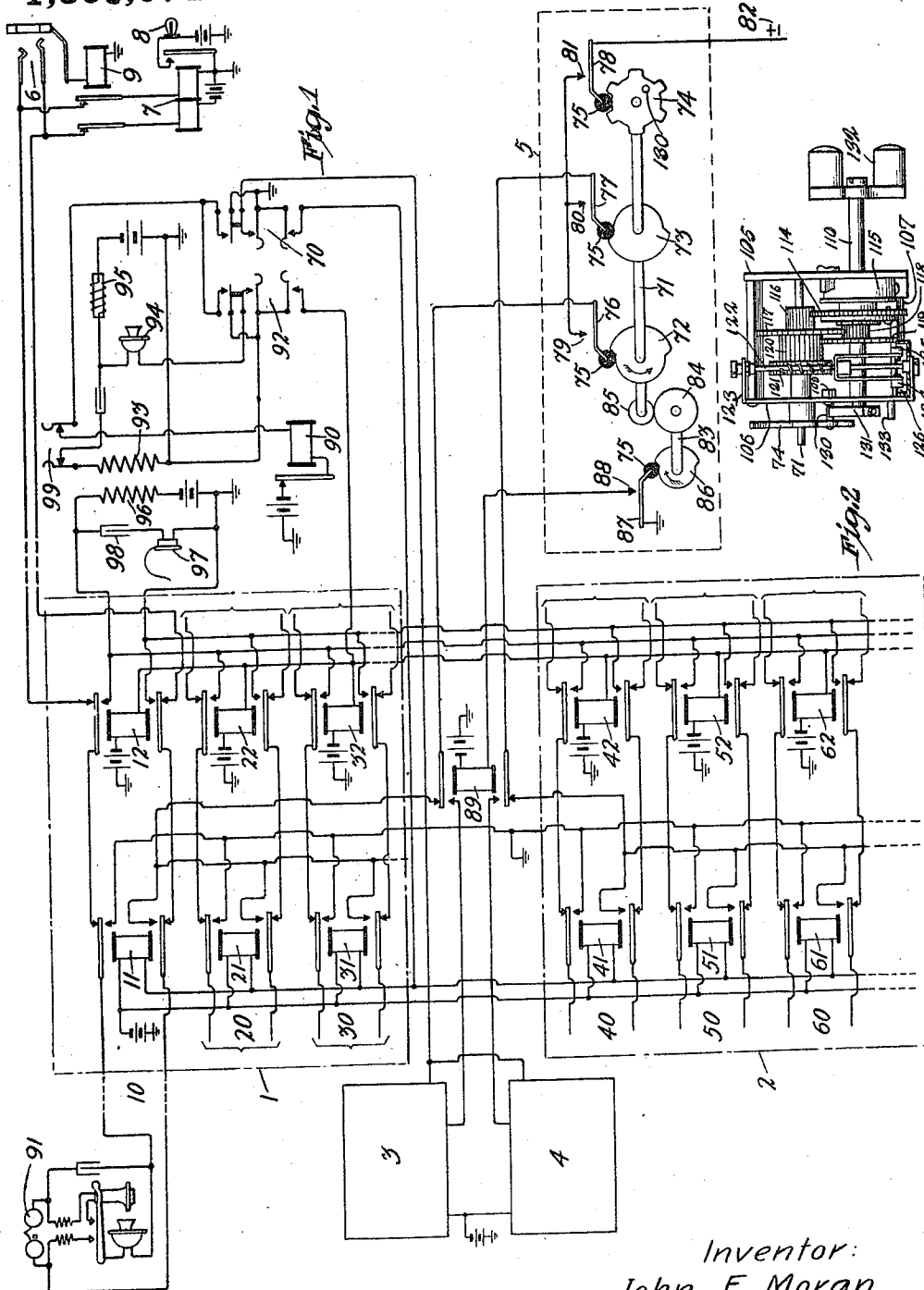


J. F. MORAN.
 SIGNALING SYSTEM.
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1,306,074.



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UNITED STATES PATENT OFFICE.

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SIGNALING SYSTEM.

1,306,074.

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To all whom it may concern:

Be it known that I, JOHN F. MORAN, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Signaling Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to signaling systems, its object being to provide means for operating signaling devices associated with telephone or other lines or systems.

