March 10, 1931. R. B. BAKER 1,795,536

PAGING SYSTEM

Filed March 22, 1926 4 Sheets-Sheet 1

Fig. 1

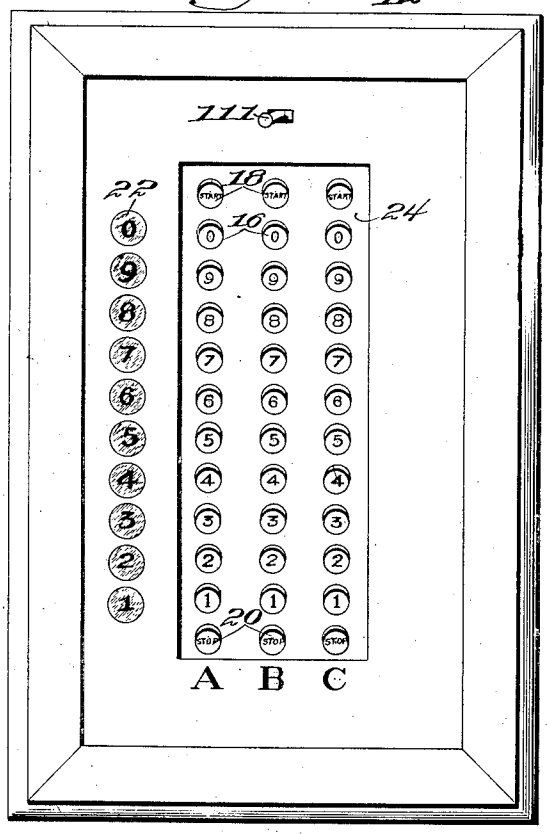


Fig. 2

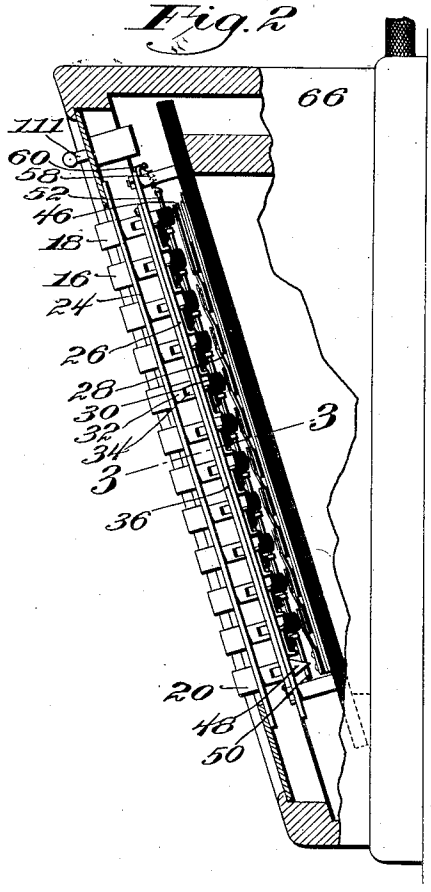
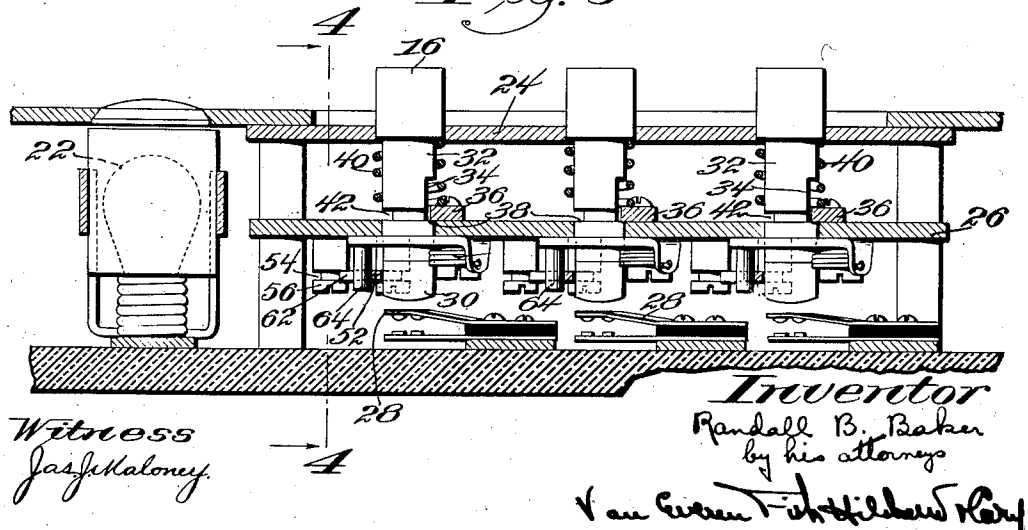


