Dec. 9, 1952 T. I. RESS 2,621,249

PAPER FEED CONTROL APPARATUS

Filed June 6, 1950 2 SHEETS—SHEET 1

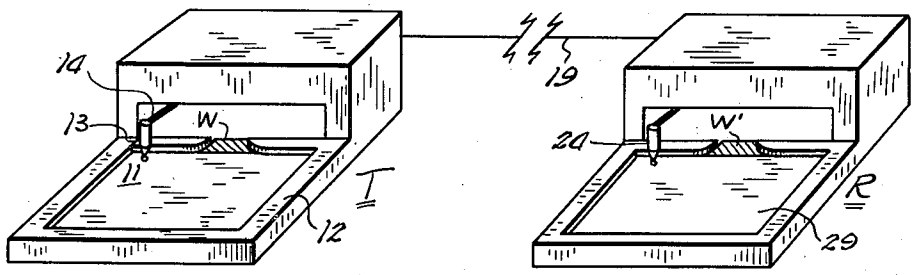


Fig. 1.

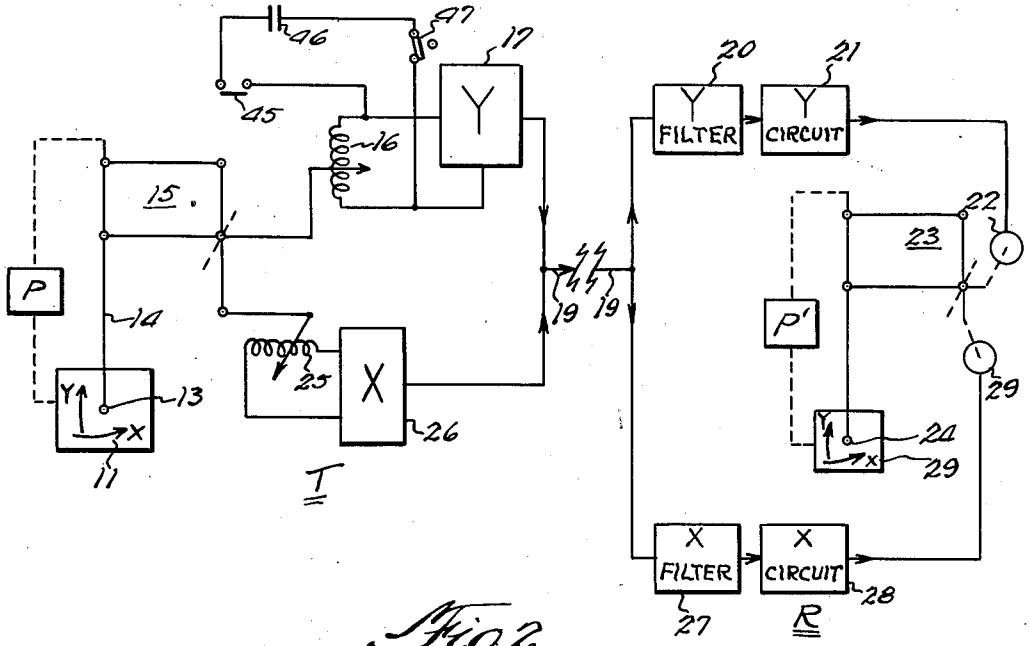


Fig. 2.

Inventor:
Thomas I. Ress.
By: Thiess, Olsen & Mecklenburger.
Attys.

