which may take the form of a ballast lamp like that shown in Fig. 1 or in Fig. 2, across a winding of a repeating coil. This arrangement is shown in Fig. 3. The coil is represented diagrammatically as comprising windings W_1, W_2 and W_3. Winding W_3 may be of high or low impedance relative to windings W_1 and W_2, and across this winding W_3 there is connected the resistance R″, which is a resistance of high temperature coefficient such as that described in connection with Figs. 1 and 2.

While the invention is specifically disclosed in certain arrangements for the purpose of illustration, it is to be understood that the true scope of the invention is determined by the appended claims.

What is claimed is:

1. In a circuit for the transmission of alter-

nating currents of frequencies in the range of audibility, a transmission line and an artificial line inserted in said transmission line and connected therewith through transformers, said artificial line comprising a plurality of series resistances of relatively low temperature coefficient capable of absorbing an appreciable amount of energy and a shunt resistance of high temperature coefficient.

2. In a circuit for the transmission of alternating currents of frequencies in the range of audibility, a transmission line and an artificial line inserted in said transmission line and connected therewith through transformers, said artificial line comprising a series resistance and a shunt resistance, said resistances differing from each other substantially as to temperature coefficient.

In testimony whereof, I have signed my name to this specification this 28th day of June, 1929.

LELAND C. ROBERTS.