

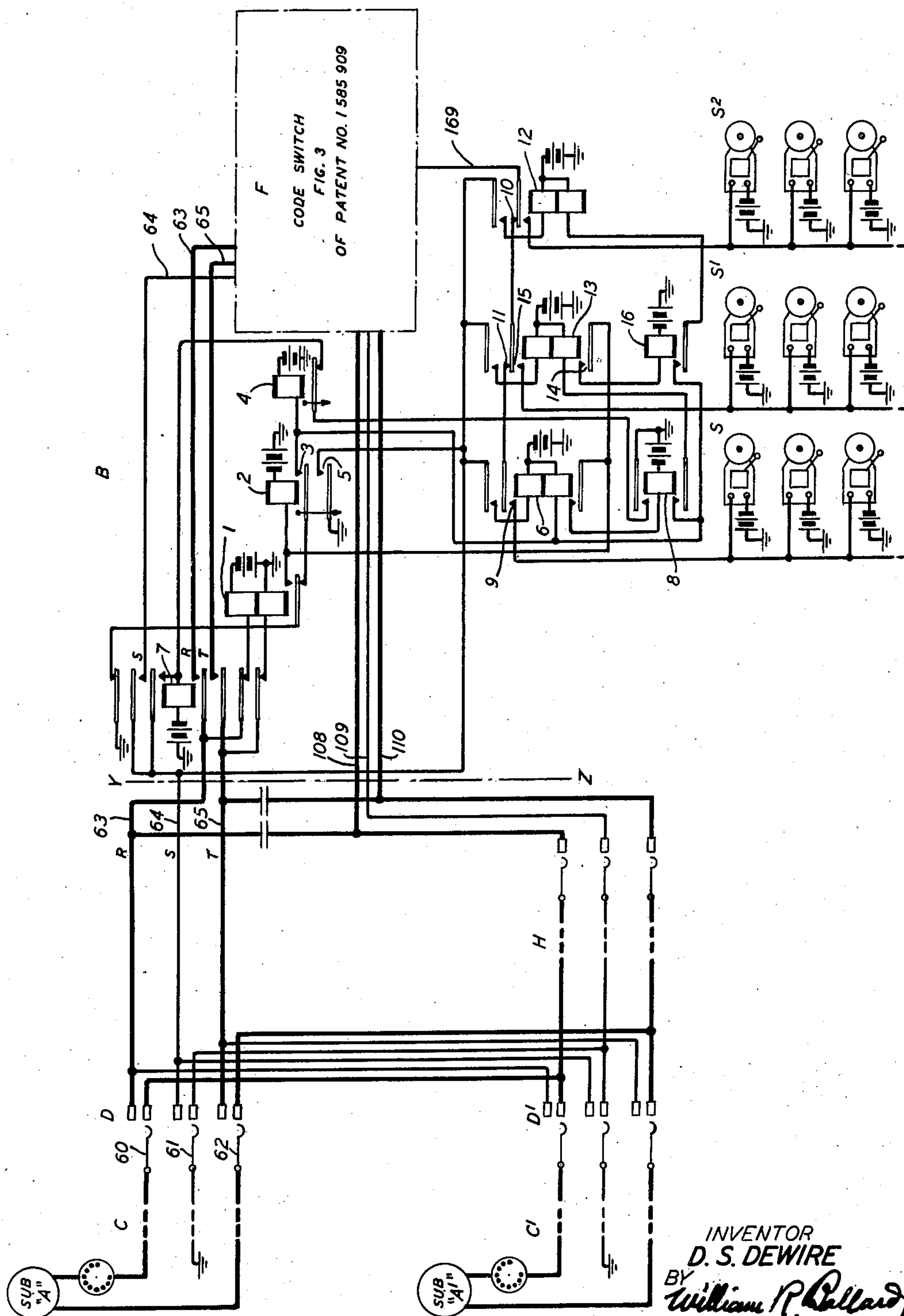
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CODE CALLING SYSTEM