Dec. 9, 1952 T. I. RESS 2,621,249

PAPER FEED CONTROL APPARATUS

Filed June 6, 1950 2 SHEETS—SHEET 2

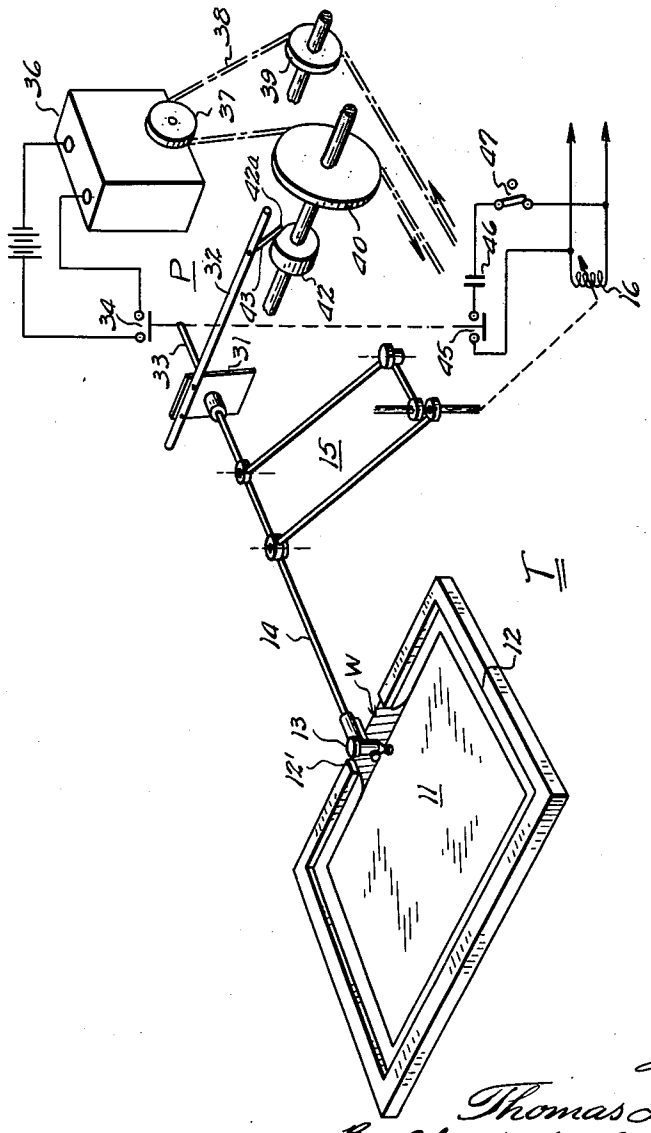


Fig. 3.

Inventor:
Thomas I. Ress.
By: Thiess, Olson & Mackenzie
Attys.

Patented Dec. 9, 1952

2,621,249

UNITED STATES PATENT OFFICE

2,621,249

PAPER FEED CONTROL APPARATUS

Thomas I. Ress, Evanston, Ill., assignor to Consolidated Electric Company, Chicago, Ill., a corporation of Illinois

Application June 6, 1950, Serial No. 166,415

10 Claims. (Cl. 178—18)

1

This invention relates to signaling apparatus within an intelligence communicating system, and more particularly to signaling apparatus in such a system for controlling the feeding of a replaceable intelligence bearing medium, such as paper, at a remote station.

In intelligence communicating systems in which the communicated intelligence is made to appear upon a writing surface such as paper, there arises the problem of replacing the paper when that portion of the paper lying within an operational area has been utilized to the extent desired. Preferably, some form of signal is originated at the transmitting station for causing simultaneous advancement of the paper at both the transmitting station and the receiving station.

In a tele-autographic system the source of this signal may be, in the interest of convenience and facility, the movement of the stylus of the transmitting station to some signal generating area beyond the normal writing surface. In such a system, as will subsequently be explained in detail, if the transmitter stylus is moved only a short distance into that signal generating area or is maintained in that area for only a short period of time, fresh paper may be fed at the transmitting station while the generated signal might be too weak or of too short a duration to cause a complete cycle of operation of the paper feeding apparatus at the receiving station. As a result, the operator at the transmitting station will be under the impression that the system is in condition for transmission of a further message while, actually, any further message will be superimposed on the previous message at the receiving station. Accordingly, it is a further object of the invention to provide improved apparatus of the character indicated wherein such possible defects are eliminated.

