April 12, 1938. J. A. PARROTT 2,113,708

TRANSMISSION SYSTEM

Filed June 5, 1936

Fig. 1

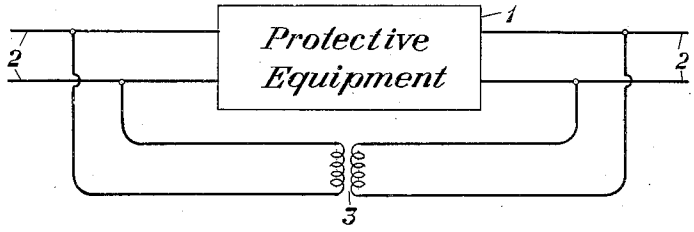


Fig. 2

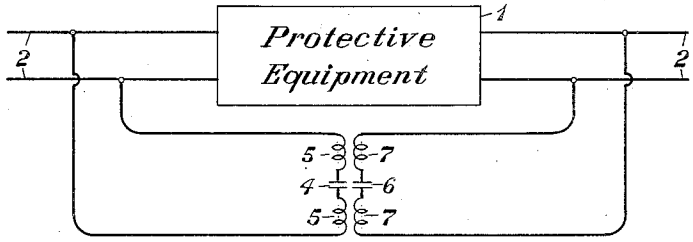
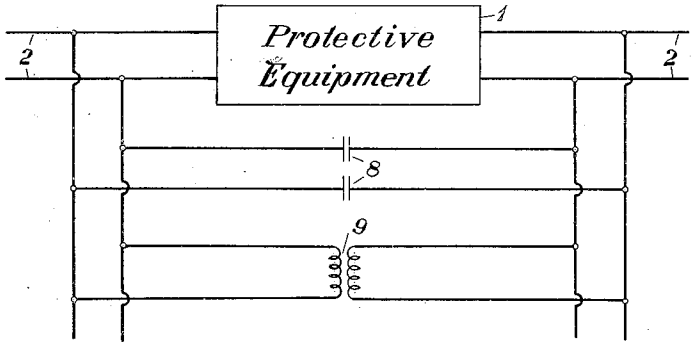


Fig. 3



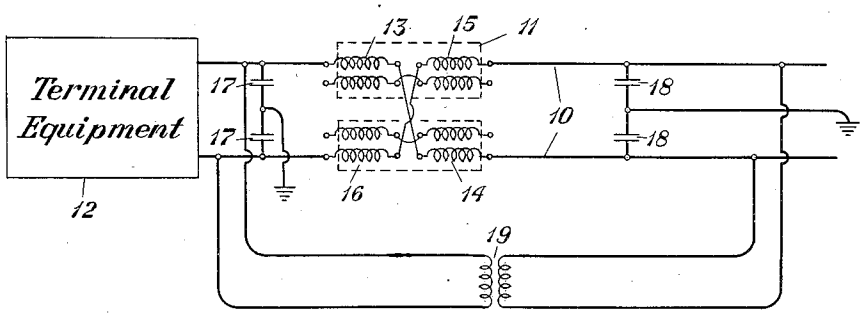


Fig. 4

INVENTOR

BY J.A.Parrott

ATTORNEY

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TRANSMISSION SYSTEM

John Angell Parrott, Roslyn, N. Y., assignor to American Telephone and Telegraph Company, a corporation of New York

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3 Claims. (Cl. 179—78)

This invention relates to signaling systems and more particularly to protection circuits for signaling systems.

When a signaling circuit is provided with a protection circuit of a type, for example, which employs impedances in series with the signaling circuit, it has been found that the protection circuit introduces large transmission losses at carrier frequencies, voice frequencies and at some of the lower frequencies. This is undesirable because it makes it difficult if not impossible to use the channel for other than direct current or low frequency transmission.

In order to improve such an arrangement, it is proposed according to this invention to connect to the signaling circuit and around the protection circuit a repeating coil, a transformer or other device which freely by-passes such relatively low frequency currents. The addition of the repeating coil or the transformer or the like provides a practicable method of regaining the speech channel and of such other low frequency channels as are effectively blocked by the protection circuit.

