R. C. LEAKE.

ELECTRICAL DISTRIBUTION.

APPLICATION FILED MAY 10, 1909.

1,066,823.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

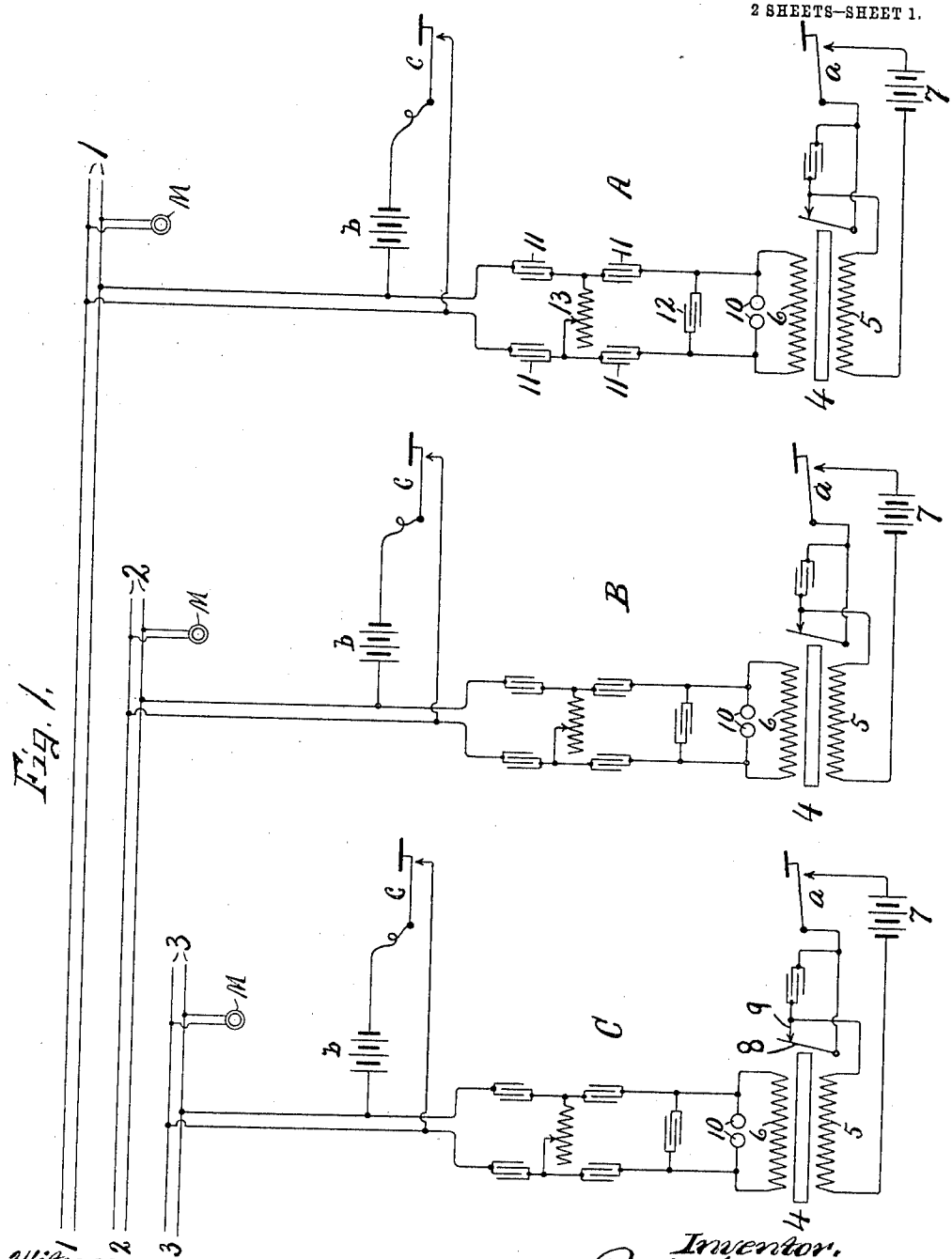


Fig. 1.

Witnesses.