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CODE CALLING SYSTEM

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This invention relates to code signaling systems as applied to private branch exchanges of the automatic or dial type, and disclosed in United States Patent 1,585,909, issued to M. L. Nelson on May 25, 1926, and reissued as Patent Reissue 17,006, on June 19, 1928, and more specifically to an arrangement, in which the signal devices to be operated are divided into a plurality of independent groups, whereby any one group of signals can be selected and operated to the exclusion of the others by dialing a predetermined digit, corresponding to the desired group, following the dial impulses necessary to set the automatic switches on the terminals of the line extending to the code signaling equipment and before dialing the digits of the desired code.

An object of the invention is therefore to improve and make more flexible code signaling systems of the type disclosed and claimed in the above-noted patent.

A feature of the invention, in accordance with the above object, resides in the provision of a circuit arrangement including a plurality of relays interposed between the switch bank of the selector or connector and the code signaling equipment whereby certain of said relays respond to a predetermined number of dial impulses, following the seizure of the circuit by the connector or selector, to conduct a desired signal group circuit to the code impulse switch to the exclusion of the other signal groups and thereafter to connect the seized terminal of the connector or selector through to the code switch, following which the transmission of succeeding digits corresponding to the desired code will adjust the code switch to determine the code to be transmitted by the impulse switch all as described in detail in the Nelson patent before mentioned.

The invention will be understood from the following description when read in connection with the accompanying drawing which shows to the left of the broken line YZ two subscribers' stations A and B together with their associated lines extending through individual line switches C and C' (not shown) but indicated by dotted lines, two selector switches D and D' and a connector switch H to which both selectors D and D' have access, which line switches, selectors, and connectors are shown in detail in Figs. 1 and 2 of the before-identified Nelson Patent 1,585,909.

Extending to the right of the broken line YZ are leads 63, 64, 65, 108, 109 and 110 and the latter three of which, i. e. 108, 109 and 110 terminate in a code switch F' at the extreme right of

the drawing which switch is identical with the arrangement shown on Fig. 3 of the Nelson patent above noted except for the elimination of bells S and S' shown thereon. Leads 63, 64 and 65 instead of also terminating directly in the code switch F, as shown in the patent, terminate in the signal group selecting circuit B which circuit is the subject of the present invention and through which these leads pass before reaching the code switch F. A lead 169 is shown extending from the lower part of the code switch F to the signal group selecting circuit B over which lead, depending upon the operated condition of one of the relays 6, 13 or 12, a signal group S, S' or S² is selectively controlled.

A description of the operation of the arrangement with particular reference to the group selecting circuit B will now be given, reference being had to the specification of the Nelson Patent 1,585,909 for the detail operation of the line switches C and C', selectors D and D', connector H and code switch F.

It will first be assumed that the system of the present invention is installed in connection with a dial private branch exchange in a large manufacturing plant having a number of separate buildings and that subscriber A desires to communicate with a certain individual X, for example a foreman in one of the buildings, and has determined in some well-known manner, as for example by calling his regular station, that he is elsewhere in the building. It being further assumed that the normal duties of X restrict him to his particular building and that the probability of his being elsewhere is remote.

As subscriber A desires to communicate with X as soon as possible, he can use the code call system and cause a number of bells located throughout the building where X is presumed to be to repeatedly and simultaneously sound a predetermined code (preassigned call for X). It is further assumed that the code of X is 45 which comprises four rings, a pause and followed by five rings.

As the other buildings of the plant also have groups of code bells located therein, the present invention permits subscriber A to select the desired group of bells to be sounded without sounding the bells in the other parts of the plant. This is done as follows:

As described in the aforementioned Nelson Patent 1,585,909, subscriber A lifts his receiver and is automatically connected by means of line switch C to an idle trunk terminating in the brushes of selector D, and thereupon, in order

to seize the code calling equipment, actuates a calling device in accordance with the digit which it is necessary to transmit to select the level of the selector which is allotted for calling the code switch. The first set of contacts in such level is connected to leads 63, 64 and 65 which extend to the code switch through the signal selecting circuit B while the remaining contacts of this particular level are permanently made busy, i. e., grounded.

