

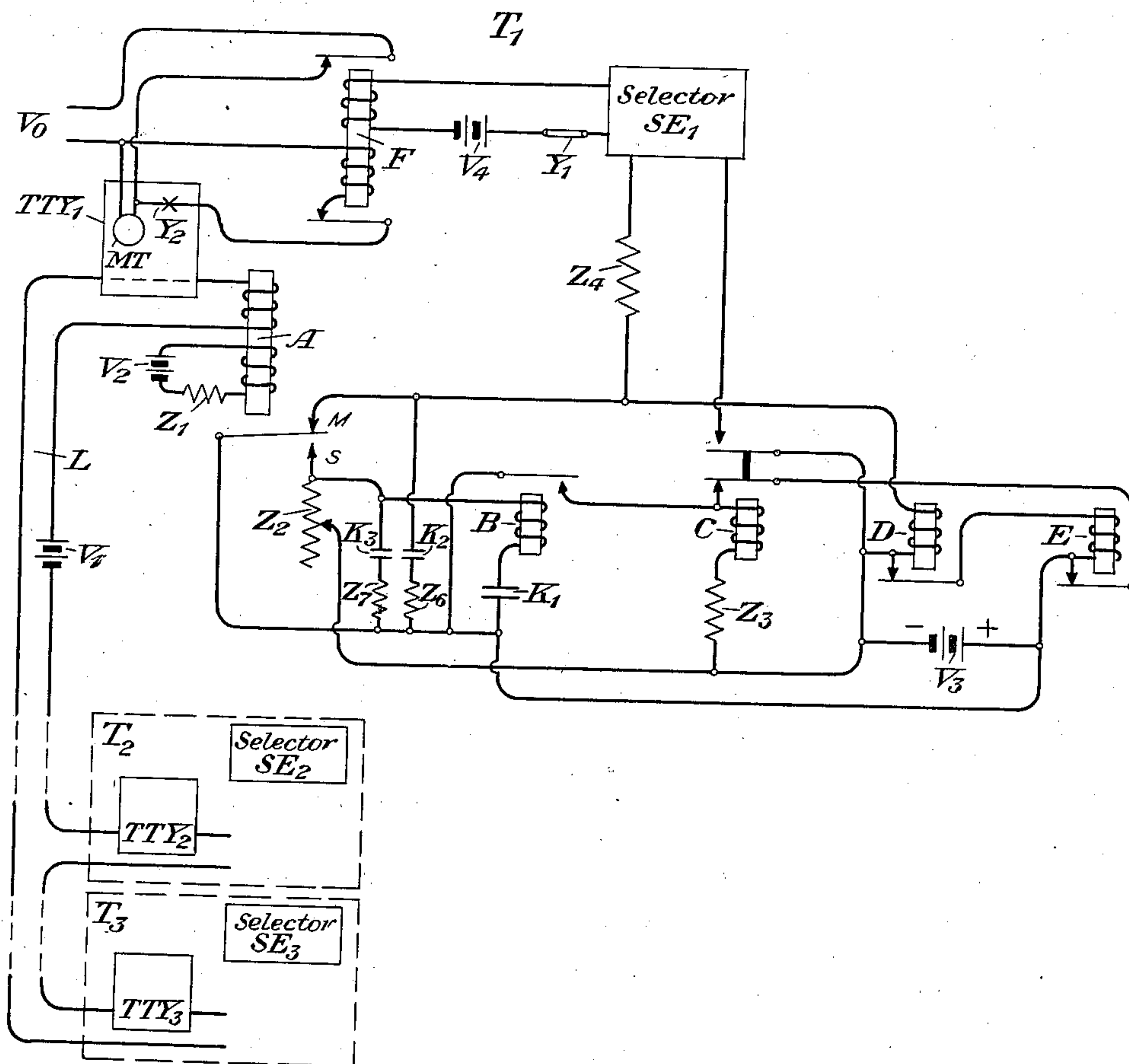
March 30, 1943.

J. L. MAXWELL ET AL

2,315,439

TELETYPEWRITER SYSTEM

Filed Oct. 24, 1941



INVENTORS
J. L. Maxwell and
 BY *E. R. Shimmmin*
Jefferson Ehrlich
 ATTORNEY

UNITED STATES PATENT OFFICE

2,315,439

TELETYPEWRITER SYSTEM

John L. Maxwell, Redwood City, and Elmer
Richard Shimmin, Del Paso Heights, Calif., as-
signors to American Telephone and Telegraph
Company, a corporation of New York

Application October 24, 1941, Serial No. 416,298

7 Claims. (Cl. 178—2)

This invention relates to signaling systems, and more particularly to signaling systems which are controlled by selective apparatus. Still more particularly this invention relates to signaling systems which are suitable for the transmission of teletypewriter signals and coded pulses for the operation of selector apparatus.

