

July 14, 1931.

E. A. DEMONET ET AL

1,814,899

BUSY TRUNK LINE SIGNAL SYSTEM

Filed July 19, 1930

3 Sheets-Sheet 1

FIG.2.

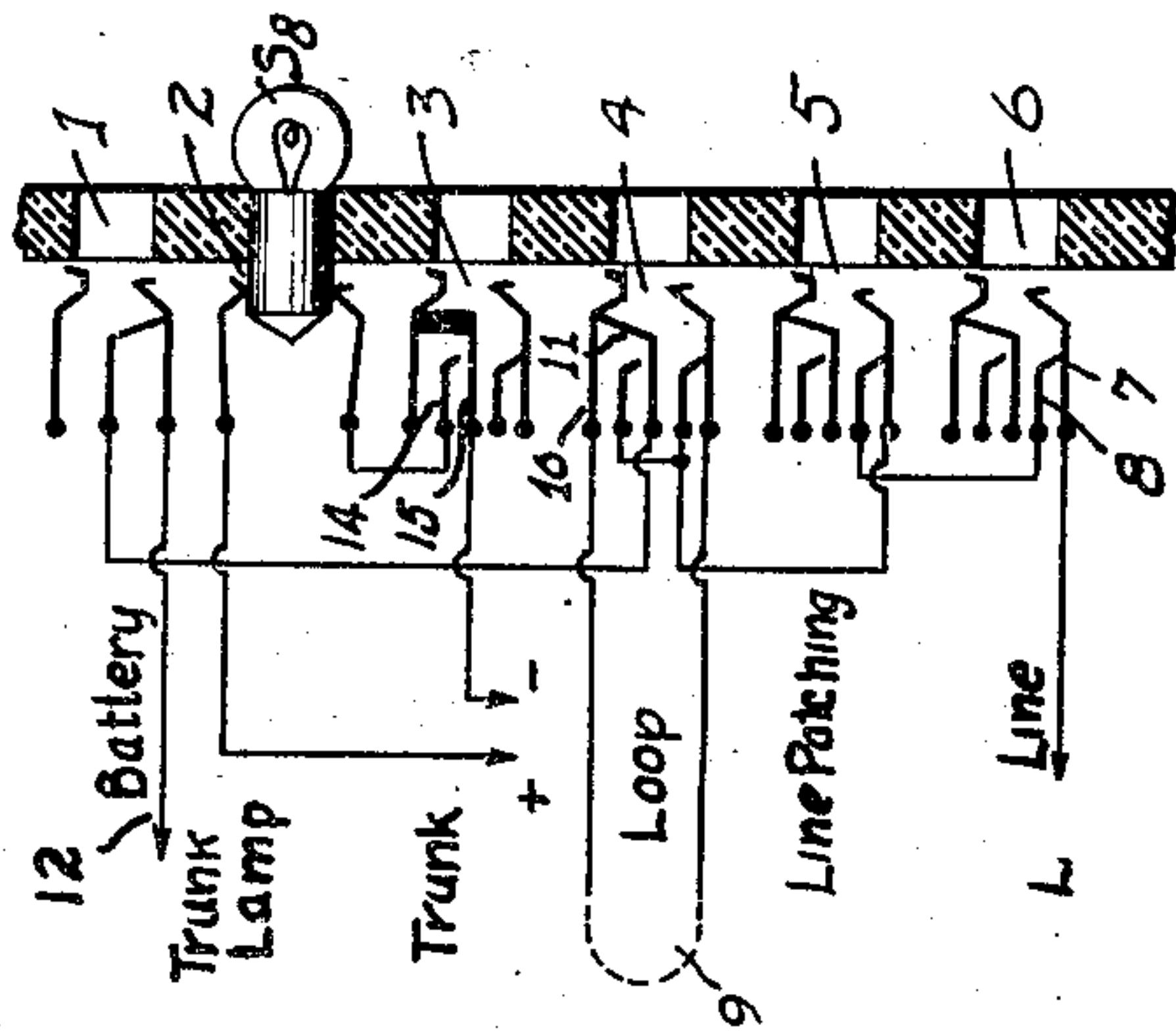
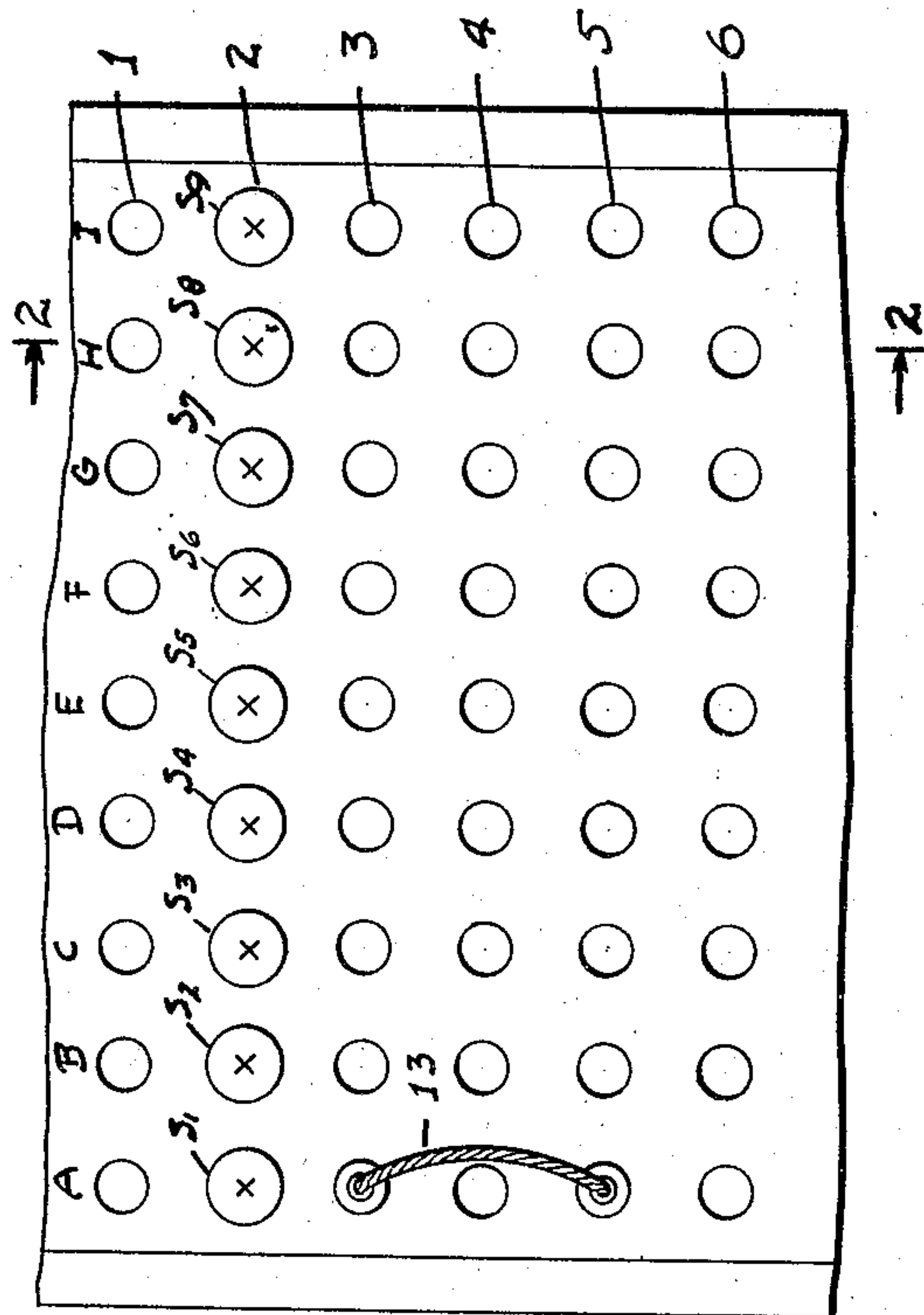


FIG.1.