By the operation of the vertical magnet of selector D, the shaft and wipers thereof are raised step by step until they come to rest opposite the desired level of the contact bank. At the end of the vertical movement, the rotary magnet of the selector is energized and moves the brushes 60, 61 and 62 into engagement with the first set of contacts in the level opposite which they have been raised, which contacts we have assumed are connected to leads 63, 64 and 65.

If the code switch is not engaged, i. e. the contact of selector D, in which lead 64 terminates, is not grounded, ground from the line switch C will be extended to lead 64 and the dial contacts at station A will be extended over brushes 60 and 62 to the line relay 1 of the signal group selecting circuit B which relay immediately operates. Operation of relay 1 closes, at its lower front contact, an obvious circuit to operate slow-to-release relay 2. Relay 2 in operating prepares a circuit at its contacts 3 to operate relays 4 and 6 in parallel when relay 1 releases. Relay 2 also closes its contacts 5 thereby grounding the conductor 64 to hold relays in the selector (not shown).

Subscriber A can now dial the code digits of the particular group of signal bells which he desired to operate and we will assume that signal group S is the one serving the building in which X is to be called which group requires that the digit 1 be dialed. In response to the operation of the dial to transmit the digit 1, the line relay will be deenergized once and immediately reenergized. When relay 1 is deenergized it momentarily closes its back contacts and completes the previously prepared circuit for relays 4 and 6, which can be traced from ground at the upper back contact of relay 7, back contact of relay 1, contact 3 of relay 2 and windings of relays 4 and 6 in parallel to battery. Relay 4 in operating opens its lower contact to prevent premature operation of relay 7.

Relay 6 in operating locks to ground on lead 64 and prepares a circuit to operate relay 8 when relay 1 reenergizes due to reclosure of the dial contact following the first break. When relay 1 operates, it closes its lower front contact whereupon relay 8 operates in a circuit from ground, uppermost contacts of relay 7, front contact of relay 1, lower front contact of relay 6 and winding of relay 8 to battery. Relay 8 prepares a circuit at its upper front contact to operate relay 7 which circuit is open at contacts of slow-release relay 4. Reoperation of relay 1 also opens its back contact thereby opening the circuit for relay 4 which releases slowly and when its back contacts close relay 7 operates in a circuit from ground, upper front contact of relay 8, back contacts of relay 4 and winding of relay 7 to battery. Relay 7 locks to lead 64 and remains operated until selector D releases. It will now be noted that relay 6 is operated and held independently of relay 1 and that its contacts 9 are closed thereby connecting the group of signal bells S to lead

169 in series with the normal contacts 10 and 11 of relays 12 and 13 which relays are not now operated.

Operation of relay 7 opens its normal contacts and closes its alternate contacts thereby releasing all relays except relay 6 which is locked to lead 64, and extends leads 63, 64 and 65 to the code switch F indicated by the broken line box at the right of the drawing.

The subscriber can now dial in succession the first and second digits of the code preassigned for X which, as before mentioned, is assumed to be 45. As the operation of code switch F, which now responds to digit impulses transmitted by the subscriber, forms no part of the present invention, and its operation is clearly and adequately described in the before-mentioned Nelson Patent 1,585,909, beginning with line 98 on page 3, the details of this switch have been omitted from the present drawing and no further reference thereto is considered necessary other than to refer to the fact that when lead 169 is grounded by the operation of the code switch as described in the patent the group of bells S are operated as before mentioned over lead 169 and contacts 10, 11 and 9 of relays 12, 13 and 6, respectively.

