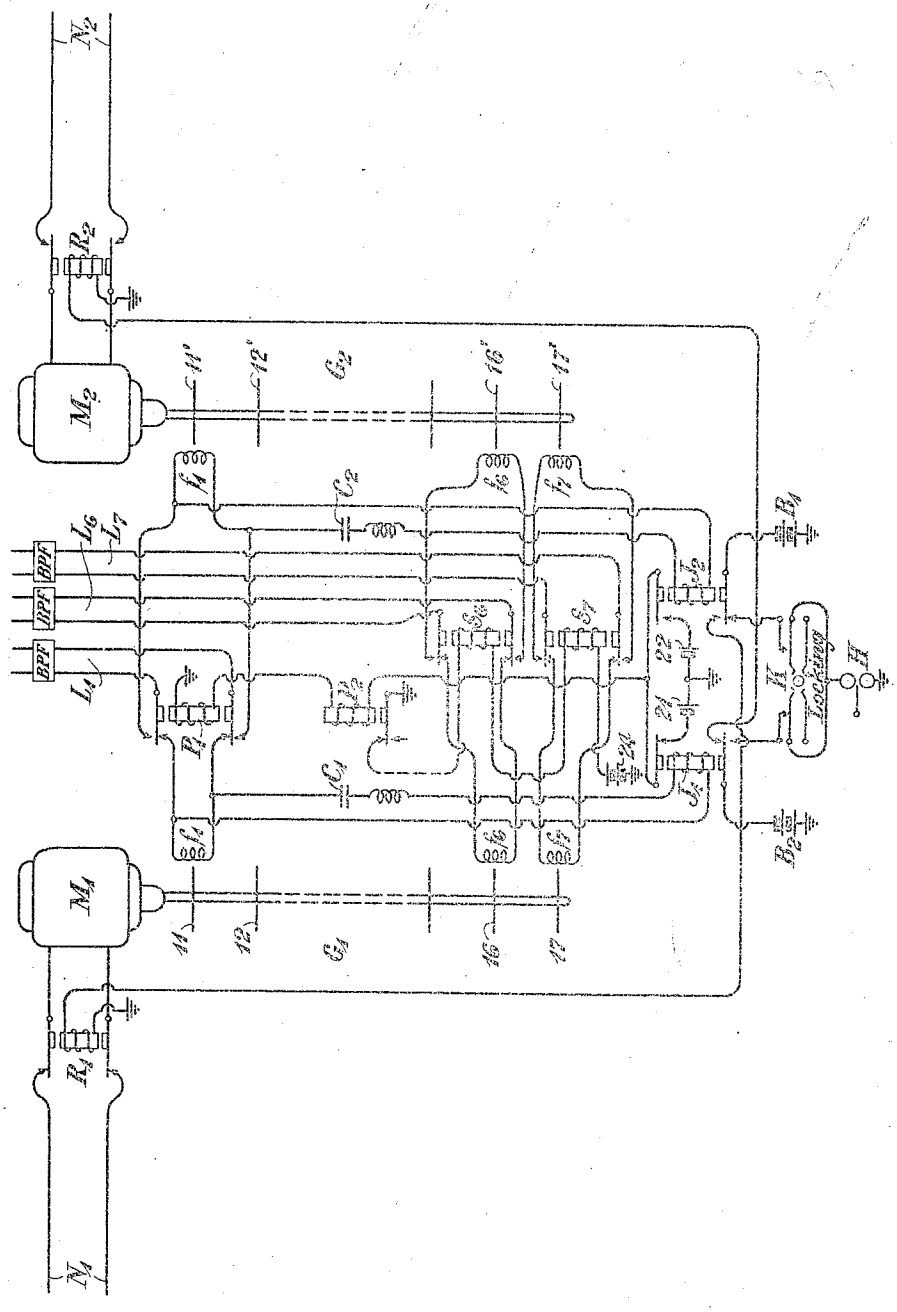
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EMERGENCY SWITCHING MECHANISM

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EMERGENCY SWITCHING MECHANISM.