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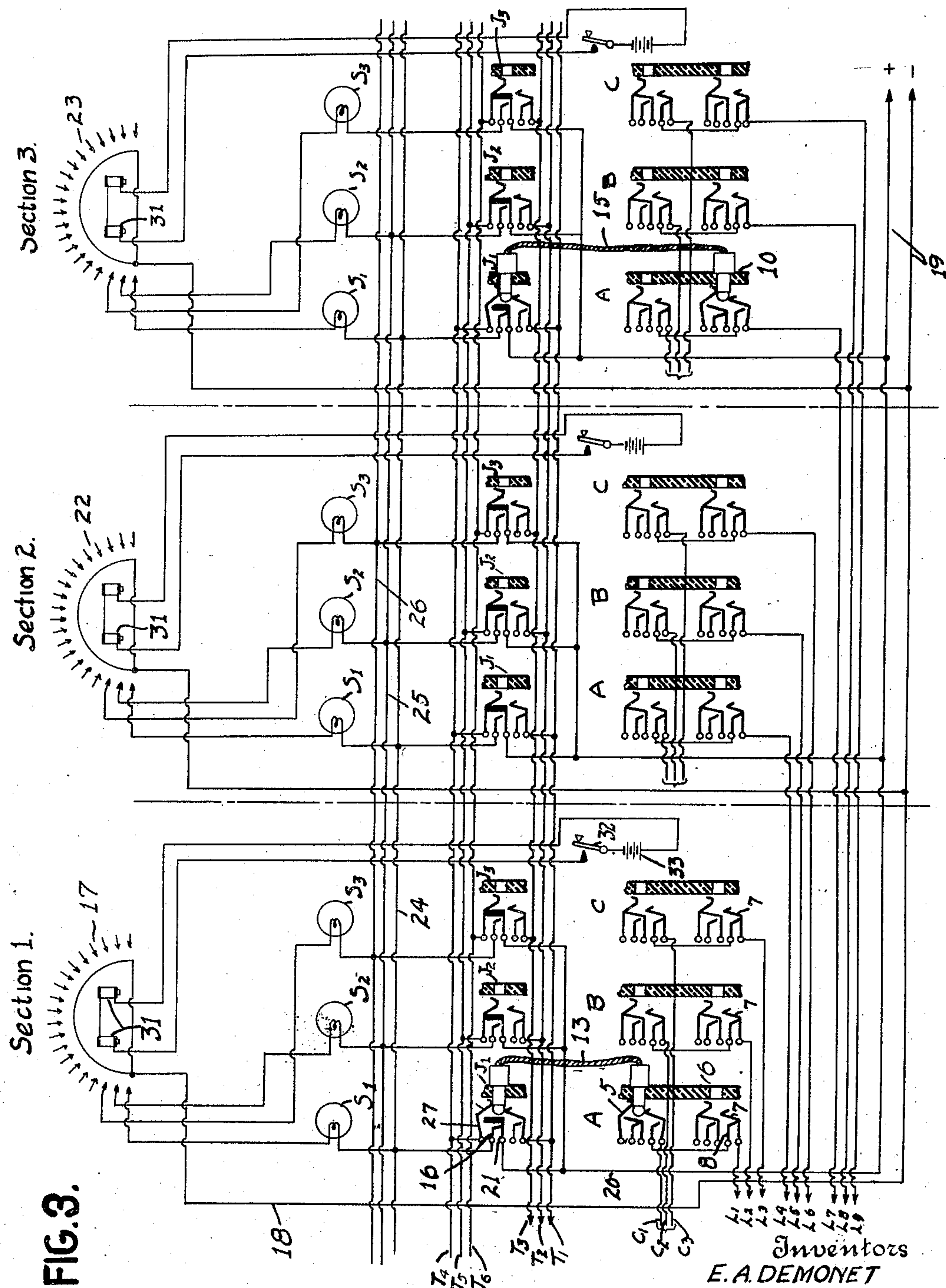
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3 Sheets-Sheet 2