In case signal group S1 had been the group which it was desired to operate, subscriber A, after dialing the first digit, to set the selector D on the terminals connected to leads 63, 64 and 65, would have dialed the digit 2 thereby releasing relay 1 twice. Due to the slow-release characteristics of relay 4, this relay remains operated over the momentary opening of its circuit due to the operation of relay 1 between the first and second dial interruptions and when relay 1 releases the second time, a circuit is completed to operate relay 13 which can be traced from ground, uppermost contact of relay 7, back contact of relay 1, contact 3 of relay 2, lower front contact of relay 8 and lower winding of relay 13 to battery and ground. Relay 13 operates in this circuit and locks over its uppermost front contact to lead 64 in parallel with relay 6, prepares a circuit at its contacts 14 to operate relay 16, and opens contacts 11 thereby disconnecting signal group S and by closing its contacts 15 connects signal group S' to lead 169 over normal contacts 10 of relay 12. When relay 1 reoperates, following the second interruption of the dial contacts, relay 16 operates from ground at the uppermost contact of relay 7, front contact of relay 1, contacts 14 of relay 13 and winding of relay 16 to battery. Operation of this relay, however, is ineffective to operate relay 12 as relay 1 is now reoperated and its lower normal contacts are open. As soon as relay 4 releases, due to the continued operation of relay 1, it closes its contacts and relay 7 operates and locks as before described to release all relays except relays 6 and 13 and extends leads 63, 64 and 65 through to the code switch. The operation of relay 6, however, is ineffective as the circuit over its contacts 9 to signal group S is open at contacts 11 of relay 13. When the code switch F is conditioned by the subsequent transmission of the code digits and applies ground impulses to lead 169, the bells of group S' only, instead of group S, will respond. Transmission of the digit 3, i. e. three interruptions of the dial circuit, and the consequent release of relay 1 three times, will operate relay 12, which locks to lead 64, thereby connecting lead 169 to signal group S2 to the exclusion of groups S and S'.

The further operation of the system whereby the party X, upon hearing his code sounded, calls from any station and is connected to the calling subscriber A, forms no part of this invention and will therefore not be described, reference to such operation being had to the Nelson patent before mentioned.

What is claimed is:

1. In a code call system, an automatic telephone exchange comprising a calling subscriber's station, an automatic switch controlled by said subscriber, a called line terminating in a code switch and adapted to be seized by said automatic switch, a signal line extending from said code switch, said code switch being adapted to be controlled over said called line by said subscriber to transmit different combinations of electrical impulses to said signal line, a plurality of independent groups of signal devices normally disconnected from said signal line and single means associated with said called line intermediate said automatic switch and code switch adapted to be controlled by said subscriber prior to control of said code switch to selectively connect any one of said groups of signal devices to said signal line.

2. In a code call system, an automatic telephone exchange comprising a calling subscriber's station, an automatic switch controlled by said subscriber, a code switch, a called line adapted to be seized by said automatic switch, a pulsing relay normally connected to said called line and controlled by said subscriber when said line is seized, a relay adapted when operated to dis-

connect said pulsing relay and extend said line to the code switch, a signal line extending from said code switch, said code switch being adapted to be controlled by said subscriber over said extended called line to transmit different combinations of electrical impulses to said signal line, a plurality of independent groups of signal devices, means controlled by said pulsing relay to selectively connect any one of said groups of signal devices to the signal line and thereafter operate said relay to extend said called line to the code switch and disconnect said pulsing relay.

3. In a code call system, an automatic telephone exchange comprising a calling subscriber's station, an automatic switch controlled by said subscriber, a code switch, a called line adapted to be seized by said automatic switch, a signal line extending from said code switch, a plurality of independent groups of signal devices normally disconnected from said signal line, a single means associated with said called line and responsive to seizure of said called line by said automatic switch and subsequent control by said subscriber to selectively connect any one of said groups of signal devices to said signal line and thereafter extend said called line to said code switch, said code switch being adapted to be controlled over said extended called line by said subscriber to transmit different combinations of electrical impulses to said signal line to cause response of the connected group of signal devices.

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