The invention will be described in connection with tele-autographic apparatus such, for example, as that disclosed and claimed in the applications of Robert Adler, Serial No. 81,709, filed March 16, 1949, now Patent Number 2,583,720 dated January 29, 1952, assigned to the same assignee as the present invention, and entitled "Follow-Up Apparatus and Systems," and Serial No. 85,236, filed April 2, 1949, now Patent Number 2,583,535 dated January 29, 1952, assigned to the same assignee as the present invention and entitled "Translating Apparatus and Follow-Up Systems."

In accordance with one embodiment of the invention, the signal which causes the feeding of

2

paper at the transmitting station results from movement of the transmitter stylus to a signal generating area outside the boundary of the normal writing surface and the signal causing the feeding of paper at the receiving station results from a corresponding movement of the receiver stylus to a corresponding signal generating area. However, this movement of the receiver stylus is caused to be exaggerated by movement of the paper feeding apparatus at the transmitting station. As a result, if the feeding of paper is initiated at the transmitting station, an adequate signal will always be produced for causing the feeding of paper at the receiving station.

Accordingly, it is another object of the invention to provide improved apparatus for generating a signal to cause the feeding of a replaceable intelligence recording medium at a remote communication station.

It is another object of the invention to provide improved apparatus for generating a paper feed signal for transmission to a remote tele-autographic receiver station, such signal being generated by actual operation of paper feed apparatus associated with a transmitting station.

It is another object of the invention to provide improved paper feed signal apparatus for a tele-autographic system which utilizes the apparatus and circuits normally employed for generating the basic communication signal.

This invention, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings, in which like parts are designated by like reference numerals:

Fig. 1 is a perspective view of tele-autographic apparatus with which the illustrated embodiment of the invention is adapted to operate;

Fig. 2 is a circuit diagram, largely in block form, of a tele-autographic system, this circuit including a paper feed control circuit associated with one feature of the invention; and

Fig. 3 is a combination perspective view and wiring diagram illustrating one embodiment of the invention as applied to the tele-autograph system illustrated in Figs. 1 and 2.

The tele-autograph system, illustrated in Figs. 1 and 2, includes a transmitting station T and a receiving station R. These stations may be reversed in function but for the purpose of illustrating the present invention one of the stations may be considered as a transmitter and the other

as a receiver. A writing surface 11 bounded by a frame 12 is provided at the transmitting station, and a writing head or stylus 13 is arranged to be manually directed over the writing surface 11 for transcribing a message thereon. The stylus 13 is connected by an arm 14 to a parallel linkage system 15, seen in Fig. 2, through which physical signals corresponding to the movements of the stylus 13 are transmitted to electrical apparatus which generates corresponding electric signals for transmission to the receiving station.

The tele-autograph system will not be described in detail herein since it may be of any suitable form and preferably is similar to the apparatus disclosed and claimed in Serial No. 81,709, referred to above. Similarly, the parallel linkage system 15 will be described only briefly since it is disclosed and claimed in application Serial No. 85,236, referred to above.

The position of the stylus 13 determined by the intersection of the X and Y coordinate axis corresponds to signals having definite frequencies generated by the X and Y circuits.

Movement of the stylus 13 along the indicated Y axis results in a corresponding variation in the frequency of the output signal of the Y circuit. This is accomplished by variation of the reactance of a variable inductance 16 which is connected to a Y circuit 17. Variation of the inductance 16 changes the resonant frequency of the Y circuit and produces a corresponding variation in the output signal frequency thereof. This varying frequency signal passes over the transmission line 19 to the receiving station R where it passes through a Y filter 20 to a Y discriminating and amplifying circuit 21. The output of the circuit 21 is fed to a motor 22 which drives a linkage system 23 and a receiver stylus 24 corresponding to the transmitter linkage 15 and the transmitter stylus 13, the ultimate position of the receiver stylus along the indicated Y axis being determined by the frequency of the transmitted Y signal.