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This invention relates to an emergency switching mechanism for communication systems, and more particularly to a switching mechanism by which, if a circuit or part of a circuit functions improperly, it will automatically be replaced by a similar supplemental circuit.

In one form of multiplex telegraphy, a plurality of carrier frequencies are used, each being suitably modulated with respect to the signal to be transmitted and all of them being adapted for impression on a single pair of wires to constitute a plurality of signaling channels. At any one station these same carrier frequencies may be applied to other wires or pairs of wires to furnish other signal channels. In certain recent equipment a multiple frequency generator of the dynamo type is used for supplying the plurality of carrier frequencies, it being understood that each frequency so generated is led off in its proper circuits for signaling purposes.

In view of the fact that in such a system all the carrier telegraph circuits terminating in one office may be supplied from a single multi-frequency generator, it will be obvious that it is of extreme importance not only that reserve equipment be installed but also that means be provided whereby, if anything should go wrong with one such generator, another can be switched into circuit with a minimum of delay. Then again, since it is customary in such systems to limit as narrowly as possible by means of wave filters the range of frequencies which can enter into any signaling channel, provision must be made not only for insurance against an actual shut-down of one of the generators but also for any change in speed which would be sufficient to shift the carrier frequencies with respect to the band assigned to any given channel.

The specific object of this invention is to provide means whereby a substitution of one generator for another may be quickly and automatically made in case one of the generators goes out of commission or changes its speed substantially or fails in any way to function properly. It should be understood, however, that the invention has wider applicability than indicated by the special apparatus described, which should be viewed as being for illustrative purposes only. The invention will be better understood by reference to the accompanying drawing, in which the figure shows the switching mechanism which comprises this invention and whereby one generator may be substituted for another.

Referring more particularly to the figure, there are shown at L_1, L_3, L_7, etc., leads coming from a source of a plurality of carrier oscillations, these leads including, if desired, filters of the band pass or other suitable type and leading to the necessary modulating apparatus, transformers, etc., as a preliminary to impression on the transmission line.

The carrier oscillations may be generated by a generator G_1 consisting, for example, of a toothed disc 11 driven by a motor M_1 in front of a stator winding f_1. As shown in the figure, the winding f_1 is connected to the transmission line through contacts of the relay P_1.

As a multi-frequency generator, G_1 may consist of a plurality of toothed discs 11, 16, 17, etc., on one shaft, all driven by the motor M_1 and each giving rise to a different frequency f_1, f_3, f_7, etc., all but the first of which may be connected by means of contacts of relays S_3, S_7, etc., to the leads L_3, L_7, etc., each of these leads going to the signaling circuits which, as stated above, may be a plurality of pairs of wires, each pair of wires constituting a plurality of channels and equipped with necessary modulators, filters and other apparatus.

The motor M_1 is supplied with power from some power source N_1, the leads therefrom including the contacts of a relay R_1. This relay, under certain circumstances, as will be described later, may be excited by battery B_1, and upon such excitation disconnects the motor M_1 from the source N_1. Bridged across the winding f_1 is a circuit containing condenser C_1 and A. C. relay

winding J_1, this circuit being tuned to the frequency developed in the winding f_1. In series with the relay P_1 is a relay P_2, both of these being connected to battery 21, having included in the circuit a contact of the relay J_1. The relays S_6, S_7, etc., are connected in series with a battery 24 and include in circuit a contact of the relay P_2.

A second generator G_2, identical with the generator G_1 and driven by the motor M_2, is supplied, as supplemental equipment, from the line N_2, including the contacts of the relay R_2, similar to the relay R_1, which latter is supplied from battery B_2. The generator G_2 includes windings f_{12}, f_{6}, f_{7}, etc., corresponding to the same windings of the generator G_1.

