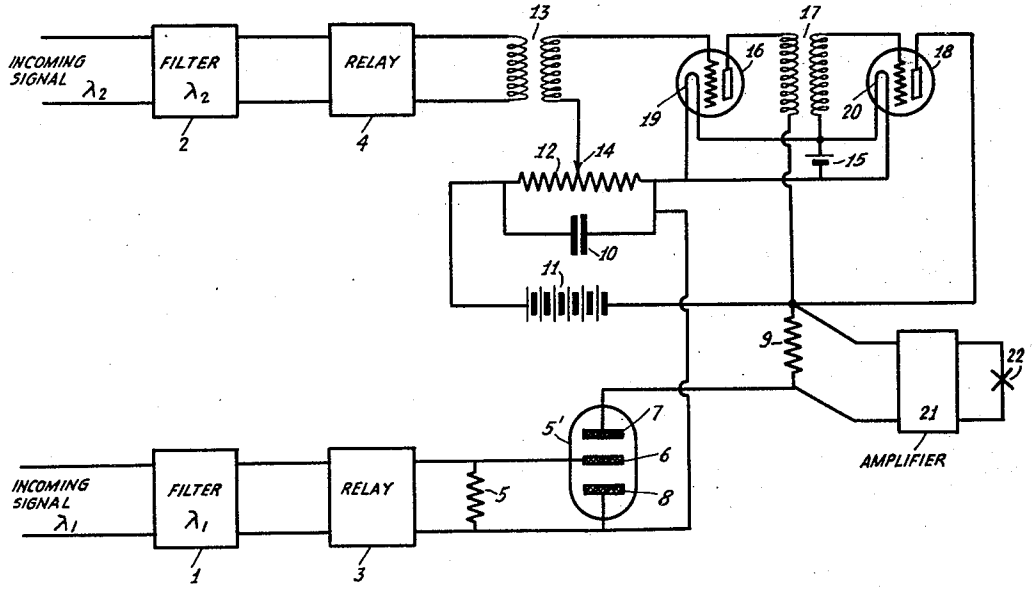
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FACSIMILE SIGNALING SYSTEM

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FACSIMILE SIGNALING SYSTEM

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4 Claims. (Cl. 178—88)

The present invention relates to a circuit arrangement adapted to prevent signal spread in short-wave telegraphy, especially in picture or facsimile telegraphy.

In United States Patent No. 1,914,898, granted on June 20, 1933 to me jointly with Wilhelm Runge, a method has been disclosed to eliminate disturbing or undesirable spread of signals in short-wave telegraphy, especially in high-speed telegraphy and picture telegraphy. Dash and dot, and black and white, respectively, are transmitted on waves of different lengths in such a manner that only the beginnings of both wave-trains will cause or control in the receiver the connection or disconnection of the recorder or "inking" current irrespective of extensions of the signals such as may be occasioned by multiple paths of the radiations. The invention hereinafter to be disclosed constitutes a further development of the above method by the aid of a circuit arrangement which, at the sending end. permits the use of detuned keying or scanning while special means and ways are adopted only at the receiving end.

Like the arrangement disclosed in the above referred to application, the circuit scheme hereinafter to be described in detail, for picture-transmission work, is also suited only for black-white contrast pictures or copies, while pictures involving shades or different stages of brightness do not come inside the scope of the invention. Hence, to transmit half-tones, recourse must priorly be had to a conversion of the copy or picture which permits of insuring intermediate impressions of blackening in well-known manner, for instance, by the screening (dot or line) method.

In what follows a description is given only of a case of facsimile transmission though, inside the scope of the invention, the method to be described could be utilized also for the expedited transmission of signals and spaces involved in various telegraphing systems and methods inasmuch as after the transformation into current impulses, say, a dash could be regarded as equivalent to a black or dark portion of the picture, and a space to a light or lighter portion thereof.

Detuned keying of the transmitter, in the present connection, signifies the transmission well known in the prior art of two sufficiently different wave-lengths, one of which is transmitted during the entire scanning period of black, while the other wave-length is radiated during the whole scanning period of white portions. In this connection, it is permitted to make a presupposition which is sufficiently borne out by practical experience, i. e., that the heads of both waves are received at the receiving end with the same time intervals that have been present when scanning the copy at the sending end between the instants of transition from light to dark, and vice versa.