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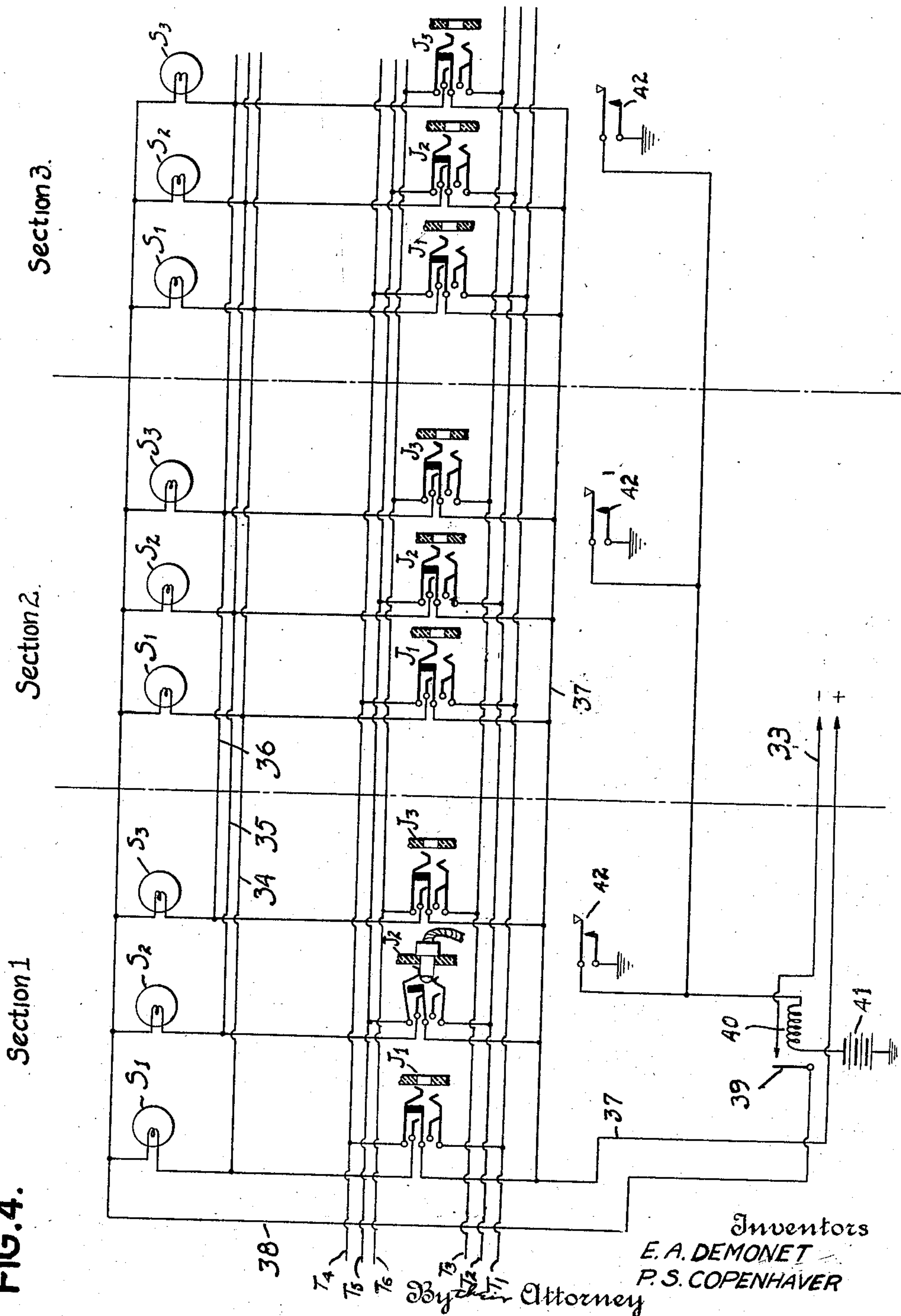
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3 Sheets-Sheet 3

FIG. 4.