In accordance with this invention there is provided for each of several telephone lines a relay through whose contacts the line normally extends to the usual central office telephone apparatus. By the actuation of an operator-controlled key the relays are operated to disconnect the lines from the central office telephone apparatus and to connect the lines with signal sending apparatus which when set in operation divides the lines into groups and causes the operation of the signaling devices of one group, then those of a second group and so on throughout the groups. A warning or guard signal is operated while the operator-controlled key is actuated to warn the operator that the lines have been disconnected from the central office telephone apparatus. By the actuation of another operator-controlled key, the lines of one group or of all groups may be connected with the operator's telephone set, whereupon the operator may simultaneously communicate with all telephone stations of the several lines.

This invention may be more readily understood by reference to the following description considered in connection with the accompanying drawing, in which in Figure 1 there is shown a plurality of telephone lines terminating at a central office at which is located apparatus by means of which the stations of the several lines may be signaled in groups, and apparatus by means of which the several lines may be simultaneously connected to an operator's telephone set, and in Fig. 2 there is shown driving mechanism for the apparatus controlling the signaling of the lines by groups.

As shown in Fig. 1 of the drawing, a plurality of telephone lines 10, 20, 30, 40, 50 and 60 extend from subscribers' stations to a central office and there terminate in jacks.

For convenience the full equipment for only one line, namely line 10, is shown, its jack being designated by reference numeral 6. Associated with each line is the usual line relay 7, line lamp 8 and cut-off relay 9. Each telephone line upon entering the central office extends through normally closed contacts of two relays. For example, the conductors of telephone line 10 extend through the normally closed contacts of relays 11 and 12. The telephone lines are divided into groups, lines 10, 20 and 30 being in group 1, and lines 40, 50 and 60 being in group 2. Other groups of lines are diagrammatically illustrated by the rectangles 3 and 4. While each group as shown comprises only three telephone lines it will be evident that this number may be increased.

For the purpose of signaling on the different groups of lines, the equipment within the dotted rectangle 5 and a key 70 are provided. This equipment comprises a rotatable shaft 71 upon which are mounted cam wheels 72, 73 and 74. The several cam wheels 72, 73 and 74 are engaged by insulating rollers carried by the free end of contact springs 76, 77 and 78 respectively, adapted in the rotation of the cam wheels to engage contacts 79, 80 and 81 respectively. A source of signaling current 82 is connected with the contact spring 78. A second shaft 83 is geared to the shaft 71 by means of gears 84 and 85 of such ratio that the shaft 83 makes one revolution while the shaft 71 is making two revolutions. The shaft 83 carries a cam wheel 86 which engages insulating roller 75 carried by a contact spring 87 adapted to engage contact 88 to maintain a relay 89 operated during the second half revolution of shaft 83 or the second full revolution of shaft 71. The shaft 71, when started, is adapted to make two complete revolutions. The driving mechanism therefor may be similar to that shown in Fig. 5 of the patent to G. Brown, No. 1,155,640.

This driving mechanism, as shown in Fig. 2, may comprise frame plate members 105 and 106 secured together by rods 107, 108 and 109. Supported in these frame plates 105 and 106 are shafts 110 and 71, the shaft 110 constituting a driving and the shaft 71 the driven shaft of the mechanism. Loosely mounted upon the shaft 110 is a gear wheel 114 adapted to be driven by a spiral spring

115 on the shaft 110. The gear wheel 114 meshes with a pinion 116 on the shaft 71, which pinion is secured to a gear wheel 117 on the shaft 71, the gear wheel 117 being in mesh with a pinion 118 loosely mounted upon the shaft 110 and secured to a gear wheel 119. The gear wheel 119 in turn meshes with a pinion 120 loosely mounted upon the shaft 71 and secured to a gear 121 which meshes with a worm on a governor shaft 122. This governor shaft 122 is arranged at right angles to the shafts 110 and 71 and is supported between arms 123, 123 formed integrally with the frame plate member 106. The governor consists of two weighted spring arms 124 and 125 which, as the governor shaft 122 is rotated, are caused to throw the weights outwardly against the inner face of a metal drum 126, the friction of the weights and drum tending to retard the movement of the rotating parts and keep them at a constant speed. The shaft 71 is adapted to make two complete revolutions each time it is set in motion, and in this connection the toothed wheel 74 is provided on one face with a projecting stop pin 130 adapted to engage a movable stop lug 131 carried by the shaft 110. In the operation of these particular parts, the shaft 110 is turned, by means of a handle 132 provided on one end of the shaft, until the stop lug 131 comes into engagement with a stop pin 133 projecting from the frame plate 106. When the handle is released, the two shafts 110 and 71 travel at such relative speeds that the shaft 71 is caused to make two complete revolutions, while the stop lug 131 is moving back into position to engage the stop pin 130 on the wheel 74. The stop lug 131 is shown in normal position in engagement with the stop pin 130 but out of engagement with the stop pin 133. When setting the driving mechanism, the handle 132 is turned to the right.