Similarly, movement of the stylus 13 along the indicated X axis operates through the linkage system 15 to vary the reactance of a variable inductance 25 which changes the resonant frequency of the input circuit of an X circuit 26. The output of the X circuit 26 is, accordingly, varied in its frequency. This signal may pass over the same transmission line 19 to the receiving station R. The X signal, being of a different frequency range than the Y signal, is blocked by the Y filter 20 but passes through an X filter 27 and an X circuit 28 which includes a discriminator and an amplifier. The output of the X circuit 28 passes to a motor 29 which drives the linkage 23 to produce movement of the stylus 24 along the indicated X axis to a position corresponding at all times to frequency of the X signal and, accordingly, to the position of the transmitter stylus 13.

Thus it is seen that as the transmitter stylus is moved over the writing surface 11, the receiver stylus is made to trace a similar path over a writing surface 29.

When it is desired to replace the writing surface 11, as for example when it has been filled with writing, it is desirable, of course, that the writing surface 29 also be replaced since a subsequent message written on the transmitter writing surface 11 would otherwise be superimposed on the previous message on the writing surface 29 at the receiving station.

One of the most convenient methods of producing a signal for automatic feeding of paper at both stations is to provide for the generation of such a signal when the styluses 13 and 24 are moved to positions not normally occupied by the styluses in the writing of a message on the respective writing surfaces. Such positions are indicated by the shaded areas W and W' at the transmitting station and the receiving station respectively. For convenience, these areas are located immediately adjacent the corresponding writing surfaces. It will be observed that when the transmitter stylus is moved into the area W to produce a paper feeding signal, the receiver stylus 24, tracing a similar path, will move into the area W' to produce a paper feeding signal for the receiving station.

The paper feeding apparatus and controls for the transmitting station and the receiving station are designated P and P' respectively in Fig. 2. The paper feeding apparatus P for the transmitting station is shown in detail in Fig. 3. It can be seen in that figure that when the transmitter stylus 13 is moved into the shaded area W, the rearward end of the arm 14 strikes a plate 31 secured to a rotatably mounted shaft 32. The rod 32 is thereby rotated in a counterclockwise direction, as viewed from the righthand end thereof, and an arm 33 fixed to the shaft 32 is raised and closes a switch 34. The closing of the contacts of the switch 34 completes a circuit including a source of electric energy such as the battery 35, and a motor 36.

Connected to the shaft of the motor 36 is a sprocket wheel 37 which drives a chain 38. The chain 38 passes over a pair of rotatably mounted idler sprockets 39 and 40 and from thence to any suitable form of paper feeding apparatus. The latter apparatus is not shown in the drawings since it may be of any suitable form. It is to be understood, however, that the chain 38 drives the paper feed mechanism for the transmitting station only.

The idler sprocket 40 is fixedly secured to a shaft 41 which is mounted in suitable fixed bearings not shown in the drawings. Also secured to the shaft 41 is a cam 42 which serves as a mechanical locking-in device assuring the continued energization of the motor 36 until a desired predetermined quantity of paper has been fed at the transmitting station. Cam 42 has a flat spot 42*a* against which an arm 43 normally rests. When the arm 43 engages this flat spot, as in the position illustrated in Fig. 3, the arm 33 is in its lowermost position and the associated switch 34 is in its open position. However, when the motor 36 has driven the chain 38 a short distance, this being effected by holding the stylus in the area W and consequently holding switch 34 closed a sufficient length of time, the sprocket 40 and hence the cam 42 are rotated a sufficient amount that the arm 43 engages the raised portion of the cam 42 whereby the arm 33 is retained in its raised position and the switch 34 remains closed. The motor 36 then continues to operate, irrespective of the withdrawal of the stylus from the area W, until the flat portion 42*a* of the cam 42 returns to the position indicated in Fig. 3. If the stylus 13 has in the meantime been withdrawn from the shaded area W, the arm 43 is free to engage the flat portion of the cam and the arm 33 may drop to its lowermost position and the switch 34 may open, de-energizing the motor 36.

The paper feeding apparatus P' at the receiving station is preferably identical to that described immediately above and is actuated by movement

of the arm supporting the stylus 24, against a plate corresponding to the plate 31.