For ultra-short picture signals or impulses, say, in scanning fine or thin lines, the wave-trains reaching the receiver equipment are apt to have a markedly variable characteristic. Owing to the propagation of short-wave radiations over differently long paths, in case of high-speed transmission, in other words, of great speed of the film, a sequence of individual impulses separated by intervals may be recorded. If the rate of transmission speed is lower these impulses coalesce into an uninterrupted or permanent impulse. However, on account of the fact that they travel over different routes, impulses which arrive together may also become extinct by action of interference or beat, and the result are gaps in the record or re-created picture. However, in the circuit scheme hereinafter to be disclosed ways and means adapted to overcome the said difficulty have been included. By the initiation of a glow-discharge which is released upon the starting of one wave, and which subsequently persists, permanent actuation of the recorder or inking relay is secured regardless of interference points or interruptions in the picture signals.

The invention will be best understood when making reference to the following specification in connection with the accompanying drawing which illustrates one embodiment of the invention by way of example.

Referring now to the drawing, the waves picked up by the receiver equipment are suitably changed into intermediate frequencies by heterodyne action. Suppose the wave corresponding to black is $\lambda 1$, the one corresponding to white is $\lambda 2$. These waves may then be separated by means of filters 1 and 2, and they are caused to control and operate key or relay means 3 and 4 adapted to furnish a constant output potential irrespective of fluctuations in the field intensity. The arrangement is to operate in this manner that upon the arrival of $\lambda 1$, the light relay of the picture recorder means is caused to flash up with the result that the photographically sensitized recorder paper is blackened from the respective point or instant. Upon the arrival of wave $\lambda 2$, this energization of the light relay is to be eliminated, indeed, its renewed operation is to be suppressed for a certain length of time corresponding to the

possible extension of the wave-train λ1. The fall of potential occasioned across the plate resistance 5 of the output tube of the relay or limiting device 3 upon the arrival of wave λ1 tends to raise the potential drop between the ignition electrode and the cathode of a glow-discharge (or gaseous-conduction) relay 5' comprising the ignition electrode 6, the anode 7 and the cathode 8, to such an extent that a spontaneous or unassisted discharge is initiated between electrodes 7 and 8 of tube 5' by virtue of the ionizing impact. Current is thus allowed to flow from the positive pole of the battery 11 by way of resistance 9, glow-discharge gap 7—8 and further by way of resistance 12 shunted by a condenser 10 back to the negative pole. The fall of potential occurring across resistor 9 is used for the purpose of causing a brightening of the light relay 22 by way of an amplifier 21 to produce markings or blackenings upon a record surface associated with the light relay 22.

This excitation of relay 22 together with the blackening of the photographic paper associated therewith continues until the wave λ2 arrives, regardless of whether, owing to breaks or fading of wave λ1 the fall of potential across the resistance 5 is interrupted or not, owing to the continued action of the glow discharge in tube 5' when once the same has been initiated. When the wave λ2 is received, a sudden change in current is produced in the primary winding of transformer 13 which, by way of an amplifier tube 16, a coupling transformer 17 and another amplifier tube 18, causes a shock-like charging up of the condenser 10. The cathodes 19 and 20 of tubes 16 and 18 are represented as being heated from a common battery 15. Owing to the rise of potential produced across the condenser 10, inside the circuit containing the electrodes 7 and 8 of the glow-discharge relay 5', a reinforced fall of potential acts against the direct current voltage of battery 11. As a result the glow-discharge is discontinued and the fall of potential across the resistance 9 which excites the light relay 22 ceases. Hence, the recorder current is disconnected upon the arrival of wave λ2.

In order that repeated impulses of λ2 which might originate from the same atmospheric causes as in the case of wave λ1 may be prevented from occasioning additional charging of condenser 10, which, in the sense of the invention, is to become discharged gradually across the resistance 12, a negative biasing potential is obtained for the control grid of tube 16 by the aid of the adjustable contact 14 at the resistance 12.

