

Nov. 18, 1941.

S. A. JANSSON
ELECTRIC REMOTE CONTROL SYSTEM

2,262,766

Filed Nov. 16, 1938

2 Sheets-Sheet 1

Fig. 1.

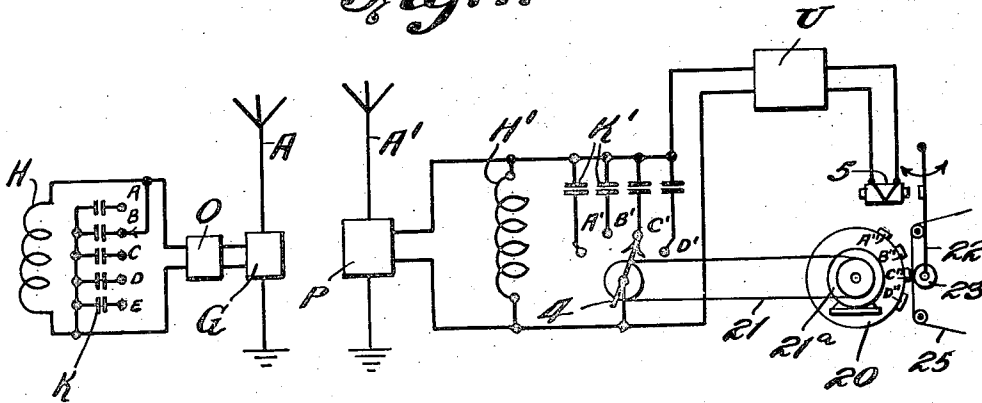


Fig. 2.

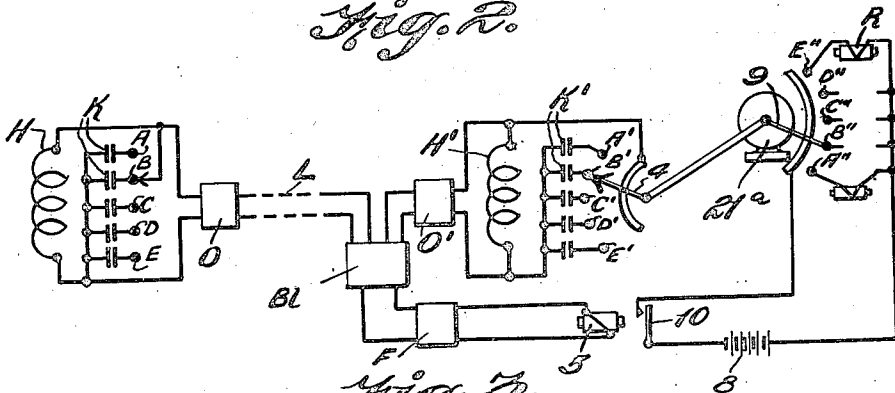
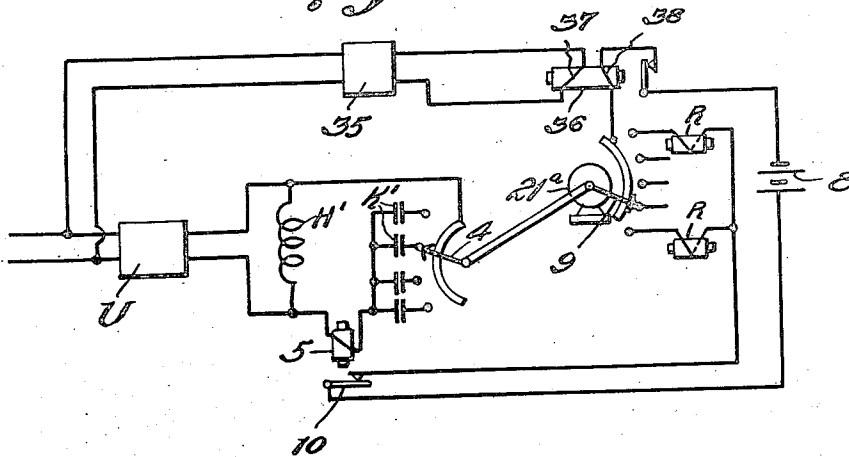


Fig. 3.



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Fig. 4.