In teletypewriter circuits, for example, selectors of the Gill type are sometimes connected to the circuits to receive coded pulses to which the selectors may respond. When such a selector responds to its received coded pulse, it may be used to operate a buzzer or other indicating device, to apprise an operator that his teletypewriter machine may be connected to the circuit for the transmission and reception of signals. In such systems each selector may thus receive teletypewriter signal pulses corresponding to the messages received over the line as well as coded pulses for the selective operation of any one of the various selectors. Although the selector will be unoperated by such signals, nevertheless these signals will actuate the time wheel and code wheel track of the selector. This will result in excessive wear on the selector time wheel and code wheel track which is, of course, undesirable and costly from a maintenance viewpoint.

One of the objects of this invention is to provide a selector arrangement at each of a plurality of stations which may be used to operate signal or other apparatus but which will be disconnected from the circuit during the transmission of messages or signals and connected to the circuit only during the transmission of coded pulses. Another object of this invention is to provide a selector arrangement which will respond to coded pulses but which will be disconnected from the circuit and, therefore, unresponsive to teletypewriter and other signal pulses.

Still another object of this invention is to provide a selector arrangement which may be operated only upon the transmission of a break signal followed by a coded pulse which is characteristic of the selector arrangement but which will be unoperated by ordinary signal pulses.

These and other objects of this invention will be better understood from the description hereinafter following when read in connection with the accompanying drawing illustrating one embodiment of the invention merely for the purpose of illustration.

Referring to the drawing, the reference character L designates a line which interconnects a plurality of teletypewriter stations T₁, T₂ and T₃ which are arranged in series relationship in the

line, a battery V₁ being used to supply current over the line. The apparatus at each of the stations T₁, T₂ and T₃ may be alike and hence, only the apparatus at station T₁ is shown and this will be described in some detail.

At station T₁ there is a teletypewriter machine TTY₁ which is in series with the line L and with the main winding of a polar relay A. The polar relay A will be used to control the operation of an alternating current relay B, a locking relay C and two slow-release relays D and E. These relays will, in turn, control the connection of a selector SE₁ to the armature and contact of relay A in response to a break signal transmitted over the line L as will be explained hereinafter. The selector SE₁ may be employed to operate a relay F in order to start the motor MT of the teletypewriter TTY₁.

When the line L is in an idle condition the current supplied by battery V₁ to the upper winding of relay A will be approximately twice as great as that supplied by the battery V₂ through a resistance Z₁ to the lower or biasing winding of the relay A and hence, the armature of relay A will be on its marking contact M. Marking contact M of relay A will also be closed when a marking pulse is transmitted over the line L. A spacing pulse or a break signal may be transmitted over the line L by interrupting the line L in the usual way at teletypewriter TTY₁ for example, in which event the flow of current through the upper winding of relay A will drop to a nullity while the biasing winding current will remain fixed at its previous value. In that case the armature of the relay A will be moved to its spacing contact S.

When the armature of relay A is on its marking contact M, the condenser K₁ will be charged by current supplied by battery V₃, the charging circuit including, in addition to battery V₃ and condenser K₁, the winding of relay B and resistor Z₂. When the armature of relay A is moved to its spacing contact S, the condenser K₁ will discharge over a circuit which includes the winding of relay B and the contact S and armature of relay A. The constants of the charging and discharging circuits are so selected that the current traversing the winding of relay B, when teletypewriter signals are transmitted, will be sufficient to operate relay B, but when slower pulses are received over the line L for operating the selector SE₁, the relay B will be unoperated. One form of relay suitable for this purpose is of the J-51 type.

The relay C may be operated in response to the operation of relay B. The operating circuit for relay C includes battery V₃, the armature and

make contact of relay B, the winding of relay C and the resistor Z₃. The relay D, which is of the slow-release type, may be operated whenever the armature of relay A is on its marking contact M. The circuit for this relay includes battery V₃, the armature and marking contact M of relay A, and the winding of relay D. The relay D controls the operation of relay E, the circuit for relay E including battery V₃, the winding of relay E, and the armature and make contact of relay D. The relay E, which is also of the slow-release type, may be employed to provide a locking circuit for relay C, the locking circuit including the battery V₃, the make contact and armature of relay E, the inner armature and contact of relay C, the winding of relay C, and the resistor Z₃.

