

Aug. 19, 1947.

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2,425,820

SELECTIVE SYSTEM

Filed Feb. 17, 1944

2 Sheets-Sheet 1

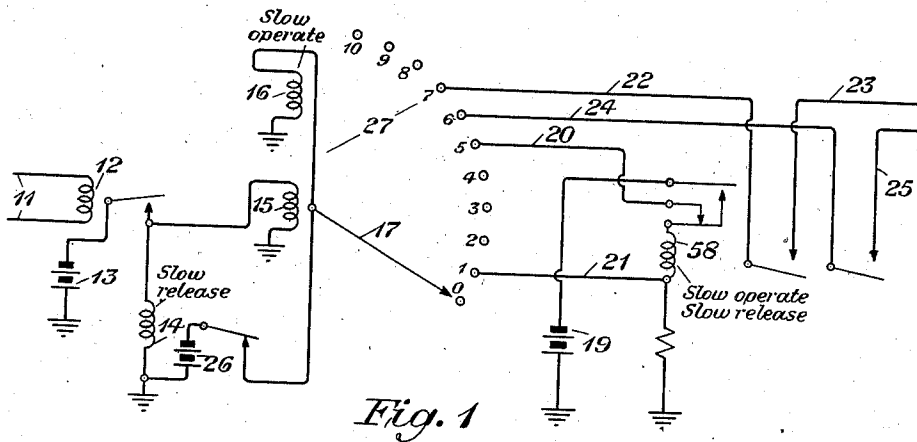


Fig. 1

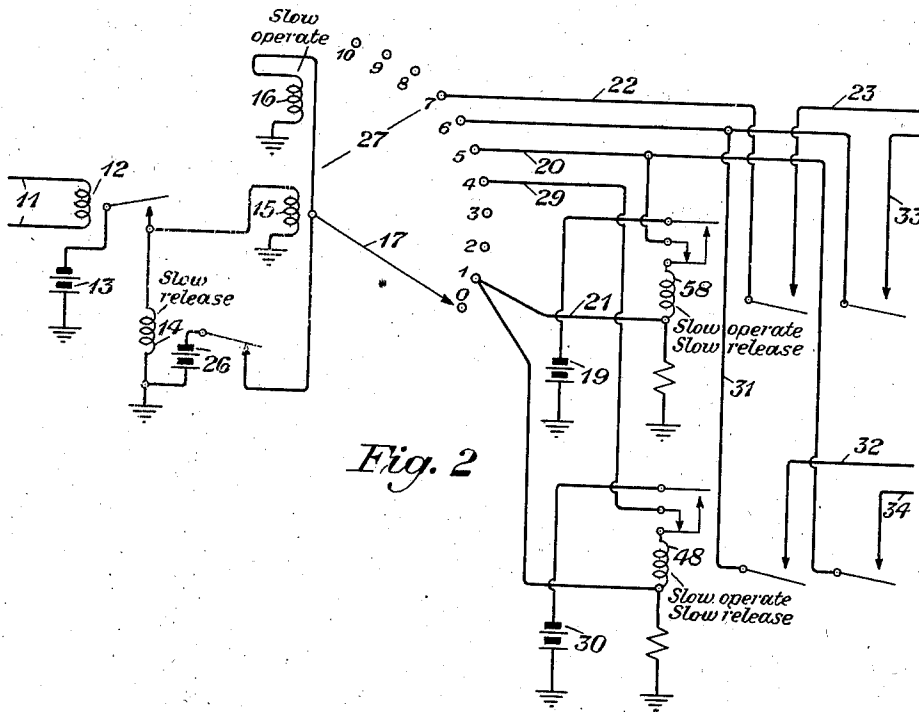


Fig. 2

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2 Sheets-Sheet 2

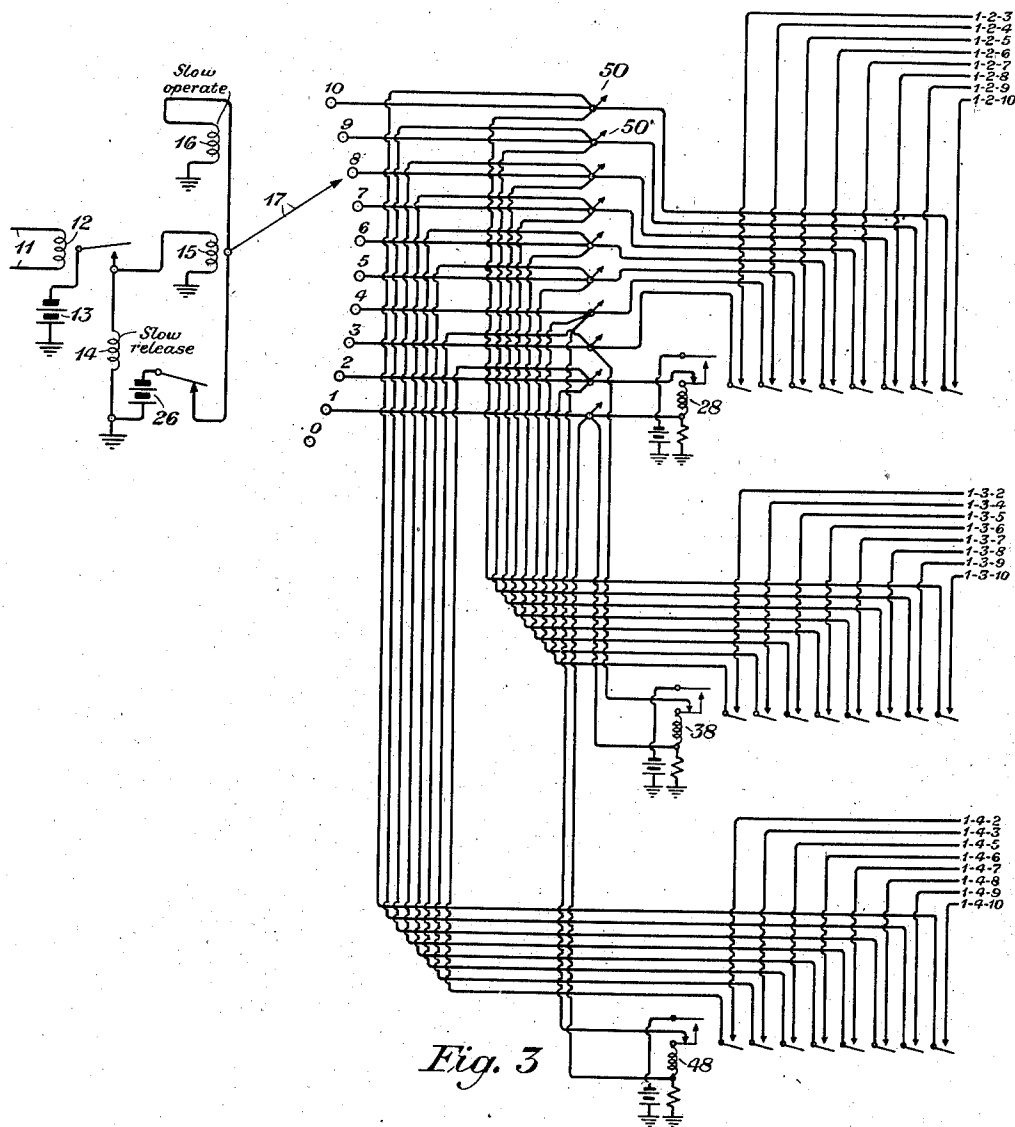


Fig. 3

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2,425,820-

SELECTIVE SYSTEM

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2 Claims. (Cl. 177-353)

1

2

This invention relates to signaling systems and more particularly to systems providing for selective signaling and is a continuation in part of application Serial No. 447,423; filed June 17, 1942.