The several lines which upon entering the central office extend through the normally closed contacts of two relays may be the telephone lines of the firemen of a volunteer fire alarm system of a small community where, upon receipt of information regarding a fire, the central office operator may first signal the telephone stations of the several firemen and may then connect these lines to the operator's telephone set so that the operator may simultaneously communicate to all firemen the information regarding the fire.

In order to accomplish this object, the operator, upon receiving information regarding a fire, first actuates key 70, which is of the locking type, thereby causing the operation of relays 11, 21 and 31 of group 1, relays 41, 51 and 61 of group 2, and corresponding relays of groups 3 and 4. The relays of groups 1 and 2 operate over a circuit

from battery through the windings of relays 11, 21, 31, 41, 51 and 61 in parallel and the lower contact of key 70 to ground, and those of groups 3 and 4 from battery through the windings of the relays thereof in parallel and the middle contact of key 70 to ground. The operation of these relays disconnects the telephone lines from the central office telephone apparatus and connects these lines to circuit leads extending to and associated with the signal sending apparatus illustrated within the dotted rectangle 5. The actuation of key 70 also causes the operation of a buzzer 90 which serves as a signal to the operator that the telephone lines have been disconnected from the central office telephone apparatus. The operator may now set the shafts 71 and 83 rotating by turning the handle 132 of the driving mechanism to the right and releasing it, whereupon, during the first half of the first revolution of shaft 71, the source of signaling current 82 is intermittently connected to the telephone lines of group 1 through contacts 78, 81 and 76, 79 controlled respectively by the cam wheels 74 and 72, and the alternate contacts of the individual relays 11, 21 and 31 to cause the intermittent or periodic operation of the call bells 91 at the several telephone stations of group 1. During the second half of the first revolution of shaft 71, contacts 77, 80 controlled by cam wheel 73 are substituted for contacts 76, 79 controlled by cam wheel 72, so that the call bells of the telephone stations in group 2 are operated. During the second revolution of shaft 71, contacts 87, 88 controlled by cam wheel 86 on shaft 83 are engaged, so that relay 89 is operated to disconnect the signal sending apparatus from groups 1 and 2 and associate it with groups 3 and 4. It will be seen, therefore, that during the first half of the second revolution of shaft 71, the call bells in group 3 will be operated, while during the second half of the second revolution, those of group 4 will be operated. At the completion of the second revolution of shaft 71, relay 89 and the apparatus within the dotted rectangle 5 are restored to normal condition with the stop lug 131 in engagement with the stop pin 130. The operator may now restore key 70 to normal position, stopping the operation of buzzer 90 and restoring the actuated individual relays to normal condition, whereupon the lines are again connected through to the central office telephone apparatus.

In order that the information regarding a fire may be communicated to the several firemen, the operator may now actuate key 92, which is of the locking type, to cause the operation of relays 12, 22 and 32 of group 1, relays 42, 52 and 62 of group 2, and the corresponding relays of the other groups, whereupon the telephone lines are again dis-

connected from the central office telephone apparatus, and are now connected with the operator's telephone set.

Upon the actuation of key 92, the buzzer 90 is again operated over a circuit from battery through the contact and winding of buzzer 90, right-hand contact of key 99 and upper contact of key 92 to ground, to furnish a signal indicating that the telephone lines are disconnected from the central office telephone apparatus, and the primary circuit of the operator's telephone set including primary winding 93 of an induction coil, transmitter 94, retardation coil 95 and battery is completed. Talking battery for the telephone lines is furnished through the secondary winding 96 of the induction coil, the receiver 97 of the operator's telephone set being connected across the telephone lines through a condenser 98. When it is desired to listen on the lines and not talk, a key 99, which is preferably of the non-locking type, may be actuated to open up the primary circuit. After communicating with the firemen, the operator may restore key 92 to normal, whereupon all apparatus returns to normal condition.