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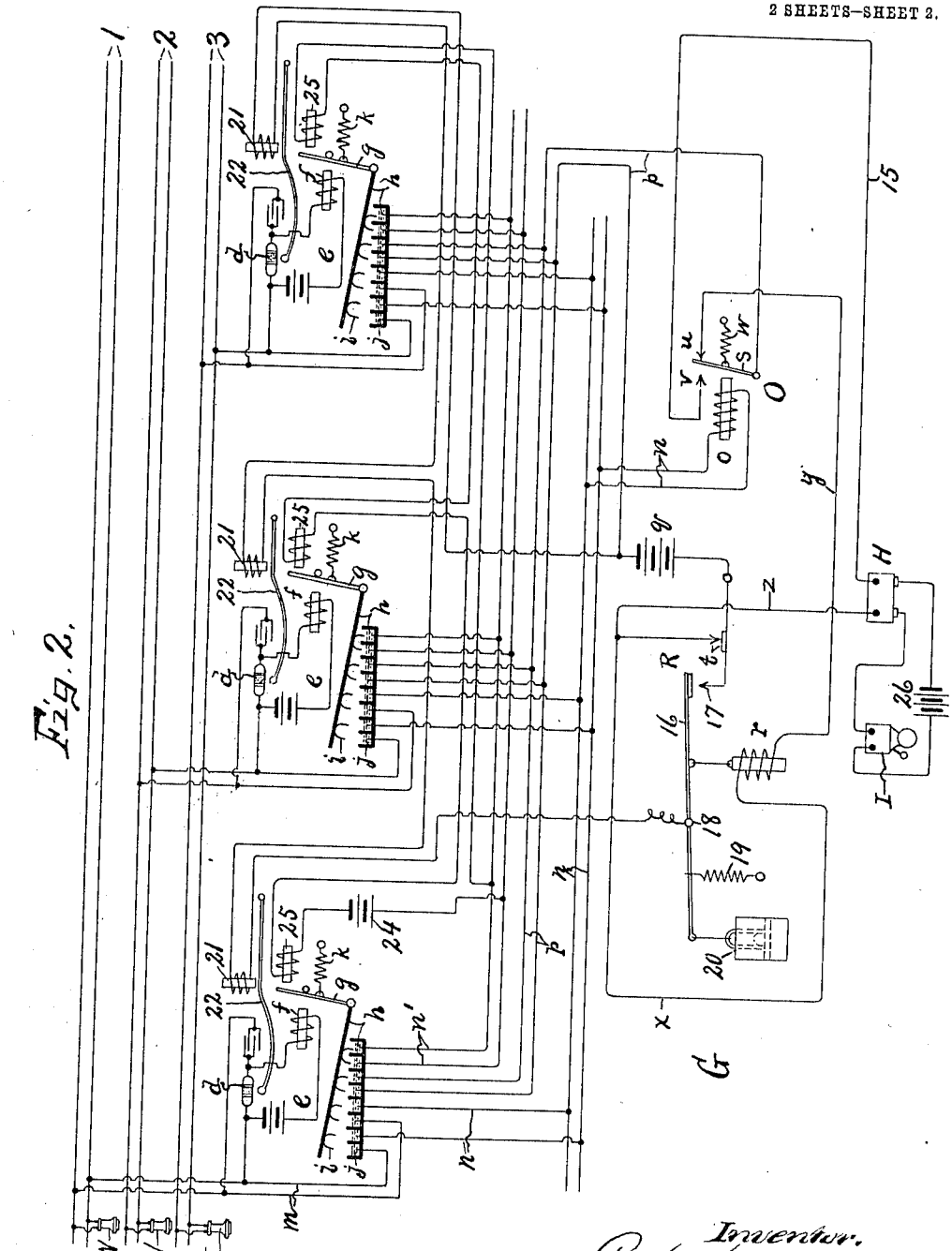


Fig. 2.

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UNITED STATES PATENT OFFICE.

RICHARD C. LEAKE, OF BALDWINSVILLE, NEW YORK.

ELECTRICAL DISTRIBUTION.

1,066,823. Specification of Letters Patent. Patented July 8, 1913.

Application filed May 10, 1909. Serial No. 494,950.

To all whom it may concern:

Be it known that I, RICHARD C. LEAKE, of Baldwinsville, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Electrical Distribution, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in electrical distribution, and refers more particularly to an electrical selective system involving the use of a main line circuit (either metal or metal ground) having a transmitting station and one or more receiving stations connected thereto, or a plurality of transmitting stations electrically connected by the same or different line circuits to the same receiving station, each receiving station comprising in its organization a suitable selector controlled at the will of the operator at any one of the transmitting stations for effecting the operation of any suitable call, signal or other translating device adapted to be controlled by the particular selector employed.