In the arrangements of the invention a signaling circuit would be provided between two offices and means, such as telephone dial equipment, would be provided at one office for opening or interrupting the signaling circuit to send code signals thereover to the other office. At the other office there would be provided a selector switch and a plurality of relays for controlling the selector switch in response to the code signals. The selector switch would have a bank of contacts with relays individual to certain of said contacts. Each of these relays might have a plurality of armatures which would be connected individually to the contacts in said bank other than the contact to which their relay was connected. For example, each of nine of the contacts of a bank of ten contacts might have a relay individually connected thereto and each relay might be provided with eight armatures connected individually to the remaining eight contacts to which their relay was not connected. With such connections the arrangements of the invention would provide a simple method of selecting at least seventy-two different signal lines in response to corresponding code combinations of a three digit code. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1, 2 and 3 of which the invention is illustrated. In Fig. 1 is a circuit diagram illustrating certain principles of operation of the invention. In Fig. 2 is a circuit diagram illustrating certain other principles of operation of the invention. In Fig. 3 is a circuit diagram illustrating in more detail how the arrangements of the invention could be utilized to select any one of a large number of lines, such, for example, as seventy-two lines. Similar reference characters have been utilized to denote like parts in all of the figures.

In Fig. 1 is shown a line 11 which would terminate at a distant station (not shown). At the distant station there would be provided apparatus (not shown) such as telephone dialing equipment whereby the line could be opened or interrupted as desired, so as to transmit code signals over the line. At the station to be called there would be provided a number of relays and selector mech-

anism to pick out the particular signal circuit to be selected. A relay 12 is shown connected to line 11 and is operated by the code signals sent thereover. Relay 12 controls the operation of relay 14 which is a slow-release relay. Relay 12 also controls the operation of a rotor magnet 15 which steps the contact arm 17 over the contacts 1 to 19 to a bank of contacts. A release magnet 16 is also provided. Connected to one of the contacts of the bank is a relay 58. In Fig. 1 this relay is shown connected to contact 5. The relay 58 would be provided with a plurality of armatures of which only two are shown in Fig. 1. These are connected to contacts in the bank such as 6 and 7, other than the contact 5 to which the relay 58 is connected. In Fig. 1 only one relay with two armatures is shown in order to more simply describe certain principles of operation of the invention. However, as will be pointed out in more detail later on, additional relays such as 58, each with a plurality of contacts, may, in accordance with this invention, be connected to other of the contacts in the bank.

The operation of the arrangements shown in Fig. 1 is as follows: When line 11 is interrupted by the code signal sent thereover relay 12 releases and closes the following circuit. From ground, battery 13, armature and contact of relay 12, winding of relay 14 to ground. This will operate relay 14 and as it is slow-release it will remain operated between interruptions of the line 11 caused by one of the digits of the code signal sent thereover. The release of relay 12 will also close the following circuit. From ground, battery 13, armature and contact of relay 12, winding of rotor magnet 15 to ground. Accordingly, every time relay 12 releases, due to interruptions of the line caused by the transmission of a digit of the code signal, rotor magnet 15 will step its contact arm ahead one step. If it be assumed that the digit of the code signal being sent is 5, the contact arm 17 will be moved ahead to contact 5 of the selector bank. Due to the fact that relay 14 is slow-release it will remain operated during these five interruptions of the line caused by the transmission of the digit 5 of the code signal. The interval between this digit 5 and the next digit of the code signal to be transmitted will, however, be long enough for slow-release relay 14 to release and close the following circuit. From ground, battery 26, armature and contact of relay 14, contact arm 17, contact 5, conductor 20, contact of relay 58, winding of relay 58 to ground. This will operate relay 58 and it will lock up over its contact