The selector SE₁ may be connected to the circuit of the armature of relay A only upon the release of relay C. Thus, when relay C is released, the selector SE₁ will be effectively connected to the system, the interconnecting circuit including the back contact and outer armature of relay C, battery V₃, the armature and contact M of relay A and resistance Z₄. The selector SE₁ may, therefore, then be operated in response to predetermined pulses received by relay A over line L, the pulses being conveyed to the selector SE₁ by the movement of the armature of relay A between its contacts M and S.

The selector SE₁ may be employed to control the operation of relay F, the upper winding of relay F being connected to the selector SE₁ by a circuit which includes the battery V₄ and a key Y₁. Thus, when the selector SE₁ is effectively connected to the circuit and it has received its individual or characteristic coded pulse, the relay F will be operated. The upper make contact of the relay F will then connect the power source of alternating voltage V₀ to the motor MT of the teletypewriter TTY₁ to start the teletypewriter. The relay F also includes a lower or holding winding which is connected across the motor MT through the lower armature and make contact of relay F. The lower winding of relay F is also connected across the source of power V₀ through the two armatures of relay F and their make contacts. The relay F will therefore remain operated after the selector SE₁ has become released and effectively disconnected from the circuit. Hence, upon the operation of relay F the teletypewriter TTY₁ will be started in operation and remain operated until a key Y₂, which may be part of the teletypewriter apparatus, has been released to open the circuit of the holding winding of relay F.

Assume that a break signal is now transmitted over the line L which, as already stated, opens the circuit to the upper winding of the relay A. The armature of relay A will then move to its spacing contact S. The relay D, which may have been previously operated, will be released due to the opening of the circuit in series with its winding at the marking contact M of relay A. The release of relay D will cause the relay E to release, the winding of relay E being opened at the contact of the armature of relay D. The release of relay E will open the locking circuit of relay C, the locking circuit being opened at the contact of the armature of relay E. The operating circuit of relay C will also be opened at the make contact of relay B due to the fact that a break signal will cause the relay B to release or stay released. With the opening of both the operating and locking circuits of relay C, this relay will be released. Upon the release of relay C the

selector SE₁ will be connected to the circuit of the armature of relay A so that the selector SE₁ may then receive any pulses conveyed over line L to the upper winding of relay A.

After the selector SE₁ has been thus connected to the circuit of the armature of relay A, the slow coded pulses which may be transmitted over the line L will cause the armature of relay A to move back and forth between its contacts M and S in accordance with these pulses. The relay B will remain released. If the coded pulse characteristic of selector SE₁ is received, the selector SE₁ will then be effectively operated. It will be understood that only one selector of the system will be operated by such coded pulses and that selector will be the one which, after a break signal has been transmitted, receives a coded pulse which corresponds to its predetermined adjustments. The operation of the selector SE₁ may then cause the operation of the relay F so that the teletypewriter TTY₁ may be started in operation and remain operated until the key Y₂ is later released. The teletypewriter TTY₁ then may both transmit signals over the line L to the other stations T₂ or T₃ or receive signals from those stations. However, any teletypewriter signals so transmitted over the line L will have no effect upon the selector SE₁, the mechanism of which will remain idle throughout the reception of such signals.

When teletypewriter signals are transmitted over line L, the armature of relay A will move back and forth between its contact M and S, as already stated. These teletypewriter signals will cause the condenser K₁ to be alternately charged and discharged, and the relay B will be operated. The operation of relay B will in turn cause relay C to operate. Relay D will be operated when the armature of relay A closes its marking contact M, and the time constant of relay D will be such that relay D will remain operated during the reception of teletypewriter signals. The relay E will be operated from the contacts of relay D and hence, close the locking circuit for relay C. When relay C is operated it will immediately open the circuit of the selector SE₁, thereby completely disconnecting the selector from the circuit of the armature of relay A.

It will be apparent from what has been described hereinabove, that by holding one of the teletypewriter break keys in its operated position for an interval of time as, for example, 2 seconds, an open will be transmitted over the line L. This will release the relays D and E and open the operating and locking circuits of relay C which controls the connection of the selector SE₁ to the armature of the marking contact M of relay A. After the predetermined break signal has been received, a coded pulse may be transmitted over the line L by means, for example, of a slow-acting dial which will then operate relay A to progressively step the selector SE₁ in unison with the dial pulses. If the dial pulses are of the proper characteristic the selector SE₁ will be operated. The selector SE₁ may be used, for example, to operate a buzzer (not shown) to apprise the operator that he may connect his teletypewriter apparatus TTY₁ to the line L. The teletypewriter signals transmitted over the line L are of such a relatively high speed that they will cause the operation of relay C and thereby disconnect the selector SE₁ from the circuit. This is an important feature of the system.