My main object is to provide a selective-call-telephonic train-despatching-system by which a despatcher may selectively call and talk with the operator at any one of the receiving stations over the same line circuit to the exclusion of other despatchers who may be connected by different lines with the same selective system at such station, and at the same time leaving the main line or telephonic circuit practically free from inductance, electromagnets and other devices employed in the operation of a selective call which might interfere with free telephonic communication. In other words I have sought to control the action of the selector through the medium of different current qualities impressed upon or in the main line circuit, the current of one quality being employed to close a normally open circuit at the receiving station through which the current of different quality may be impressed or passed to operate the selector and at the end of such operation cause the opening of such local circuit.

The local circuit mentioned at the receiving station includes therein what is technically known as a "coherer" which is normally decohered but is energized to close such local circuit by means of a high frequency current impressed upon the line by the despatcher at the transmitting station and constituting the current of one quality which is followed up immediately after the energizing of the coherer by direct current impulses over the same line to bring into action the selector, each selector at the various receiving stations being controlled by a different combination of impulses or any other well known selective forms of current with which the various selectors or other translating devices may be attuned, as it is evident that in some instances the selectors may be omitted and the calls or other translating devices at the receiving stations operated directly from the sending station, each to the exclusion of the other.

Other objects and uses relating to specific parts of the system will be brought out in the following description.

In the drawing—Figures 1 and 2 are respectively a diagrammatic view of a series of, in this instance three, transmitting stations and a diagrammatic view of one of any number of receiving stations, said receiving stations being connected by a series of, in this instance three, separate main line circuits (preferably metallic) through the medium of separate controlling devices at the receiving station, one for each sending station, whereby the operator at either transmitting station may bring into action the same call or other translating device at the receiving station to the exclusion of the other operators at the sending stations.

For convenience of illustration I have shown in Figs. 1 and 2 portions of a plurality of, in this instance three, main line (preferably metallic) circuits, —1—, —2— and —3— which are to be considered as continuous between a corresponding number of sending stations A, B and C, Fig. 1, and all of any number of receiving stations —G—, Fig. 2. These sending stations A, B and C are electrically connected in any suitable manner to their main line circuits —1—, —2— and —3—, and may be located at the same or at different points in the system, but are here represented as train despatching stations for the exclusive use of the despatchers in telephonic communication with any one of the receiving stations with which it may be desired to communicate. Each of these despatching stations A, B and C comprises means for generating an alternating current of high frequency and impressing the same in or upon the corre-

sponding line circuit to close the local circuit at the receiving station hereinafter described, and also comprises means for generating and impressing upon the line direct current impulses of predetermined frequency or duration for operating a selector or other translating device at the receiving station immediately upon the closing of the local circuit by the high frequency current.

Any suitable means may be employed at each of the sending stations for generating a high frequency alternating current and impressing the same upon the corresponding main line, and for purposes of illustration I have shown each sending station as equipped with an induction coil —4— comprising a primary circuit —5— and a secondary circuit —6—, the primary circuit being supplied with current from any suitable source, as a battery —7—. This primary circuit is normally open and adapted to be closed by any suitable circuit closer, as —*a*—, which may be of any well known form of manual or manually controlled automatic type, said primary circuit having connected therein a vibrating armature —8— playing between the core of the induction coil —4— and a contact terminal —9— which is also connected in the primary circuit. The secondary circuit —6— includes therein jump spark terminals —10— which are electrically connected through suitable condensers —11— to the corresponding main line circuit, a similar condenser —12— and a variable inductance —13— being connected across the line between the induction coil —4— and main line.

It is now apparent that by the closing of the switch or circuit closer —*a*— at any one of the sending stations, an alternating current of very high frequency will be generated in the corresponding main line from the secondary coil —6—, such high frequency current being employed to energize certain devices at all of the receiving stations which may be electrically connected with that particular line for a purpose hereinafter described.

The means for generating and impressing a direct current on any one of the main lines preferably consists of a source of electric energy, as an electric battery —*b*— and a suitable circuit closer —*c*—, which are connected to the main line circuit, the switch —*c*— being of any well known form of manual or manually controlled automatic type for impressing direct current impulses of predetermined periodicity or duration upon such main line for the purpose of operating a selector or translating device at any particular receiving station with which it may be desired to communicate.

Any number of receiving stations —G— may be connected in any one of the main line circuits —1—, —2— or —3—, or as shown in Fig. 2 any number of sending stations may be connected by the main lines to a single receiving station, but in each case practically all of the electromagnetic devices and inductance used in the operation of a selective call or other translating device at the receiving station are normally cut out of the main line circuit leaving the main line free from any interruptions or influences which might interefere with perfect telephonic or telegraphic communication between the sending station and selected receiving station, it being understood that the high frequency current generated at the sending station is so balanced with said line that all noise through telephones is eliminated, thus permitting conversation to be carried on even though selection is being made at the time.