3

and armature through battery 19 to ground. The release of relay 14 will also close a circuit from battery 26, through the winding of release magnet 16 to ground and will operate release magnet 16 which will return the contact arm to its zero position. The relay 58 is a slow-operate and slow-release relay and the release magnet 16 is adjusted to operate slightly slower than relay 58. Under these conditions when the contact arm rests on contact 5 relay 58 will have time to operate and lock up before the release magnet 16 returns the contact arm to its zero position. Furthermore, when the rotor magnet 15 is stepping the contact arm 17 ahead, or when the release magnet 16 operates and returns the contact arm 17 to its zero position, the speed with which it will pass over other contacts such as 4, 3, 2, etc., to which other slow-operate, slow-release relays similar to 58 might be connected, will be such that the slow-operate, slow-release relays will not be operated and locked up. Let it be assumed that the next digit being sent in the code signal is 7. The contact arm which has been returned to its zero position will now be moved around to contact 7 and the interval following the transmission of such digit will be long enough for slow-release relay 14 to release. This will connect battery 26 to contact arm 17, contact 7, and thence over conductor 22 and the armature and contact of relay 58 to conductor 23. Conductor 23 will be the circuit selected by the code signal heretofore mentioned, and it may terminate in a lock-up signal (not shown) of any desired type. The release magnet 16 will subsequently operate and will return contact arm 17 to its zero position. In order to select other lines it would first be necessary to release the locked up relay 58. To do this the digit 1 is always the first digit of the code signal to be sent over the line. This would step contact arm 17 to position 1. In the ensuing interval between digits of the code signal relay 14 would release and would place like poles of batteries 26 and 19 across the winding of relay 58 effectively short-circuiting it and causing it to release. Accordingly, each code signal used to select a line should start with the digit 1 and would then be followed by other digits of the code signal. As will be pointed out hereinafter, all of the other relays such as 58 individual to contacts of the bank would have their windings connected by conductors similar to 21 to the contact 1 of the bank. Accordingly, the use of the digit 1 as the first digit of each code signal, would release any of the relays such as 58 which had previously been locked up and would prevent false operation of the arrangements. As heretofore pointed out, relay 58 is a slow-release relay. Accordingly, when a code signal such as 5 is sent over the line and the release magnet 16 allows the contact arm to return over contacts 4, 3, 2, 1, successively, the interval that the contact arm remains on contact 1 in so returning to its zero position will not be long enough to release relay 58. However, when the digit 1 of the code signal is sent, the fact that release magnet 16 is slow-operate, as heretofore pointed out, will allow the contact arm 17 to remain on contact 1 long enough to release relay 58. To select another line by means of relay 58 and another of its armatures, the code signal 1, 5, 6 might be sent. As heretofore pointed out, the transmission of the digit 1 would release relay 58 and any other relays similar to it that had been operated. The transmission of digit 5 would cause relay 58 to

4

operate and become locked up in the manner heretofore described. The subsequent transmission of the digit 6 would advance the contact arm 17 to contact 6 and would connect battery 26 to conductor 24, the second armature of relay 58 and thence to conductor 25, thus causing line 25 to be selected.

In Fig. 2 is shown a circuit diagram illustrating other principles of operation of the invention. In Fig. 1 only one relay, such as 58, with a plurality of armatures was shown connected to the selector mechanism. In Fig. 2 is shown how additional relays, such as 48, could be connected to other of the contacts of the bank. The connections for relay 58 are the same as heretofore described with respect to Fig. 1. Relay 48 has one end of its winding connected by conductor 29 to contact 4 of the bank. As heretofore pointed out the other end of its winding (as would be the case with all similar relays) would be connected to contact 1 of the bank so that if it had previously been operated and locked up the transmission of digit 1, which starts every one of the code signals used, would cause it to release. To select the lines 32 and 34 shown associated with the armature of relay 48 the code signals 1-4-6 and 1-4-7 would be used respectively. As pointed out previously the digit 1 would release any of the relays, such as 58 or 48, which had previously been operated. The transmission of digit 4 would cause relay 48 to operate and lock up. The transmission of digits 6 or 7 would put battery 26 on lines 32 or 34 respectively by means of the armatures and contacts of relay 48 to cause them to be selected.