The operation of the circuit will now be described. As shown, the circuit of relay R_2 is open and the motor M_1 therefore drives the generator G_1, supplying power in the windings f_{12}, f_6, f_7, etc. Part of the power from the coil f_1 passes through the tuned circuit with its relay J_1 and draws up the contacts of this relay. Circuit is then closed from battery B_2, through the relay R_2, holding open the power leads of the motor M_2. At the same time, circuit is closed through the battery 21, contact of relay J_1, relays P_2 and P_1 to ground. The excitation of the relay P_1 connects the line L_1 to the winding f_1 of the generator G_1. The excitation of the relay P_2 closes circuit from battery 24, relay windings S_7, S_6, etc., through contact of relay P_2 to ground, thus connecting the windings f_6, f_7, etc. of G_1, to the leads L_6, L_7, etc.

As long as the generator G_1 functions properly, the connections will remain as given. If, however, this generator should cease to operate or should suffer such a change in speed that the frequency in the winding f_1 departs substantially from that for which the circuit C_1—J_1 is tuned, the relay J_1 will release its contacts, thus opening the circuit of relay R_2. This will permit the motor M_2 to start, and when the proper speed has been attained, excitation of the winding f_1 of generator G_2 will cause current to flow through the tuned circuit containing condenser C_2 and A. C. relay J_2. Excitation of this latter relay will draw up its lower contact and place battery B_1 on relay R_1, thus opening the power leads for the motor M_1, which thereupon ceases to run. At the same time, the closing of the upper contact of relay J_2 will close battery 22 on the relays P_1 and P_2. This battery is poled in the opposite direction from the battery 21 and will cause the armatures of these relays to move outwards. This operation, so far as the relay P_1 is concerned, will connect the winding f_1 of generator G_2 to the line L_1. The release of the armature of P_2 will open the circuit of battery 24, releasing the armatures of relays S_6, S_7, etc., and thus connecting the windings f_6, f_7, etc., of generator G_2 to the leads L_6, L_7, etc. In this way, a complete transfer is made from the generator G_1 with its associated apparatus to the generator G_2 with its associated apparatus, the whole being done quickly and automatically; and the generator G_2 will continue in operation until failure on its part to function normally. It should be noted that the relays P_1 and P_2 are polar relays so constructed that they will remain on either pole when current ceases to flow.

It would be desirable, in general, to have some warning indicating that a change has occurred, in order that suitable steps may be taken to correct the defects of the motor which has ceased operating. To this end I provide a locking key K which is normally thrown to that side which corresponds to the generator which is running. This key includes in its circuit an alarm device H and is controlled further by a contact, on the one side, of the relay J_1 and, on the other side, of the relay J_2. As shown in the figure where the generator G_1 is in operation, the key is locked to the left. When the relay J_1 ceases to be excited by failure of the generator G_1, circuit is closed from battery B_2, contact of relay J_1, key K and alarm H. Upon the giving out of the alarm the operator moves the key K to lock it on the right side, thus placing the alarm circuit in condition to be operated upon failure of the generator G_2 and corresonding release of the relay J_2.

While I have shown and described the relay J_1 as operated from the winding f_1, it is apparent that any other of the windings of the generator G_1 may be used in its place. In general, however, I find it preferable to use that coil with the lowest frequency, thereby simplifying the construction of the A. C. relay J_1.

It is apparent that many changes may be made in the details of this circuit without departing from the spirit of this invention.

What is claimed is:

1. In a carrier telegraph system comprising a generator of a plurality of carrier frequencies, a second similar generator of carrier frequencies, a switch for substituting the second for the first generator, said switch being controlled by a departure from normal operation of the first said generator, said switch comprising means to start the second generator and stop the first, and other means for disconnecting the generating coils of the first and connecting the generating coils of the second generator to the communication circuits.

2. A circuit comprising a generator of a plurality of oscillations, work circuits therefor, a second similar generator, a switching mechanism for substituting the second for

the first generator, a relay circuit associated with and tuned to one of the frequencies of the first generator and acting to close circuits whereby the generated oscillations are impressed on their respective work circuits, said relay being adapted upon departure of the first generator from normal operation to set the switching mechanism in operation for the purpose described.

In testimony whereof, I have signed my name to this specification this 6th day of October 1922.

ANDREW L. MATTE.