Each receiving station is equipped with a normally open circuit closer consisting, in this instance, of a coherer —*d*— connected to the main line circuit and adapted to be energized or cohered by the high frequency current impressed upon said main line by the closing of the switch —*a*— at the sending station. The coherer —*d*— is connected in, and forms a part of, a local battery circuit —*e*— in which is connected the winding of an electromagnet —*f*— forming one of the elements of a local relay having an armature —*g*—, the latter carrying the movable arm of a normally open local switch —*h*— which, in this instance, consists of a series of contact points —*i*— movable into and out of a corresponding series of mercury cups —*j*—. It is now clear that immediately upon the energizing or cohering of the coherer —*d*— the local battery circuit —*e*— is closed, thereby energizing the relay magnet —*f*— to attract the armature —*g*— against the action of a retracting spring —*k*— to close the switch —*h*—.

Two of the mercury cups —*j*— of the switch —*h*— are electrically connected by wires —*m*— across one of the main lines, as —*l*—, while another pair of mercury cups are connected by wires —*n*— to the winding of an electromagnet —*o*— of another local relay having an armature —*s*— which is movable into and out of contact with terminals —*u*— and —*v*—, but is normally held in contact with the terminal —*u*— by a retracting spring —*w*—. The closing of the local switch —*h*—, therefore places the relay magnet —*o*— in electrical connection with the corresponding main line circuit —*l*— ready to receive the direct current impulses from the despatcher or operator at the sending station —A— by the operation of the circuit closer —*c*—. A third pair of the mercury cups —*j*— are electrically connected to wires —*p*— forming a part of another local circuit to which current is sup-

plied by a local battery —*q*—, and in this circuit is connected the winding of an electromagnet —*r*— and normally the armature —*s*— of the electromagnet —*o*—, one of the wires —*p*— being connected to one pole of the battery —*q*—, while the other pole of said battery is connected by a normally closed switch —*t*— and wire —*x*— to one end of the winding of the electromagnet —*r*—, the other end of said winding being connected by a wire —*y*— to the terminal —*u*—. One of the contact terminals of the switch —*t*— is also connected by a wire —*z*— to a selector —H— of any suitable or well known type, said selector being connected by a wire —15— to the contact terminal —*v*— of the switch armature —*s*—, thereby establishing another local circuit receiving current from the same battery —*q*— and of which the armature —*s*— is adapted to form a part when in contact with the terminal —*v*— or when the electromagnet —*o*— is energized.

The electromagnet —*r*— is preferably made in the form of a solenoid having its plunger connected to the movable contact arm, as —16—, of a normally open switch including a terminal —17—, which is, in this instance, mounted upon the movable member of the switch —*t*— and is connected to the same pole of the battery —*q*—. The switch arm —16— is pivoted intermediate its ends at —18— and is normally held open by a retracting spring —19—, the end of said arm opposite to that which contacts with the terminal —17— being connected to a suitable retarding device, as a dash-pot —20—, of any well known construction capable of retarding the closing action of the switch arm —16— except under prolonged energizing of the electromagnet —*r*—. This switch arm —16— is also connected in a local circuit receiving current from the same battery —*q*— and in which is electrically connected the winding of an electromagnet —21— which operates a vibrator —22— co-acting with the coherer —*d*— to decohere the coherer and thereby open the local battery circuit —*e*— for a purpose presently described.

A fourth pair of mercury cups —*j*— are connected by wires *n'* to an additional local circuit deriving current from a suitable source of electric energy, as a battery —24—, and in which circuit is connected the winding of an electromagnet —25— co-acting with the spring —*k*— to hold the armature —*g*— in its retracted position for holding the switch —*h*— open.

When more than one despatching station is connected with the same receiving station over different line wires, as —2— and —3—, the coherer —*d*—, local circuit —*e*— and its corresponding relay including the electromagnet —*f*—, armature —*g*— and switch —*h*—, together with the electromagnets —21— and —25— are duplicated for each line, in which case the electromagnets —25— of the several sets are connected in one series, while the electromagnets —21— for the decoherer are electrically connected in a separate series, the battery —24— being common to the entire series of electromagnets —25— so that when the circuit, in which these magnets —25— are connected, is closed, all such magnets are energized simultaneously; and likewise when the circuit, in which the electromagnets —21— are connected, is closed, all of said magnets are similarly energized.