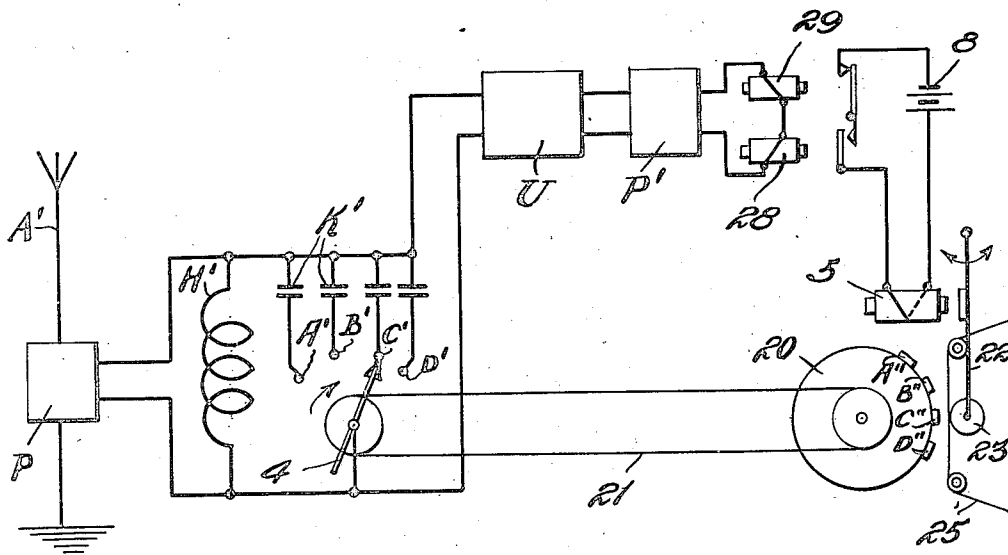
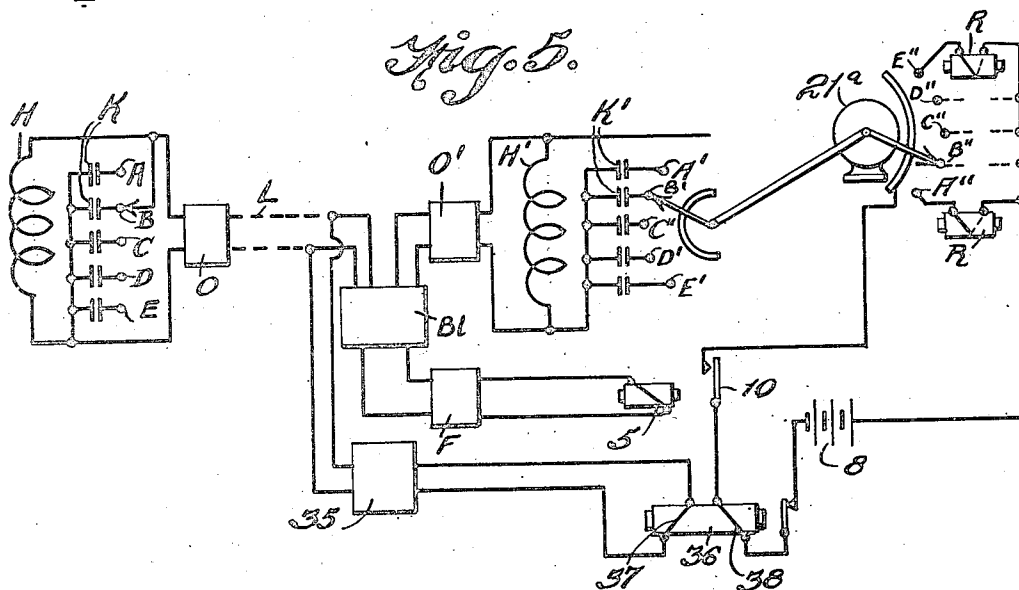


Fig. 5.



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UNITED STATES PATENT OFFICE

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ELECTRIC REMOTE CONTROL SYSTEM

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In Sweden November 18, 1937

7 Claims. (Cl. 178—35)

My invention relates to electric remote control systems, and pertains more particularly to such systems in which a selectively adjustable sender is employed to supervise a receiver comprising a tuning member or the like adapted to be adjusted within a certain tuning range for the purpose of tuning or otherwise regulating a selective circuit or the like at the receiver side in correspondence with the selective condition of the sender.