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UNITED STATES PATENT OFFICE

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BUSY TRUNK LINE SIGNAL SYSTEM

Application filed July 19, 1930. Serial No. 469,130.

This invention relates to a pin jack switchboard having a number of multiple trunk lines for transferring circuits from one portion of the switchboard to another, and particularly to means for indicating which of said trunk lines are available for use.

In telegraph pin jack switchboard construction, each main line entering the telegraph office terminates at a line jack, at the switchboard, and each line jack has associated with it a number of other jacks, usually arranged in a vertical row, for making the normal assignments of the line, such as loop circuit and battery connections, and connections to the wire chief's test set, anti-induction network, or to any desired apparatus. The circuits may be extended from one portion of the switchboard to another by patching cords where the distance is short, but where it is necessary to extend a circuit to a part of the board not readily reached by the standard lengths of patching cords, multiple trunks are provided. These consist of conductors extending lengthwise of the switchboard, having jacks in multiple thereto appearing at intervals along the board so that one of the multiple trunk line jacks will be within a standard patching cord length of each switchboard jack. Circuits may thus be extended from one part of the board to another by connecting the circuit to any one of the multiple trunks not already in use by a patching cord, and continuing the circuit at the other part of the board from the trunk line to the new circuit by another patching cord. Large telegraph switchboards may employ eighty or more of such multiple trunk lines.

In order to avoid interference with other circuits, it is necessary to determine whether the trunk to be employed is already in use at some other portion of the board before making a connection thereto. For this purpose, busy test knobs have been provided, heretofore, adjacent each trunk line jack, so connected that the insertion of a plug in any trunk jack grounds all of the busy test knobs on that particular trunk. Before using a trunk line, the switchboard attendant must tap the busy test knob of each jack

with a test plug until he locates one which is not in use, as determined by the absence of a click of his test sounder. If the sounder clicks when the test knob is tapped, it indicates that the trunk is in use and another trunk must be selected and the test repeated until an idle trunk is located.

One of the objects of the present invention is to avoid the individual testing of each trunk line and to provide a signal system which will indicate visibly which trunk lines are busy and which are idle at any time.

Another object is to provide such a signal system which will operate only at the particular section of the switchboard at which it is desired to utilize the trunk line.

Other objects and advantages of the invention will hereinafter appear.

Telegraph switchboards as ordinarily constructed are divided into sections of convenient width and each trunk has a jack located in each section or each alternate section, a typical board having from twenty to forty trunk jacks appearing at each section. In accordance with the present invention, a signal lamp is provided adjacent each trunk jack, such lamps being connected through the contacts of the trunk jacks so that the circuit for every lamp associated with a particular trunk line is partially prepared when a patching cord plug is inserted in any jack of that particular trunk.

In one embodiment of the invention the return circuits for the lamps are completed through a relay operated by a switch provided at each switchboard section. Upon operation of the switch at any section, the signal lamps of all busy trunks glow at every section of the board. In accordance with another embodiment of the invention, a separate return circuit is provided for the lamps of each section through a multi-contact switch controlled by a manual switch at each section, the busy trunk line signals operating only at the particular section where the manual switch is operated.