The selector —H— (which, in this instance, is adapted to be operated by direct current impulses over any one of the lines —1—, —2— or —3— by the predetermined manipulation of the corresponding switch —*c*— at the sending station), is adapted to close a local circuit —26— at the receiving station for operating a call or signal —*i*— or any other translating device which it may be desired to operate through the medium of a selector, this selector may be similar to that shown in my Patent No. 853,888, May 14, 1907, or what is commonly known as the "Gill" selector now in common use.

In operation, assuming that a despatcher at station —A— desires to communicate by telephone with one of the receiving stations —G—, then he first closes the switch —*a*— for impressing a high frequency current upon the corresponding line —1— which is transmitted to and coheres all of the coherers —*d*— which may be connected to such line at the several receiving stations, thereby closing all of the local battery circuits —*e*— and energizing the electromagnets —*f*— to draw the corresponding armatures —*g*— out of the field of the adjacent magnets —25—, thereby closing all the switches —*h*—. These operations, of course, refer only to those parts which are connected to the main line —1— and not to those which are connected to the main lines —2— and —3—, as the corresponding parts which are connected to lines —2— and —3— are not to be considered in the description of this operation. This closing of the switch —*h*— connects the local line wires —*m*— to the wires —*n*— which lead to the electromagnet —*o*— of the relay —O—. Now by the proper manipulation of the switch —*c*— to impress direct current impulses of predetermined periodicity corresponding to that to which the particular receiving station it is desired to call is attuned, such impulses will be transmitted through the line wires —*m*— and —*n*— and electromagnets —*o*—, thereby causing a corresponding vibration of the armature —*s*— between the terminals —*u*— and —*v*— so that at each energizing of the magnet —*o*— the

armature —*s*— will be moved out of contact with the terminal —*u*— and into contact with the terminal —*v*—, thus closing the local battery circuit from the battery —*q*— through the switch —*t*— and wire —*z*— to the selector —H— and thence through the wire —15—, terminal —*v*—, armature —*s*— and line wires —*p*— and through the corresponding terminals of the switch —*h*—. It, therefore, follows that at each contact of the terminals of the switch —*c*— the selector —H— will be operated, and that if the proper number of impulses to which the chosen selector —H— is attuned are impressed upon the corresponding line, such selector will bring into action the call signal —I— or such other translating device as may be controlled or operated by the selector; such, for example, as a bell, a semaphore or motor. It is also clear that at each break of the contact terminals of the switch —*c*— the armature —*s*— will contact with the terminal —*u*— of the relay —O—, thereby closing the local battery circuit from the battery —*q*— through the wires —*p*— and corresponding terminals of the switch —*h*—, and also through the electromagnet or solenoid —*r*—, tending to close the switch —R— of which the terminals —16— and —17— are a part, but owing to the fact that this closing of the switch —R— is retarded by the dash-pot —20— the terminals —16— and —17— are kept apart during the manipulation of the switch —*c*—.

As soon as the relay —O— is operated to effect the operation of the call signal —*i*—, or other translating device, it assumes its normal open position and allows the armature —*s*— to remain in contact with the terminal —*u*—, thus keeping the electromagnet —*r*— energized until it closes the switch —R—, or rather until the terminal —16— is brought into contact with the terminal —17—, by which operation the switch —*t*— is opened for an instant and the current from the battery —*q*— is allowed to flow through the switch —R— and terminal —16— and thence to the electromagnet —21—for attracting and operating the vibrator —22— against the coherer —*d*— and decohering the latter and thereby breaking the local circuit —*e*—. Now, as long as the switch —*h*— remains closed the switches —*t*— and —R— will be alternately opened and closed, thereby continuing the vibration of the decohering vibrator —22— until the coherer —*d*— is sufficiently decohered to open the local battery circuit —*e*— and permit the retracting spring —*k*— to open the switch —*h*—, whereupon the vibration of the decohering vibrator —22— ceases, the switch —R— being finally opened by the opening of the switch —*t*—, which deënergizes the electromagnet or solenoid —*r*—, allowing the spring —19— to retract the movable switch member —16— ready for a repetition of the operation just described. When the parts are in this normal condition with the local battery circuit —*e*— and the switch —*h*— open, it is evident that all of the electromagnets and other inductance at the receiving station are cut out from the main line circuit in which are connected suitable telephones —M— and —N— located respectively at the sending and receiving stations, by which free communication may be established between the sender and receiver, although it is evident that any other means of communication may be employed over the same line without interruption. It is also evident that the electromagnet —*f*— of the selected station is energized to close the corresponding switch —*h*— before the electromagnets —25— are energized, and that the armature —*g*— of the selected station is, therefore, moved out of the field of the electromagnet —25— before the latter is energized, and that immediately upon the closing of the switch —*h*— at such selected station, the magnets —25— at the receiving stations corresponding to the other sending stations, are energized, thereby holding their respective switches —*h*— against closing and preventing the despatchers at such sending stations from breaking in upon the despatcher who has first endeavored to call this particular receiving station, so that the despatcher who has first closed the high frequency current switch —*a*— retains possession of the particular receiving station desired until he is through. It is evident, however, that any one of the despatchers at stations —B— and —C— may effect a similar call of the same receiving station through the medium of the corresponding coherers —*d*—, local circuits —*e*—, magnets —*f*—, armatures —*g*— and switch —*h*—, together with the electromagnets —21—, vibrating armatures —22— and electromagnet —25—. It is evident, however, that many of the devices herein described may be substituted by equivalent mechanisms or electrical translators without departing from the spirit of my invention, which consists primarily of means for impressing upon a line circuit any form of current which will selectively operate any one of a number of translating devices on the same line, and at the same time leaving the main line free from electromagnets, inductance, or other apparatus which might interfere with the free transmission of telephonic communication between the communicating stations.