Accordingly, when the transmitter stylus is moved into the shaded area W, the receiver stylus will trace the path of the transmitter stylus and move into the corresponding shaded area W'. Such movement of the two styluses well into these areas and for sufficient lengths of time will actuate the corresponding paper feed control apparatus and circuits and paper will be fed at both stations. It has been found that if the transmitter stylus is moved only a short distance into the shaded area W a signal will be generated which will initiate a complete cycle of operation of the local paper feed control apparatus but the control apparatus at the receiving station may not operate because the receiver stylus is not urged into the shaded area W' with sufficient force to actuate the paper feed control apparatus. Also, it has been found that, if the transmitter stylus is moved rapidly into and out of the shaded area W, the paper feed control apparatus at one station (for example, the transmitting station) may be energized for a sufficient length of time to enable the cam 42 to lock in the apparatus and assure a complete cycle of operation, but, at the receiving station, the cam corresponding to the cam 42 may not have turned far enough to assure a complete cycle of operation of the paper feed apparatus at that station. These conditions may arise as the result of slight differences or misalignment between corresponding circuit and control apparatus components. For example, the receiver stylus may occupy a position slightly out of correspondence with the position of the transmitter stylus for particular frequencies, or there might be small variations in physical dimensions of respective parts of the control apparatus, such as the length of the arm 14 or the angular orientation of the flat spot 42' on the cam 42. Other possible forms of misalignment will be apparent to those skilled in the art.

Any small misalignment might result in fresh paper being fed to the writing surface at the transmitting station but not at the receiving station whereby a subsequently transmitted message would be superimposed over the last preceding message at the receiving station.

In the illustrated embodiment of the invention the possibility of such improper operation of the apparatus is substantially eliminated. Apparatus is provided for generating a signal which will assure paper feeding at the receiving station whenever paper is fed at the transmitting station.

This apparatus includes a switch 45 appearing in Fig. 2 as well as in Fig. 3. The switch 45 is mechanically connected to the arm 33 and is actuated thereby. The switch is normally open but when the transmitter stylus 13 is moved into the shaded area W the arm 33 closes the switch 45. This closes a circuit placing a condenser 46 in parallel with the coil 16, as is clearly seen in Fig. 3, and produces a pronounced change in the frequency of the Y signal by virtue of substantially changing the resonant frequency of the input circuit.

This Y signal, of substantially increased or decreased frequency, is transmitted over the transmission line 19 and through the Y filter 29 to the Y circuit 21. The change in signal frequency resulting from insertion of the reactance 48 is of such value as to cause exaggerated movement of the receiver stylus 24 along the indicated Y axis in the direction of the shaded area W'. The receiver stylus is thereby thrust into the shaded area W' with substantial force and may be maintained in this area for at least a portion of the operating cycle of the paper feeding apparatus at the transmitting station, even though the transmitter stylus is withdrawn from the corresponding area W.

It will be apparent that the switch 45 will remain closed for substantially the same length of time as the switch 34 and, accordingly, that the exaggerated Y signal will be transmitted to the receiving station throughout the paper feeding operation at the transmitting station. This assures that the receiver stylus 24 will remain in the shaded area W' for a substantial period of time and cause a complete cycle of operation of the paper feeding apparatus at the receiving station.

Accordingly, if the transmitter stylus is moved into the shaded area W and is retained there long enough to initiate a complete cycle of operation of the paper feed apparatus at the transmitting station, a signal will always be produced which will assure a complete cycle of operation of the paper feed apparatus at the receiving station.

It will be noted that a switch 47 is arranged in series with the switch 45. The switch 47 is connected to or is a part of a switch located at each station, but not shown in the drawings, for alternatively conditioning the corresponding station to operate as a transmitter or a receiver. When a station is operating as a transmitter the switch 47 is closed whereby the condenser 46 may be placed in parallel with the coil 16 and an exaggerated Y signal or paper feeding signal may be produced and transmitted to a receiving station when the switch 45 is closed.

When a station is operating as a receiver, the switch 47 is opened. This is desirable since otherwise the corresponding condenser 46 at the receiving station would be placed in circuit when the receiver stylus is driven into the shaded area W' and would seriously affect the response of the receiver stylus to the received intelligence signals. More specifically, it might have the effect of neutralizing the exaggerated Y signal received from the transmitting station.