In order that the invention may be more fully understood, reference will be had to the accompanying drawings in which

Figure 1 is a fragmentary view of a portion of a switchboard panel showing the location of the trunk jacks and signal lamps;

Figure 2 is a section on the line 2—2 of Figure 1 showing the circuit connections for a telegraph switchboard circuit;

Figure 3 is a diagrammatic illustration of a switchboard having a number of sections in which the busy trunk line signals operate only at individual sections; and

Figure 4 is a circuit diagram of a modified busy trunk line signal system in which the signals operate at all sections.

Referring first to Figures 1 and 2, which show the relative arrangement of the line switchboard circuit jacks with relation to the trunk line jacks and signal lamps, a number of vertical rows of jack openings A to I are shown, each row having jacks 1, 2, 3, 4, 5 and 6 disposed behind the panel to provide facilities for separate switchboard circuits. Each line switchboard circuit shown includes a battery jack 1, loop jack 4, line patching jack 5, and line jack 6. The line L entering the telegraph office, terminates at the tip contact 7 of the line jack 6, the circuit continuing from the tip normal contact 8 of the line jack to the tip normal and tip contacts of the line patching jack 5 and loop jack 4, to one side of the loop 9, thence through the loop, which may include suitable transmitting and receiving apparatus, to the sleeve contact 10 and sleeve normal contact 11 of the loop jack 14, thence through the tip normal and tip contacts of the battery jack 1 and by conductor 12 to a suitable source of potential. The loop jack 4 and battery jack 1 provide the normal assignments of the line L and changes in assignments are made by means of patching cords extending either from the line or line patching jacks 6 and 5 respectively, to a trunk line jack 3. One such patching cord 13 is shown in Figure 1, connecting the line patching and the trunk jacks 5 and 3.

The trunk line jacks are grouped in a horizontal row and each one thereof has a signal lamp jack 3 disposed thereabove. Busy trunk line signal lamps S_1 to S_s are positioned in the lamp jacks, the circuit for the signal lamps being completed through the contact springs 14 and 15 of the associated trunk jack 3.

Referring now to Figure 3 there is shown a switchboard comprising three sections, each section having three main line circuits A, B and C, terminating thereat. It will be understood, however, that a large telegraph switchboard may involve as many as a hundred or more sections and that each section may provide terminal facilities for from twenty to sixty or more telegraph lines. In Figure 3 each switchboard circuit for simplicity, is shown provided with only a line jack 6 and a line patching jack 5, al-

though a complete switchboard circuit may include fifteen or more jacks to provide for all of the necessary line assignments.

The main lines L1 to L9 entering the telegraph office, terminate at the tip contact 7 of the line jacks 6, the circuit being continued through the tip normal contact 8 of the line jack to the tip normal and tip contacts of the line patching jacks 5, and thence by conductors C_1 , C_2 , and C_3 to the remaining portion of the switchboard circuit, as for instance, to a loop circuit containing transmitting and receiving apparatus.

Three tip trunk lines T1, T2 and T3, and three sleeve trunk lines T4, T5 and T6 extend across the three sections of the switchboard and each pair of trunk lines has a trunk jack J1, J2 and J3, respectively disposed at each section of the board, the jacks J1, J2 and J3 having their tip contacts connected to the trunks T1, T2 and T3, respectively, and their sleeve contacts connected to trunks T4, T5 and T6 respectively.

When it is desired to extend a circuit, such as the conductor C_1 of circuit A at section 1, to another part of the board, a patching cord 13 is connected between the jack 5 of circuit A and any one of the trunk line jacks, as jack J1, thus disconnecting the line L1 from the remainder of the switchboard circuit, and connecting the conductor C_1 through the tip contacts of the jacks 5 and J1 to the trunk line T1. This circuit may then be continued to any other line at any part of the board, as for instance, line L7 at section 3, by connecting another patching cord 15 between the jack J1 and the line jack 6 of section 3.

