

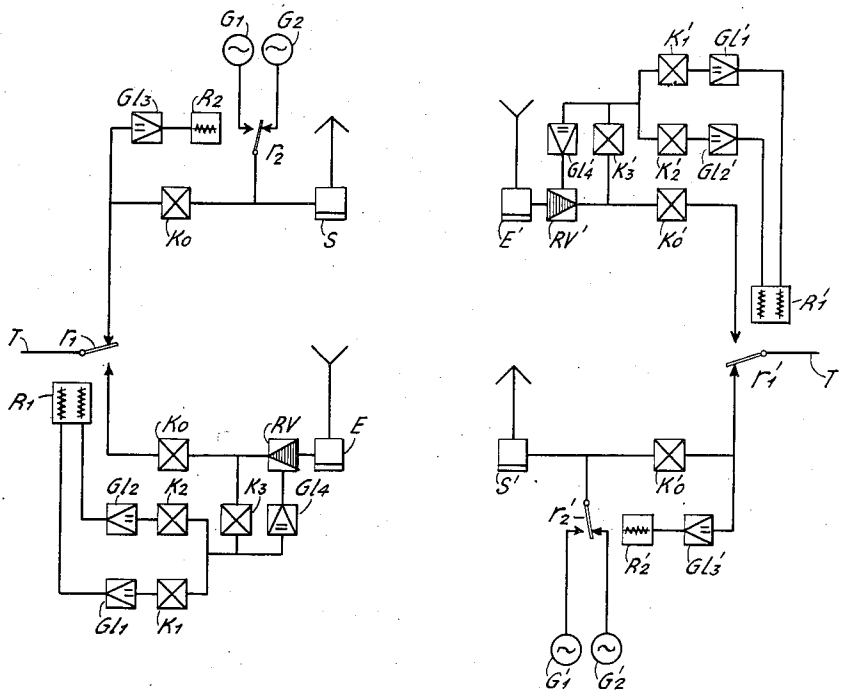
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TRANSMISSION SYSTEM

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TRANSMISSION SYSTEM

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The invention is concerned with a method to control the transmission measure by the aid of a control frequency, and the same distinguishes itself from methods known in the prior art in that the control action is effected by altering the frequency of the controlling current.

In the operation of regeneration locks or blocks it has been customary in the prior art to block transmission in one direction in the presence of the control frequency, and to block transmission in the other direction upon the failure or absence of this control frequency. According to the method of the present invention traffic in one direction is blocked by one control frequency, and traffic in the other direction by another control frequency. The connection or switching in and rendering operative of the various control frequencies is insured in this scheme by the signal currents by ways and means well-known in the art.

The invention will be found particularly advantageous if in addition to the regeneration block also a regulation of the volume level is to be secured. By the use of two comparatively adjacent frequencies it is possible to effect both these regulative actions. The volume regulator and stabilizer means would in this case have to be so designed that they will respond to both frequencies. Inasmuch as a control frequency is present all the time this means that a continual regulation of volume level is insured. If the two frequencies are located close enough together, for example, say about 100 cycles per second apart, then fluctuations in the intensity of the energy transmission over the distance covered, say, by radio will affect both frequencies in like manner so that a change of the frequency used for volume control and regulation will not be attended by any inconvenience. The regeneration blocks should be so designed that they will be able to distinguish between or respond selectively to the frequencies so that one or the other of the two transmission paths will be opened or cleared depending upon the frequency of the control current, that is, which control current is operative.

Designing the regeneration blocking means in such a manner that in the presence of both frequencies of about like amplitude simultaneously no change in the sense of transmission is produced, this means that a rather thorough insensitiveness of the arrangement to disturbing potentials, say, of an atmospheric origin, will be secured. Atmospheric disturbances, as is well known, normally do not merely contain one disturbing potential, but they cover a more or less wide frequency band. Thus, if the two frequencies of the control currents are chosen close together there is a chance of the receiver devices tuned to the control frequencies containing approximately the same disturbing potentials. The

methods known in the prior art which utilize but one control frequency, do not offer this chance of obtaining a compensation of atmospheric or similar disturbances.

The invention shall be explained in more detail by reference to a practical embodiment given by way of example. The drawing shows a transmission system wherein the control frequencies used for the actuation of the regeneration blocks are used at the same time for controlling or stabilizing the level of the volume. Double conductors are represented by single line.

The merit residing in the circuit scheme illustrated primarily consists in that the operation of the blocking means for the two directions are perfectly similar inasmuch as a definite frequency is provided for each direction of transmission. In the circuit arrangements heretofore used, owing to the presence of the control frequency, one direction of traffic was blocked and the other one cleared; in other words, the two blocks were actuated in contrary directions.

The subscribers T and T' are united by radio. S and E, respectively, denote the radio transmitters and receivers. The receiving means are connected with the regulating amplifiers RV whose transmission measure or amplification characteristic is regulated by the rectifiers G14. The rectifiers G14 respond to the control frequencies transmitted according to the invention. The filter K3 is broad enough to pass both of the controlling frequencies, which, as indicated above, are separated by a relatively small difference frequency, as, for example, 100 cycles per second, whereas the filter K₀ also connected with RV does not permit these frequencies to reach the subscriber's connections r1, T. To actuate the regeneration blocks two rectifiers G11 and G12 are connected by way of the filters K1 and K2 respectively to RV by way of K3, as shown. The reversing of the subscriber's lines, that is, the changing from and to the transmitter and receiver means, respectively, is effected by the agency of a relay R1 which is provided with two opposed windings which are associated with the rectifiers G11 and G12 respectively.