What I claim is—

1. In an electric selective system, a main line having connected thereto a sending station and a receiving station, a local circuit at the receiving station having therein a normally open circuit closer connected across

the main line, means for impressing current on the main line for operating the circuit closer to close the local circuit, a separate local circuit at the receiving station including therein a selector, a relay at the receiving station, means brought into action by the closing of the first named local circuit for connecting the relay across the main line, separate means at the sending station for impressing current on the main line for operating the relay to close said separate local circuit and thereby operate the selector.

2. In an electric selective system, a main line having connected thereto a sending station and a receiving station, a local circuit at the receiving station having therein a normally decohered coherer connected across the main line, means at the sending station for impressing current on the main line to cohere the coherer and close the local circuit, a relay at the receiving station, means brought into action by the closing of said local circuit for connecting the relay across the main line, and a selector at the receiving station controlled by the relay.

3. In an electric selective system, a main line having connected thereto a sending station and a receiving station, a local circuit at the receiving station having therein a normally decohered coherer connected across the main line, means at the sending station for impressing current on the main line to cohere the coherer and close the local circuit, a relay at the receiving station, means brought into action by the closing of said local circuit for connecting the relay across the main line, and means controlled by the relay for decohering the coherer.

4. In an electric selective system, a main line circuit having connected thereto a sending station and a receiving station, a coherer at the receiving station connected across the main line circuit, means at the sending station for impressing current upon the line to cohere the coherer, a relay at the receiving station, and means brought into action by the energizing of the coherer for placing the relay in electrical connection with the main line.

5. In an electric selective system, a main line circuit having connected thereto a sending station and a receiving station, a coherer at the receiving station connected across the main line circuit, means at the sending station for impressing current upon the line to cohere the coherer, a normally open branch circuit at the receiving station connected across the main line, a circuit closer for the branch circuit, and means brought into action by the cohering of the coherer for operating the circuit closer to close said branch circuit.

6. In an electric selective system, a main line circuit having connected thereto a sending station and a receiving station, a local circuit at the receiving station having a coherer connected across the main line, means at the sending station for impressing current on the main line to cohere the coherer and close the local circuit, a normally open branch circuit at the receiving station, means brought into action by the closing of the local circuit for closing the branch circuit, a normally open local selector circuit at the receiving station and a selector therein, means at the sending station for impressing a different current on the same main line and branch circuit, means brought into action by the current impressed on the branch circuit for closing the local selector circuit for operating the selector, and electrical means brought into action by the normal opening of the selector circuit for decohering the coherer and thereby breaking the first named local circuit.

7. In an electric selective system, a main line circuit having connected thereto a sending station and a receiving station, a local selector-circuit at the receiving station and a selector therein, a translating device and separate circuit therefor controlled by the selector, a relay controlling the action of the selector, an electric switch controlling the action of the relay, electrical means controlled from the sending station for controlling the closing of the switch, and separate means at the sending station for controlling the action of the relay when the switch is closed.

In witness whereof I have hereunto set my hand this 28th day of April, 1909.

RICHARD C. LEAKE.

Witnesses:
H. E. CHASE,
J. M. HOES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."