It is a general object of my invention to provide for selective receipt of impulses from the sender without having to resort to any synchronizing of the sender and the receiver and without the use, at the receiver, of a plurality of circuits or the like which are fixedly tuned in advance each to one of a number of different sender signals or impulses. The invention may be applied for instance in automatic telephone systems to effect a simplification of the selector arrangements, particularly the arrangements for the transmission of impulses from the subscriber's stations to the exchange. Furthermore, the invention may advantageously find application in high speed telegraph systems, particularly in teleprinters or type printing telegraphs, the invention comprising also special arrangements for increasing the telegraphing speed in such systems.

My invention will be better understood from the following description when considered in connection with the accompanying drawings, showing various embodiments of the invention. In the drawings:

Fig. 1 illustrates an application of the invention in a type printing radio telegraph system.

Fig. 2 shows another application of the invention in which the heterodyne principle is used.

Fig. 3 is a diagrammatic view showing an arrangement of the receiver in which means are provided for preventing repetition of the indication of an incoming signal.

Fig. 4 illustrates a further example of the invention applied to a type printing radio system.

Fig. 5 illustrates a combination of the arrangements shown in Figs. 2 and 3.

Referring to the drawings, there is shown at A a sender antenna connected to a high frequency oscillator G having a fixed frequency and the oscillations of the oscillator are modulated in a known manner by means of low frequency oscillations supplied from a low frequency oscillator O. The oscillator is a tube oscillator the frequency determining circuit of which is composed of a fixed inductance H and a variable capacity composed of condensers K between which con-

tacts A, B, C, D, E . . . are provided. The oscillator may be replaced by any other alternating current generator having a controllable frequency. The receiver antenna A' is connected through a detector P and, if desired, an amplifier, to the parallel resonance circuit including an inductance coil H' and condensers K' of the receiver. This circuit is adapted to be tuned in correspondence with the sender circuit. This tuning is effected by means of a contact arm 4 which is rotated continuously by a motor 21a coupled to the shaft of the contact arm 4 by means of a suitable transmission such as a belt 21 so that the condensers K' are successively connected to the inductance H' at the contacts A', B', C', D' . . . A releasing relay 5 is connected through the low frequency amplifier U to the parallel resonance circuit which includes the condensers K' and the coil H'. A type wheel 20, provided with printing types A'', B'', C'', D'' . . . each corresponding to one of the contacts A', B', C', D' . . . is driven by the motor 21a in synchronism with the arm 4, so that in each setting position of the contact arm the type wheel will take up an angular position corresponding thereto, the corresponding type then occupying a position opposite to a printing roller 23 supported by an arm 22. The arm 22 is connected with the armature of the releasing relay 5, so that upon energization of the relay the printing roller will be pressed against the opposite type causing the type to be printed on a paper strip 25 which moves between the type wheel and the printing roller. For the purpose of increasing the printing speed the printing roller is preferably arranged to rotate continuously with the same peripheral speed as the type wheel and it may be coupled with the type wheel through a friction coupling.

The printing wheel 20 may be regarded as forming the selector which is driven in synchronism with the contact device 4 and which travels all through its selecting range each time the tuning circuit runs through its tuning range. If the various resonance frequencies have considerably different building-up times the contact segments A', B' . . . should have a varying width in order to give the lower frequencies more time to become built up. In the embodiment according to Fig. 1 the types A'', B'' . . . should then be unevenly spaced around the circumference in such a manner that the types corresponding to the lower frequencies will have greater mutual distances than the types corresponding to the higher frequencies in order that each type shall

have reached its printing position at the very moment when the corresponding frequency has reached a sufficient amplitude to effect release of the printing relay 5.

In the embodiments above described, in which alternating current or high frequency oscillations are used for the signal transmission, the receiver is designed as a straight radio receiver, in that the signals are transformed at the receiver directly to releasing impulses. If desired, one may subject the signals received, prior to their transformation into releasing impulses, to a frequency transformation. In some cases, for example if the transmitting medium or means does not permit transmission of frequencies above a certain relatively low limit, it may be suitable to effect at the receiver a doubling or multiplying of the frequency for the purpose of utilizing the shorter time of oscillation of the higher frequencies, thereby rendering possible a more rapid sequence of characters. The higher frequencies obtained, which in this case bring about the release of the indications, should be as free as possible from higher and lower harmonics.