At the transmitting end there are two generators G1 and G2 provided to supply the control frequencies. The changing-over of the generators is effected by way of the keeper r2 of relay R2. This latter relay is united with the subscriber's line by way of the rectifier G13.

In the state of inoperation of the communication equipment in which the relays occupy positions as shown in the drawing, the subscriber's offices are connected with the corresponding transmitter means; hence, regeneration is not possible. The frequency furnished from the generator G2, in a way well-known in the art, serves for fading regulation (compensation). This fre-

quency is fed from the aerial to the receiver E and from E through the regulating amplifier RV, through the filter chain K3 and the rectifier G14 and back to RV to regulate the same against fading.

The filter chains K1 and K2 are so dimensioned that the frequency of the generator G2 will be transmitted only by the filter chains K2. Through the intermediary of the rectifier G12 the action of this wave is so that the relay R1 holds its keeper in the position as illustrated. When the subscriber T is sending out a communication the signal currents will cause the relay R2 to respond by way of the rectifier G13. The generator G2 is switched off, while the generator G1 is connected with the transmitter. The frequency of the generator G1 is fed by way of the filter K3' for the regulation or compensation of the fading effects to the rectifier G14', and by way of the filter chain K1' to the rectifier G11' which energizes one of the windings of the relay R1', so that the keeper r' is thrown over with the result that subscriber T' is connected with the receiver E'.

Now, if disturbing potentials happen to reach the receiver the risk of faulty operation of the regeneration block is very slight. For if these disturbing potentials happen to fall inside the region of the control frequency they will normally be contained in both frequencies to approximately the same amplitude. The disturbing potentials will thus actuate both rectifiers G11' and G12'. Since the currents furnished from the rectifiers are brought to act upon the relay R1' in opposite senses, these troublesome potentials will fail to release an action.

In case of a communication proceeding from the subscriber T' to the subscriber T, similar circuit changes will occur in the transmission arrangement of the subscriber T' and in the receiver arrangement of the subscriber T.

Instead of using two generators for the production of the two control frequencies, it would be feasible also to employ but one generator to which a condenser is connected in parallel for the object of insuring changes in wave-length. The mechanical relays shown in the exemplified scheme of the drawing, as will be evident to the expert, could be replaced also by thermionic tubes.

The application of the basic idea of this invention of using two frequencies for the control of the transmission measure affords certain advantages for the reasons as above set forth (atmospheric compensation) if distinct level regulation is dispensed with or if this is replaced by another regulation.

I claim:

1. A duplex signalling system, each end of which includes a transmitting means, receiving means, a subscriber's line, a first switch connected thereto, a plurality of control frequency generators at each transmitter, switching means for alternately connecting said control frequency generators to said transmitter, a balanced relay at each receiver, said relay being operatively related to said first switch, a contact adjacent said first switch connected to said transmitter, said contact being normally closed, a contact adjacent said first switch connected to said receiver, said contact being normally open, and filter means interposed between said receiver and said relay whereby when one control frequency is transmitted said subscriber's line is connected by said

first switch to said transmitter, and when another control frequency is transmitted said subscriber's line is switched to said receiver.

2. An arrangement as claimed in claim 1 in which said control frequency generators operate at different frequencies and in which the position of said switching means for alternately connecting said control frequency generators determines which control frequency generator is connected to said transmitter.

3. A duplexing system comprising, two or more stations, each including a transmitter and a subscriber's line, a pair of control frequency generators, switching means normally connecting one of said control frequency generators to said transmitter, a second switching means normally connecting said subscriber's line to said transmitter, a relay associated with said first named switch and actuated by signal frequencies through said subscriber's line to disconnect the control frequency generator normally connected to said transmitter from said transmitter and to connect another of said control frequency generators to said transmitter, receiving means at each of said stations, said receiving means each including a filter and a relay connected thereto responsive to the frequency of the control frequency generator normally coupled to the transmitter at another of said stations for normally maintaining the second named switch in a position to maintain said receiver at each of said stations disconnected from said subscriber's line, each of said receiving means also including a second filter connected with said receiver and with said relay and responsive to the frequency transmitted when said other control frequency generator is connected with said transmitter of said other station to energize said relays to move said second switch in a position to connect said receiver to said subscriber's line when signal frequencies are impressed from the subscriber's line at the other station on the transmitter.

4. A duplexing system as claimed in claim 3 in which each of said receivers includes automatic volume control means actuated by either of said control frequencies.

5. A duplexing system as recited in claim 3 in which said control frequency generators generate frequencies separated by a narrow band of frequencies and in which said receivers each include a filter tuned broad enough to pass the frequencies of both of said control frequency generators, and automatic volume control means connected with said filter and with said receivers.

6. A duplexing system comprising stations including, a transmitter and a receiver, a subscriber's line normally connected with said transmitter, a pair of oscillation generators generating frequencies which differ by approximately 100 cycles per second, a relay in said receiver responsive to one of said control frequencies for maintaining said transmitter normally connected to said subscriber's line, and means in said relay responsive to the other of said control frequencies for disconnecting said transmitter from said subscriber's line and connecting said receiver to said subscriber's line.

7. A duplexing system as recited in claim 6 in which each of said receivers includes an automatic volume control means responsive to either of said control frequencies.

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