What is claimed is:

1. In a signaling system, in combination, a plurality of lines extending from stations to a central office, a signaling device for each line located at the station thereof, a relay for each line, signal control apparatus for each line located at the central office and connected with the lines through normally closed contacts of the respective relays, a switch operable to cause the energization of the relays to open the normally closed contacts, circuit leads connected with the lines through alternate contacts of the respective relays upon the energization thereof, a plurality of conductors, each conductor being connected with predetermined circuit leads, thereby dividing the circuit leads into groups, a source of signaling current, and switching means adapted when actuated to connect the source of signaling current with predetermined groups of circuit leads in succession to cause the successive operation of the signaling devices by groups.

2. In a signaling system, in combination, a plurality of lines extending from stations to a central office, a signaling device for each line located at the station thereof, a relay for each line, signal control apparatus for each line located at the central office and connected with the lines through normally closed contacts of the respective relays, a switch operable to cause the operation of the relays to thereby disconnect the signal control apparatus from the lines, a plurality of circuit leads less in number than the number of lines, each circuit lead being connected to a plurality of lines upon the operation of the relays thereby dividing the lines into

groups, a source of signaling current, and switching means adapted when actuated to connect the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups.

3. In a signaling system, in combination, a plurality of lines extending from stations to a central office, a signaling device for each line located at the station thereof, a relay for each line, signal control apparatus for each line located at the central office and connected with the lines through normally closed contacts of the respective relays, a switch operable to cause the operation of the relays to thereby disconnect the signal control apparatus from the lines, a plurality of circuit leads less in number than the number of lines, each circuit lead being connected to a plurality of lines upon the operation of the relays thereby dividing the lines into groups, a source of signaling current, and a rotatable switching device adapted when started to rotate for a predetermined period and to connect the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups.

4. In a signaling system, in combination, a plurality of lines extending from stations to a central office, a signaling device for each line located at the station thereof, a relay for each line, signal control apparatus for each line located at the central office and connected with the lines through normally closed contacts of the respective relays, a switch operable to cause the operation of the relays to thereby disconnect the signal control apparatus from the lines, a plurality of circuit leads less in number than the number of lines, each circuit lead being connected to a plurality of lines upon the operation of the relays thereby dividing the lines into groups, a source of signaling current, a relay common to the lines, and a rotatable switching device coöperating with the relay to connect the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups.

5. In a signaling system, in combination, a plurality of lines extending from stations to a central office, a signaling device for each line located at the station thereof, a relay for each line, signal control apparatus for each line located at the central office and connected with the lines through normally closed contacts of the respective relays, a switch operable to cause the operation of the relays to thereby disconnect the signal control apparatus from the lines, a plurality of circuit leads less in number than the number of lines, each circuit lead being connected to a plurality of lines upon the operation of the relays thereby dividing the lines into groups, a rotatable switching de-

vice adapted when started to rotate for two complete revolutions, and a relay deenergized during the first and energized during the second revolution of the switching device and cooperating therewith to connect the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups.

6. In a combined telephone and signaling system, a plurality of telephone lines, each extending from a telephone station to a central office, a signaling device for each line located at the station thereof, a first and a second relay for each line, a line signal control apparatus connected with each line through normal contacts of the relays, an operator controlled switch operable to simultaneously energize the first relays of all lines to disconnect the lines from the line signal control apparatus, circuit leads less in number than the number of lines, each circuit lead being connected with a plurality of lines by the energization of the first relays and serving to divide the lines into groups, a source of signaling current, switching mechanism when operated connecting the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups, an operator's telephone set, and a second operator controlled switch operable to cause the si-

multaneous energization of the second relays of all lines to connect the operator's telephone set to the lines.

7. In a combined telephone and signaling system, a plurality of telephone lines, each extending from a telephone station to a central office, a signaling device for each line located at the station thereof, a first and a second relay for each line, line signal control apparatus connected with each line through normal contacts of the relays, an operator controlled switch operable to cause the simultaneous energization of the first relays of all lines to disconnect the lines from the line signal control apparatus, circuit leads less in number than the number of lines, each circuit lead being connected with a plurality of lines by the energization of the first relays serving to divide the lines into groups, a source of signaling current, a rotatable switching device for connecting the source of signaling current to the circuit leads in succession to cause the operation of the signaling devices by groups, a second operator controlled switch, and an operator's telephone set connected with the lines upon the energization of the second relays when the second switch is actuated.

In witness whereof, I hereunto subscribe my name this 5th day of June, A. D. 1917.

JOHN F. MORAN.

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