The simple apparatus and circuits shown in the drawings and described above assures substantially concurrent operation of the paper feed apparatus at both the transmitting station and the receiving station and at the same time has the advantage of utilizing a substantial part of the basic intelligence communicating signal circuits for generating and transmitting a signal for controlling the paper feed apparatus at the receiving station.

It will be apparent that the apparatus shown schematically in Fig. 3 may be of many forms, the important factor being that the signal for actuating the paper feed apparatus at the receiving station be obtained from the paper feed apparatus at the transmitting station, it being understood that the latter term includes any apparatus such as the shaft 41 or the shaft 32, for example, which is maintained in operative or energized condition for a substantial period of time or throughout the operating cycle of the paper feeding at the transmitting station.

Similarly, the apparatus for producing the paper feed signal for the receiving station may be of many forms. The normal intelligence signal might be altered, for example, in frequency or voltage by insertion, removal or modification of any suitable circuit element.

Accordingly, while a particular embodiment of

the invention has been shown, it will be understood that the invention is not limited thereto since many modifications may be made, and it is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

The invention having thus been described, what is claimed and desired to be secured by Letters Patent is:

1. In an intelligence communicating system including an alternating current intelligence signal transmitting station and a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, a stylus at each of said stations for recording on said intelligence bearing mediums, said power operated apparatus at said receiving station being actuatable by movement of the stylus at said receiving station to a predetermined position, and means located at said transmitting station for actuating said power operated apparatus at said transmitting station; means at said transmitting station for generating a signal for actuating said power operated apparatus at said receiving station, said last mentioned means including a variable circuit element for materially altering the output signal frequency of said transmitting station to drive said stylus at said receiving station forcibly into said predetermined position.

2. In an intelligence communicating system including an alternating current intelligence signal transmitting station and a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, a stylus at each of said stations for recording on said intelligence bearing mediums, said power operated apparatus at said receiving station being actuatable by movement of the stylus at said receiving station to a predetermined position, and means located at said transmitting station for actuating said power operated apparatus at said transmitting station; means at said transmitting station for generating a signal for actuating said power operated apparatus at said receiving station, said last mentioned means including a reactance element for materially altering the output signal frequency of said transmitting station to drive said stylus at said receiving station forcibly into said predetermined position.

3. In a tele-autographic system including a signal transmitting station, a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, and a stylus at each of said stations for recording on said intelligence bearing mediums, the stylus at said receiving station automatically tracing movements of the stylus at said transmitting station, and each of said power operated apparatus being actuatable by movement of the corresponding stylus to corresponding predetermined positions; the structure comprising, means at said transmitting station for assuring movement of said receiver stylus into the corresponding one of said predetermined areas when said transmitter stylus is moved into said predetermined area at said transmitting station, said means including a variable circuit element for materially altering the output signal of said transmitting station.

4. In a tele-autographic system including a transmitting station for generating an alternating current signal of modulated frequency, a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, and a stylus at each of said stations for recording on said intelligence bearing mediums, the stylus at said receiving station automatically tracing movements of the stylus at said transmitting station, and each of said power operated apparatus being actuatable by movement of the corresponding stylus to corresponding predetermined positions; the structure comprising, means at said transmitting station for assuring movement of said receiver stylus into the corresponding one of said predetermined areas when said transmitting stylus is moved into said predetermined area at said transmitting station, said means including a reactance element for materially altering the frequency of the output signal of said transmitting station.

5. In a tele-autographic system including a signal transmitting station, a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, and a stylus at each of said stations for recording on said intelligence bearing mediums, the stylus at said receiving station automatically tracing movements of the stylus at said transmitting station, and each of said power operated apparatus being actuatable by movement of the corresponding stylus to corresponding predetermined positions; the structure comprising, means at said transmitting station for driving said receiver stylus relatively forcefully into the corresponding one of said predetermined areas at each operation of said power operated apparatus at said transmitting station, said means including a variable circuit element for materially altering the output signal of said transmitting station and being associated with said power operated apparatus at said transmitting station and actuatable by operation thereof.