Furthermore, it is possible in connection with the invention to apply the heterodyne principle in such a manner as to bring the local oscillator disposed at the receiver to produce for each revolution of the selector a number of different frequencies which may form, through interference each with a corresponding one of the frequencies which may be sent out from the sender, one and the same sum or differential frequency, the receiver being then provided with a member tuned to said constant frequency or made selective. Figure 2 shows an embodiment of this kind. The oscillator circuit is here designed in the same manner as in Fig. 1 and is directly connected to the receiver through a transmission line L. The receiver is provided with a local oscillator O' the frequency determining circuit of which consists of a fixed inductance H' and capacity which is adjustable step by step by means of the contact arm 4. The capacity is composed of condensers K' which are adapted to be selectively included in the circuit. The signal oscillations incoming over the line L from the sender and the oscillations coming from the local oscillator O' are mixed in a modulator B₁ which is connected at its output side to the releasing relay 5 over a band filter F having a narrow frequency band providing the predetermined interference frequency. Since the frequency is produced only upon the occurrence of corresponding settings of the sender and the receiver, for instance in the setting positions B and B', and since all other modulation products of the modulator B₁ are blocked by the filter F, the releasing relay 5 will be actuated only during the moments when corresponding settings occur. The active modulation product, or the interference frequency passed by the band filter F, should generally, with regard to the requisite building-up time of the filter, be selected higher for a more rapid sequence of the characters. In case of a great receiving speed it is therefore generally more suitable to use a sum frequency than a difference frequency.

In the connection according to Fig. 2 the oscillator O' in combination with the modulator B₁ and the filter F may be considered as the selective tuning member at the receiver, which tuning member is selectively sensitive in each setting position of the contact arm 4 for a single corresponding sender frequency, namely the one

which is capable of producing in the modulator the predetermined interference frequency corresponding to the filter F.

A contact arm 4 is mechanically coupled with another contact or selector arm 9 which during each passage of the contact arm 4 over the row of contacts A', B', C' . . . passes over a row of corresponding selector contacts A'', B'', C'' . . . thereby preparing in advance, for each setting of the contact arm 4 in any of the contact positions A', B', C' . . . , an indicating circuit containing a current source 8 by connecting up successively at the contacts A'', B'', C'' . . . a number of relays R. Each relay R thus corresponds to a setting position A', B', C' . . . for the contact arm 4 and consequently also to a setting position A, B, C . . . at the sender.

In the applications of the invention in type printing telegraphs or the like shown in Fig. 1 a certain irregularity of printing may occur because of the fact that the building-up time for each frequency can vary somewhat according to the phase which the signalling frequency has at the moment when the corresponding contact in the contact row A', B', C' . . . is closed, whereby the letters may be printed in somewhat dislocated positions. This inconvenience may be avoided by preventing the releasing circuit, by means of a separate relay device, from becoming closed until after the contact closing in the tuning circuit has ceased. Fig. 4 shows an example of the use of such a correcting arrangement in the connection according to Fig. 1. The amplifier U, which in Fig. 1 is directly connected to the relay 5, is connected in Fig. 4, if desired through a detector P', to two series-connected relays 28 and 29, of which relays the last mentioned one is somewhat slow upon release. An opening contact of the relay 28 and a closing contact of the relay 29 are included in series in the circuit of the releasing relay 5, said circuit also containing a battery 8. When the oscillatory circuit formed of the coil H' and a condenser K' is in resonance with the incoming signal, for example in the setting position C', both relays 28 and 29 are energized simultaneously, so that the circuit of the relay 5 will temporarily remain interrupted. At the moment when the contact arm 4 leaves the contact C' the relay 28 will be deenergized immediately, whereas the relay 29 will retain its armature attracted for a further brief moment during which the relay 5 has time to become energized and to cause printing of the type C'' on the paper strip 25. In this arrangement the printing will always take place at the moment when the corresponding contact closing in the tuned circuit ceases, a perfectly regular printing of the letters being thus obtained. The correcting arrangement in question may also be used in any one of the embodiments described in order to secure indication of a certain signal in exactly the same angular position of the selector.