By disconnecting the selector SE₁ from the circuit during the transmission of teletypewriter

signals it will be protected from excessive wear on its time wheel and its code wheel track. The life of the selector will, therefore, be considerably enhanced and its performance improved. The selector SE₁ will be effectively connected to the circuit only by the transmission of a break signal of predetermined duration. The selector will then be operated only if such a break signal is transmitted and followed by a coded pulse of predetermined characteristics.

Relay E has been employed in the circuit so that its slow-release time may be added to the slow-release time of relay D. This will prevent the release of relay C unless a break signal of a time interval comparable to the time factors of relays D and E is received by the system.

If desired, the relay E may be entirely omitted. In that case its winding will be completely shunted out. The armature and contact of relay D may then be employed to control the locking circuit of relay C, in a manner which will be understood by those skilled in the art.

While this invention has been shown and described in certain particular embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be employed in other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a signaling system, the combination of a line over which may be transmitted teletypewriter signals and coded pulses which are not teletypewriter signals, selector apparatus to be operated only by said coded pulses, means responsive to a break signal received over said line to start said selector apparatus, means responsive to a predetermined coded pulse received over said line to progressively step said selector apparatus and operate it, and means responsive to teletypewriter signals received over said line to release said selector apparatus to prevent said selector from stepping in response to said teletypewriter signals.

2. In a signaling system, the combination of a line, a teletypewriter connected to said line, selector apparatus to control the connection of said teletypewriter to said line, means responsive to a break signal followed by a predetermined coded pulse received over said line to operate said selector apparatus to connect said teletypewriter to said line, and means responsive to teletypewriter signals transmitted over said line to disconnect said selector apparatus while maintaining said teletypewriter connected to said line.

3. In a signaling system, the combination of a line, selector apparatus, means responsive to a coded pulse of predetermined characteristics received over said line to operate said selector apparatus, signaling apparatus connected to said line and responsive to ordinary signals but non-responsive to said coded pulse, and means responsive to ordinary signals received over said line to operate said signaling apparatus continuously and simultaneously to release said selector apparatus and maintain said selector apparatus

released during the reception of said ordinary signals by said signaling apparatus.

4. In a signaling system, the combination of a line, a teletypewriter connected to said line, selector apparatus, means responsive to a predetermined coded pulse received over said line to operate said selector apparatus while maintaining said teletypewriter unoperated, means responsive to the operation of said selector apparatus to start said teletypewriter, and means responsive to signals received over said line to release said selector apparatus and maintain said selector apparatus released during said signaling.

5. In a teletypewriter system, the combination of a plurality of teletypewriters, a line to which said teletypewriters are connected in series with each other, a plurality of selectors one corresponding to each teletypewriter, each selector being operated only in response to a predetermined coded pulse, an individual circuit for each selector controlled by the pulses transmitted over said line, means responsive to a break signal transmitted over said line to connect all of said selectors to their circuits, means responsive to a predetermined coded pulse to operate but one of said selectors to the exclusion of all other selectors, and means responsive to teletypewriter signals transmitted over said line to disconnect all of said selectors from their respective circuits.

6. A teletypewriter system including a line, a first relay having its winding connected to said line, a second relay, a condenser connected in series with the winding of said second relay, means responsive to teletypewriter signals received by said first relay over said line to alternately charge and discharge said condenser and operate said second relay, the capacity of said condenser being such that said second relay will be unoperated by coded selector pulses received by said first relay over said line, a selector, means responsive to a break signal transmitted to said first relay over said line to connect said selector to the first relay armature and one of its contacts, means responsive to a predetermined coded selector pulse received by said first relay to operate said selector, and means responsive to teletypewriter signals received by said first relay to disconnect said selector from said first relay armature and its contact.

7. In a signaling system, the combination of a line over which signal pulses and coded pulses may be transmitted, a first relay responsive to said signal pulses and said coded pulses, a second relay, means for operating said second relay when said first relay responds to signal pulses but not when said first relay responds to coded pulses, a selector, a third relay operated in response to the operation of said second relay, means for connecting said selector to the circuit of the armature of the first relay only when said third relay is released, and means including a slow-release relay for locking the third relay in its operated position during the reception of signal pulses over said line.

JOHN L. MAXWELL.
ELMER R. SHIMMIN.