Each trunk jack has a signal lamp S1, S2 and S3 arranged adjacent thereto, each lamp having one terminal connected to the contact spring 16 of the corresponding trunk jack, the lamp circuit normally being open at this contact. The opposite terminal of each lamp of section 1 is connected to one contact of a multi-contact switch 17 common to this section, the circuit being completed from the switch 17 by a conductor 18 to one side of a power line 19. The opposite side of the power line is connected by a conductor 20 to the sleeve normal contact 21 of each of the trunk jacks in multiple. Similarly, the return circuits of the lamps of sections 2 and 3 extend to the multiple contact switches 22 and 23, provided in sections 2 and 3 respectively. The jack sides of the lamps S1 of each section are connected in multiple by a conductor 24, and the lamps S2 and S3 of each section are similarly connected in multiple by conductors 25 and 26.

Each of the multi-contact switches 17, 22 and 23 are operated by electromagnets 31 included in a circuit, also including a manual switch 32 and battery 33.

The operation of the system is as follows: Upon insertion of a plug in one of the trunk

jacks, as for instance, jack J1 of the section 1, contacts 16 and 21 of the jack are closed, thus preparing a circuit from the power line through conductor 20, contacts 16 and 21 of jack J1 of section 1 and conductor 24 to the lamps S1 of each section in parallel, which circuit is held open at the contacts of each of the multi-contact switches 17, 22 and 23. When it is desired to determine which of the trunk lines are busy, the switch 32 at any section is closed to operate the multi-contact switch at that particular section and thus to complete the circuits of each of the lamps, at that section, which are associated with busy trunk lines. A visible indication is thus given of which of the trunk lines are busy and which are idle and thus available for use.

It will be understood, of course, that with the system shown in Figure 3 only those busy trunk signal lamps operate which are located at the particular section at which the switch 32 is closed. Figure 4 illustrates a system in which the signal lamps at all sections operate simultaneously whenever the manual switch is closed at any one of the sections.

In Figure 4 the switchboard circuits have been omitted and only the busy trunk line signal circuits illustrated. In this system the signal lamps S1, S2 and S3 are connected to one side of the power line 33 through conductors 34, 35 or 36, jacks J1, J2 or J3 and conductors 37, exactly as in Figure 3. The opposite sides of the lamps of every section are connected in multiple to the common conductor 38, the circuit being completed through the contacts 39 of a relay 40, to the other side of the source of power 33. The relay 40 has one side connected to a grounded battery 41 and the other side connected in multiple to one side of the switches 42, one of which is provided for each section, the opposite contact of the switches being grounded. To test for a busy trunk line, any one of the switches 42 may be operated to close the relay contacts 39 and thus complete the circuit to the lamps of each busy trunk line at all sections of the switchboard.

Obviously other circuit connections may be devised and, therefore, we desire the specific connections shown to be considered in an illustrative rather than a limiting sense.

What we claim is:

1. A busy trunk line indicating system for a pin jack switchboard comprising a plurality of trunk lines, a jack for each trunk line, a plurality of signal devices for each trunk line, means acting upon insertion of a cord plug in any of said trunk line jacks for preparing a circuit to the signal devices associated with that particular trunk line and means universal to all of said circuits for completing the circuits to those signal de-

vices which are associated with busy trunk lines.

2. A busy trunk line indicating system for a pin jack switchboard comprising a plurality of trunk lines, a jack for each trunk line, a plurality of signal devices for each trunk line, means for preparing a circuit to the signal devices of each of said trunk lines whenever said lines are put into use and means for simultaneously completing the circuit to all of said signal devices which are associated with busy trunk lines.

3. A busy trunk line indicating system for a pin jack switchboard comprising a plurality of trunk lines, a jack for each trunk line, a plurality of signal devices for each trunk line, means dependent upon the busy or idle condition of each of said trunk lines for preparing the circuits to the signal devices associated with each trunk line and means for simultaneously completing the signal circuits so prepared.