This invention will be better understood from the detailed description hereinafter following when read in connection with the accompanying drawing in which Figure 1 illustrates one embodiment of the invention illustrating a two winding transformer associated with protective equipment, Fig. 2 shows a modification of Fig. 1 having condensers in series with the transformer windings, Fig. 3 shows two circuits in shunt with the protective equipment and Fig. 4 shows still another modification of the invention.

Referring to Fig. 1 of the drawing, the reference character 1 designates protective equipment interposed in a signaling circuit 2, 2. The protective equipment may comprise, for example, a series reactor or transformer or other device which in effect introduces a high impedance to longitudinal currents of a particular frequency, such as 60 cycles, the latter frequency being that of a nearby power station or power line. Protective equipment 1 of the type just mentioned does not usually introduce sufficient impedance to circulating currents to cause appreciable losses for low frequency signaling, such as used in most telemetering and supervisory telephone control systems but substantial losses are, however, introduced at voice frequencies.

According to this invention, this difficulty may be obviated by connecting a repeating coil 3 having high dielectric strength between the line and drop windings. This repeating coil 3 will by-pass the voice currents around the protective equipment 1. Consequently the speech channel at least—which was suppressed by the protective equipment 1—will be recaptured. It will therefore be unnecessary to provide a separate circuit for the transmission of currents of such frequencies.

Fig. 2 is a modification of Fig. 1 in which a condenser 4 is connected between and in series with windings 5—5 on the line side of the signaling circuit 2 and a similar condenser 6 positioned between and in series with windings 7—7, the latter windings being coupled to windings 5—5. The condensers 4 and 6 prevent the circulation of direct currents through the by-pass circuit around the protective equipment 1. These condensers may be further employed to tune the by-pass circuit for efficient transmission of any predetermined frequency or frequencies, as for example, voice frequencies.

If the protective equipment 1 is so constituted that it affects two widely different frequencies or ranges of frequencies, as for example, carrier frequencies and voice frequencies, then an arrangement such as Fig. 3 may be satisfactorily employed. In Fig. 3, the condensers 8—8 form one by-pass circuit suitable for freely transmitting carrier frequencies while the repeating coil or transformer 9 forms another by-pass circuit for voice or other predetermined frequencies. Thus, the arrangement of Fig. 3 enables the recapture of separated frequency bands as, for example, one, the speech frequency band, and the other a band in the carrier range.

Fig. 4 shows the signaling circuit 10 connected through protective equipment 11 to terminal equipment 12 of well known type. The protective equipment comprises series windings 13 and 14 which are connected to opposite conductors of the circuit 10 and are respectively coupled to series windings 15 and 16 also connected to opposite conductors of circuit 10. One side of the protective equipment 11 is shunted by series condensers 17—17, the common terminal of which is grounded. The other side of the protective equipment 11 is similarly shunted by equal series condensers 18—18 the common terminal of which is also grounded. The repeating coil 19 is shunted around the protective equipment 11 for reasons already explained hereinabove.

While this invention has been shown and described in certain particular arrangements merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied

organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The combination of a two wire signaling circuit for transmitting currents within a predetermined range of frequencies, an impedance device connected serially in the signaling circuit for effectively suppressing the transmission through the signaling circuit of a predetermined frequency lying outside of said predetermined range, said device also detrimentally affecting currents of frequencies within said predetermined range, and a circuit bridged across both wires of the signaling circuit and around said device for regaining the signaling channel at said detrimentally affected frequencies while at the same time suppressing said predetermined frequency.

2. The combination of a protective circuit for suppressing the longitudinal transmission therethrough of a predetermined frequency but at the same time interfering with transmission therethrough at carrier frequencies and at voice frequencies, and two parallel circuits bridged across said protective circuit for freely permitting the independent transmission of said carrier frequencies and said voice frequencies respectively through said bridged circuits and for suppressing the transmission through said parallel circuits of said predetermined frequency.

3. The combination of a signaling circuit for transmitting currents of a range of frequencies, protection apparatus inserted serially in said circuit for suppressing currents of a predetermined frequency induced into said circuit, said protection apparatus adversely affecting current of other frequencies to be freely transmitted by said circuit, and a by-pass circuit bridged across both wires of said signaling circuit for freely transmitting currents through said bridged by-pass circuit of the frequencies adversely affected by said protection apparatus while substantially suppressing said current of predetermined frequency.

JOHN A. PARROTT.