6. In a tele-autographic system including a transmitting station for generating an alternating current signal of modulated frequency, a receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, and a stylus at each of said stations for recording on said intelligence bearing mediums, the stylus at said receiving station automatically tracing movements of the stylus at said transmitting station, and each of said power operated apparatus being actuatable by movement of the corresponding stylus to corresponding predetermined positions; the structure comprising, means at said transmitting station for driving said receiver stylus relatively forcefully into the corresponding one of said predetermined areas at each operation of said power operated apparatus at said transmitting station, said means including a reactance element for materially altering the frequency of the output signal of said transmitting station and being associated with said power operated apparatus at said transmitting station and actuatable by operation thereof.

7. In an intelligence communicating system including an alternating current intelligence signal transmitting station, a receiving station, circuit means at said transmitting station for producing an intelligence signal having a characteristic variable over a predetermined normal range of values for transmission of intelligence to said receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, said power operated apparatus at said receiv-

ing station being actuatable by said intelligence signal when said characteristic of said signal is varied beyond said normal range of values, and means located at said transmitting station for actuating said power operated apparatus at said transmitting station; means at said transmitting station associated with said power operated apparatus at said transmitting station and actuated by operation thereof for so varying said characteristic of said signal beyond said normal range of values to actuate said power operated apparatus at said receiving station, said last-mentioned means including a circuit element, and switch means operable by said power operated apparatus at said transmitting station for alternately connecting said circuit element with said circuit means and disconnecting said element therefrom.

8. In an intelligence communicating system including an alternating current intelligence signal transmitting station, a receiving station, circuit means at said transmitting station for producing an intelligence signal having frequency variable over a predetermined normal range of values for transmission of intelligence to said receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, said power operated apparatus at said receiving station being actuatable by said intelligence signal when said frequency of said signal is varied beyond said normal range of values, and means located at said transmitting station for actuating said power operated apparatus at said transmitting station; means at said transmitting station associated with said power operated apparatus at said transmitting station and actuated by operation thereof for so varying said frequency of said signal beyond said normal range of values to actuate said power operated apparatus at said receiving station, said last-mentioned means including a reactive circuit element and switch means operable by said power operated apparatus at said transmitting station for alternately connecting said circuit element with said circuit means and disconnecting said element therefrom.

9. In an intelligence communicating system including an alternating current intelligence signal transmitting station, a receiving station, circuit means at said transmitting station for producing at least two cooperating intelligence signals having frequencies variable over predetermined normal ranges of values for transmitting intelligence to said receiving station, power operated apparatus at each of said stations for intermittently replacing an intelligence bearing medium thereat, said power operated apparatus at said receiving station being actuatable by one of said intelligence signals when said frequency of said one signal is varied beyond its normal range of values, and means located at said transmitting station for actuating said power operated apparatus at said transmitting station; means at said transmitting station associated with said power operated apparatus at said transmitting station and actuated by operation thereof for so varying said frequency of said one signal beyond said normal range of values to actuate said power operated apparatus at said receiving station, said last-mentioned means including a reactive circuit element and switch means operable by said power operated apparatus at said transmitting station for alternately connecting said circuit element with said circuit means and disconnecting said element therefrom.

10. In an intelligence communicating system including a transmitting station and a receiving station, power operated apparatus at said receiving station for intermittently replacing an intelligence bearing medium thereat, and a stylus at each of said stations for recording on intelligence bearing mediums, said power operated apparatus being actuatable by movement of said stylus at said receiving station to a predetermined position; means at said transmitting station for generating a signal to drive said stylus at said receiving station forcibly into said predetermined position to actuate said power operated apparatus.

THOMAS I. RESS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,186,252	Little	Jan. 9, 1940
2,415,718	Wilson et al.	Feb. 11, 1947
2,455,617	Shepard	Dec. 7, 1948
2,565,612	Levin	Aug. 28, 1951
2,590,294	Both	Mar. 25, 1952