In Fig. 3 is shown a more complete circuit diagram illustrating how the arrangements of the invention could be utilized to select any one of a large number of lines, such for example as seventy-two lines. In Fig. 3 are shown the contacts 1 to 10 respectively of the bank of contacts of the selector mechanism. The apparatus for responding to the code signals transmitted over the line 11 such as relays 12 and 14 and rotor magnet 15 and release magnet 16 operates as heretofore described with respect to Fig. 1. In Fig. 3 relay 23 is shown with one end of its winding connected to contact 1 and the other end of its winding connected to contact 2. It might be provided with eight armatures with which would be associated eight lines to be selected. These armatures would be connected to contacts of the bank other than contact 2 to which relay 23 is connected and other than contact 1 which is commonly used for release purposes. In other words the armatures of relay 23 would be connected to the contacts 3 to 10 inclusive. As will appear from the description of the operation heretofore given any one of the eight lines associated with the armatures of relay 23 may be selected by using the following three digit code signals:

1-2-3
1-2-4
1-2-5
1-2-6
1-2-7
1-2-8
1-2-9
1-2-10

Relay 38 is shown with one end of its winding connected to contact 1 and the other end of its winding connected to contact 3. It might be provided with eight armatures with which would be associated eight lines to be selected. These arma-

5

tures would be connected to contacts of the bank other than contact 3 to which relay 38 is connected and other than contact 1 which is commonly used for release purposes. Any one of the eight lines associated with the armatures of relay 38 may be selected by using the following three digit code signals:

1-3-2
1-3-4
1-3-5
1-3-6
1-3-7
1-3-8
1-3-9
1-3-10

Another relay 48 is shown with one end of its winding connected to contact 1 and the other end of its winding connected to contact 4. It too might be provided with eight armatures and eight associated lines. In this case the armatures would be connected to contacts in the bank other than contacts 1 and 4. Any one of the lines associated with the armatures of relay 48 may be selected by using the following three digit code signals:

1-4-2
1-4-3
1-4-5
1-4-6
1-4-7
1-4-8
1-4-9
1-4-10

In a similar manner other relays each with a plurality of armatures and associated lines to be selected might be connected to other contacts in the bank by means of conductors such as 50 and 50'. By providing ten contacts and having nine relays, each with eight contacts, the arrangements of the invention provide a means for selecting any one of seventy-two lines. However, in accordance with the principles of the invention the number of contacts in the bank, the associated relays and the number of armatures to each relay might be increased or decreased from the number shown to select a greater or lesser number of lines.

Accordingly while the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A selective system comprising a line over which code combinations comprising groups of impulses are transmitted, a station connected to said line, selective mechanism including a bank of terminals and a contact arm therefor at said station, said contact arm having a normal position, a plurality of relays each connected individually to a different one of the terminals of

6

said bank, a plurality of contacts individual to each of said relays, each of said contacts being connected individually to terminals in said bank other than the terminal to which its individual relay is connected, a plurality of circuits to be selected individual to each of said relay contacts, means responsive to the reception at said station of a group of impulses of a transmitted code combination to cause said contact arm to rest on any desired terminal to which any of said relays is connected to operate the relay connected thereto, means responsive to the subsequent reception of another group of impulses of the transmitted code combination to cause said contact arm to rest on any desired terminal to which is connected a contact individual to the previously operated relay to complete the circuit individual to the contact connected to such terminal, and means whereby the contact arm is returned to normal after the termination of each group of impulses.

2. A selective system comprising a line over which groups of impulses are transmitted, a station connected to said line, selective mechanism including a bank of terminals and a contact arm therefor at said station, said contact arm having a normal position, a plurality of relays each connected individually to a different one of the terminals of said bank, a plurality of contacts individual to each of said relays, each of said contacts being connected individually to terminals in said bank other than the terminal to which its individual relay is connected, a plurality of circuits to be selected individual to each of said relay contacts, means responsive to the reception at said station of a group of impulses to operate any desired one of the relays connected to said terminals, means responsive to the subsequent reception at said station of another group of impulses to complete any desired one of the circuits individual to any of the contacts individual to the relay previously operated by said first group of impulses, means responsive to the subsequent reception at said station of another group of impulses to release the previously operated relay and means whereby the contact arm is returned to normal after the termination of each group of impulses.

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