4. A busy trunk line indicating system for a pin jack switchboard having a plurality of sections comprising a plurality of trunk lines having multiple jacks appearing at a plurality of sections, a signal device associated with each trunk line, means acting upon the insertion of a cord plug in any jack connected to a particular trunk line for preparing a circuit to all of the signal devices associated with that particular trunk line and means operable at will for simultaneously completing the circuit to the signal devices associated with busy trunk lines.

5. A busy trunk line indicating system for a pin jack switchboard having a plurality of sections comprising a plurality of trunk lines having multiple jacks appearing at a plurality of sections, a signal device associated with each trunk line jack, means acting upon the insertion of a cord plug in any jack connected to a particular trunk line for preparing a circuit to all of the signal devices associated with that particular trunk line and means operable at will for simultaneously completing the circuit to at least one signal device associated with each busy trunk line.

6. A busy trunk line indicating system for a pin jack switchboard having a plurality of sections comprising a plurality of trunk lines having multiple jacks appearing at a plurality of sections, a signal device associated with each trunk line jack, means operable at will for simultaneously actuating the signal devices located in any section which are associated with busy trunk lines.

7. A busy trunk line indicating system for a pin jack switchboard having a plurality of sections comprising a plurality of trunk lines having multiple jacks appearing at a plurality of sections, a signal device associated with each trunk line jack, means acting upon the insertion of a plug in any jack

connected to a particular trunk line for preparing a circuit to all of the signal devices associated with that particular trunk line and means at each section operable at will for simultaneously completing the circuit to all

5 of the signal devices associated with busy trunk lines which are located at that particular section.

8. A switchboard having a plurality of sections, a plurality of trunk lines each having multiple jacks appearing at a number of different sections, a signal lamp disposed adjacent each of said jacks, a circuit for each of said lamps, including the contacts of the adjacently disposed jack, said circuits being normally open at the contacts of the jacks, means for closing the circuits to one side of all of the lamps associated with a particular trunk line upon insertion of a cord plug in any jack connected to said trunk line and a multi-contact switch for completing the circuit to the opposite side of all of the lamps appearing at a particular section.

9. A switchboard having a plurality of sections, a plurality of trunk lines each having multiple jacks appearing at a number of different sections, a signal lamp disposed adjacent each of said jacks, a circuit for each of said lamps, including the contacts of the adjacently disposed jack, said circuits being normally open at the contacts of the jacks, means for closing the circuit to one side of all of the lamps associated with a particular trunk line upon insertion of a cord plug in any jack connected to said trunk and a switch common to a group of said lamps for completing the circuit to the opposite side of all of the lamps of said group.

10. In a pin jack switchboard, a plurality of trunk lines, a plurality of signal devices for each trunk line, said devices being arranged in groups and sections, means operable on bringing any trunk line in use for completing the circuit to one side of all of the signal devices of the group associated with said trunk line and means operable at will for completing the circuit to the other side of all of the signal devices of a particular section.

11. A switchboard having a plurality of sections, a plurality of trunk lines each having multiple jacks appearing at a number of different sections, a signal lamp disposed adjacent each of said jacks, a circuit for each of said lamps, including the contact of the adjacently disposed jacks, said circuits being normally open at the contacts of the jacks, and manual means for completing the circuit to the other side of said lamps.

12. In a pin jack switchboard, a plurality of trunk lines, multiple jacks for each trunk line, said jacks being arranged in groups and sections, a signal device associated with each jack and also arranged in groups and sections, means operable on insertion of a cord

plug in any jack of any one group for completing a circuit to one side of each lamp in the associated group and manual means for completing the circuit to the other side of said lamps.

13. In a pin jack switchboard, a plurality of trunk lines, a plurality of signal devices for each trunk line, said devices being arranged in groups and sections, means operable on bringing any trunk line in use for completing the circuit to one side of all of the signal devices of the group associated with said trunk line and a multi-contact switch for completing the circuit to the other side of all of the signal devices of a particular section.

In testimony whereof we affix our signatures.

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PRESTON S. COPENHAVER.