In cases when the selector runs through its selecting range in uninterrupted repeated sequence it may occur that a signal transmitted from the sender will last longer than a complete revolution of the selector, so that if no precautions were taken one and the same sign could be repeated two or more times at the receiver. Such an unintentional repeating can be prevented by arranging the releasing circuit as shown in Figs. 3 and 5 with an auxiliary relay 36 provided with two windings 37 and 38, the first windings being connected through an am-

plifier 35 directly to the line and the other one being included in the releasing circuit over an opening contact of the relay. The winding 37 connected to the line is so dimensioned that for each incoming signal it brings about a preparatory magnetization of the relay, said magnetization being in itself insufficient to attract the armature but sufficient to hold the same in attracted position. The auxiliary relay 36 is thus magnetically biased for each signal, but is operated only when the tuning circuit formed of the coil H' and a condenser K' is in resonance with the signal, the armature being then attracted, opening the releasing circuit only after the indicating relay R corresponding to the signal has operated, whereafter the releasing circuit is kept open until the signal has ceased.

I claim:

1. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a regulating device for adjusting the selective circuit of the receiver successively and in repeated sequence into different selective conditions each corresponding to one of the selective conditions of the sender, a recording device comprising a type wheel driven synchronously with said regulating device and arranged under the control of the selective circuit of the receiver to operate when reaching selective correspondence between the sender and the receiver, and an impulse restricting device acting to cut off recording signal impulses after actuation of the recording device to prevent repetition of registration of incoming signals.

2. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a regulating device for adjusting the selective circuit of the receiver successively and in repeated sequence into different selective conditions each corresponding to one of the selective conditions of the sender, a type wheel driven synchronously with said regulating device, and a printing member disposed in front of said type wheel and arranged under the control of the selective circuit of the receiver to be pressed against said type wheel when reaching selective correspondence between the sender and the receiver, and impulse restricting means acting to cut off recording signal impulses after actuation of the printing member to prevent repetition of registration of incoming signals.

3. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a local oscillator cooperating with said selective circuit of the receiver so as to determine the selective condition of the receiver, means for varying the frequency of said local oscillator stepwise so as to produce a series of local frequencies each allotted to one of the sender frequencies, a recording device under the control of the selective circuit of the receiver, means for adjusting said recording device in synchronism with the adjustment of said local oscillator into different recording conditions, and impulse restricting means acting to cut off recording signal impulses after actuation of the recording device to prevent repetition of registration of incoming signals.

4. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective

circuit at the receiver, a local oscillator cooperating with said selective circuit of the receiver so as to determine the selective condition of the receiver, means for varying the frequency of said local oscillator stepwise so as to produce a series of local frequencies each differing from a corresponding sender frequency with a constant value, a selective circuit tuned to said constant difference of frequencies, a recording device under the control of the selective circuit of the receiver, means for adjusting said recording device in synchronism with the adjustment of said local oscillator into different recording conditions, and an impulse restricting device acting to cut off recording signal impulses after actuation of the recording device to prevent repetition of registration of incoming signals.

5. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a regulating device for adjusting the selective circuit of the receiver successively and in repeated sequence into different selective conditions each corresponding to one of the selective conditions of the sender, an indicating device under the control of the selective circuit of the receiver, means for adjusting said indicating device in synchronism with the adjustment of the selective circuit of the receiver into different indicating conditions, and a relay arranged to be supplied with biasing voltage by incoming signals and to be actuated upon operation of said indicating device so as to break off the operative condition of said indicating device thereby preventing repetition of the registration of an incoming signal.

6. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a regulating device for adjusting the selective circuit of the receiver successively and in repeated sequence into different selective conditions each corresponding to one of the selective conditions of the sender, an operating circuit connected with the selective circuit of the receiver, an indicating device under the control of said operating circuit, means for adjusting said indicating device in synchronism with the adjustment of the selective circuit of the receiver into different indicating conditions, and an electromagnetic relay having one winding connected to the input side of the receiver so as to be supplied with biasing voltage by incoming signals and having another winding included in said operating circuit in series with a breaking contact of the relay.

7. In an electric remote control system the combination of, a sender, a receiver, an adjustable selective circuit at the sender, a selective circuit at the receiver, a regulating device for adjusting the selective circuit of the receiver successively and in repeated sequence into different selective conditions each corresponding to one of the selective conditions of the sender, an indicating device under the control of the selective circuit of the receiver, means for adjusting said indicating device in synchronism with the adjustment of the selective circuit of the receiver into different indicating conditions, and impulse restricting means acting to cut off signal impulses after actuation of the indicating device to prevent repetition of an indication of incoming signals.

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