As long as current is flowing between the electrodes 7 and 8 of the glow-discharge relay, this negative biasing potential just has the correct value for the operation of the tube 16 functioning as an amplifier. However, if the voltage across condenser 10 or across the terminals of resistance 12 has been abruptly raised owing to the charge current caused by the starting or the incoming of the wave λ2, then the control grid is blocked to an extent where renewed impulses of wave λ2 during a certain decaying time of the condenser 10 will be unable to affect tube 16 any longer. The decrease of potential of condenser 10 by way of resistance 12 must be regulated in accordance with the length of time within which lagging amplitudes of wave λ1 may still come in, this end being attained by suitable dimensioning of the capacity of condenser 10 and of the resistance 12, in other words, by proper choice of the time-constant of the assembly. In this manner, conditions are made so that the potential active between the electrodes 7 and 8 of the glow-discharge relay will remain below a value required for the discharge during a certain adjustable length of time of the decaying or discharging period of the condenser 10, with the result that excitation of light relay 22 is blocked for that time. However, this blocking effect gradually decreases with the charge potential of condenser 10 and thereby insures the process of a time-limited counter-action against spreading of the wave λ1.

Other modifications and changes may suggest themselves to those skilled in the art to which the invention relates, and I, therefore, believe myself to be entitled to make and use any and all of such modifications as fall fairly within the spirit and scope of the hereinafter appended claims.

Having now described my invention, what I claim and desire to secure by Letters Patent is the following:

1. In a system for preventing spreading of signals wherein a plurality of different frequency signals represent different characters of transmission, a receiver system having portions thereof each responsive to a single one of said signals, a signal recording device, a glow discharge means operative upon receipt of one of said signals for operating said recording device, means for maintaining the glow discharge device in an operative state irrespective of the persistence of said signals initiating the operation, and means operative upon receipt of the other of said signals for initiating a counter electromotive force to render the glow discharge device inoperative.

2. In a system for preventing spreading of recorded signals wherein spacing and marking impulses are produced each as signals of different frequency characteristics and which are each transmitted during the entire period of spacing or marking, means for receiving and separating each of said signals, a recording device, a glow discharge relay associated with said signal receiving means, means responsive to the receipt of one of said signals for initiating an uninterrupted flow of current through said glow discharge relay for exciting said recording device, and an amplifying means responsive to the other of said received signals for initiating a counter electromotive force through said glow discharge relay for discontinuing the glow discharge current flowing therethrough for rendering said recording device inoperative.

3. In a system for preventing spreading of signals wherein signals of one frequency characteristic indicate marking impulses and signals of a second frequency characteristic indicate spacing impulses, a receiving means responsive to each of said signals, a recording device, a glow discharge device adapted to become operative to pass current upon receipt of one of said signals whereby the recording device is rendered operative, means for causing current to continue to flow through the glow discharge device subsequent to the initial signal so as to render the recording device permanently operative until the receipt of signals of different frequency characteristic irrespective of the duration of the signals initiating the operation of the recording device, and means responsive to the frequency of the second frequency characteristic for abruptly decreasing the operating voltage effective upon the glow discharge device to interrupt the current flow therethrough and thereby render the recording device inoperative for a time period

continuing until the receipt of signals of the first frequency characteristic causing the initial operation.

4. In a system for preventing spreading of signals wherein signals of a first frequency characteristic indicate marking impulses and signals of a second and differing frequency characteristic indicate spacing impulses, means for receiving signals of the first of said differing frequency characteristic signals, a recording device, a glow discharge device responsive to the frequency of said first received signals for rendering said recording device operative, means for maintaining the operation of said recording device irrespective of the continuity of the signals initiating the operation thereof, means responsive to the signals of the second characteristic frequency, amplifying means connected with said second signal receiving means, a connection between said amplifying means and said glow discharge device for introducing into said glow discharge device during periods when signals of the second frequency characteristic are received a counter electromotive force for interrupting the operation of said glow discharge device and rendering said recorder inoperative, and a capacity and resistance element associated with said amplifying system for neutralizing repeated impulses of the second wave characteristic.

FRITZ SCHRÖTER.