Fig. 3



Witness
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PAGING SYSTEM

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Fig. 4

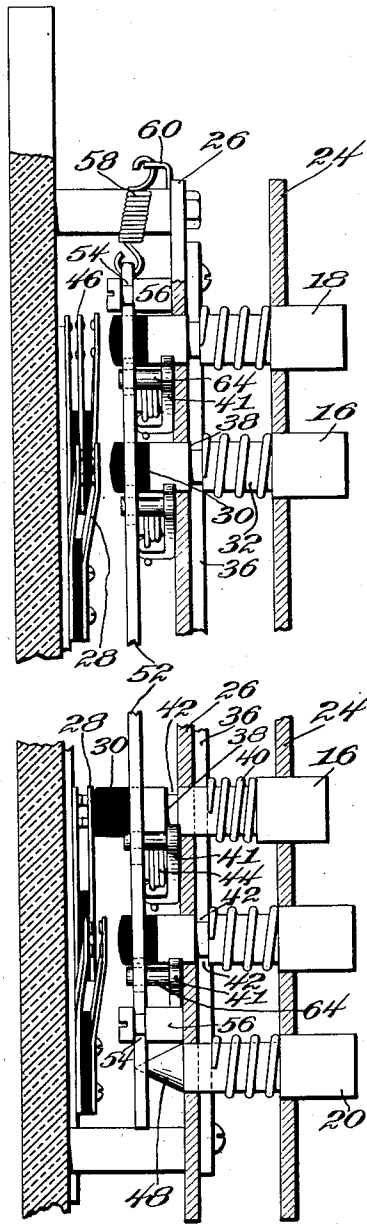
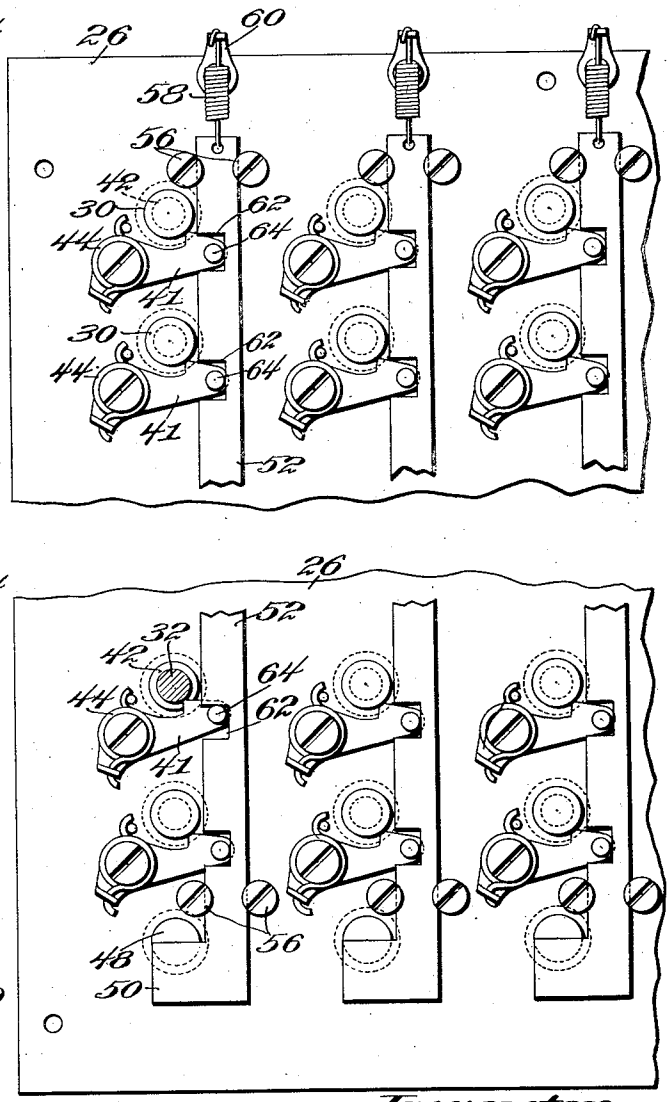


Fig. 5



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PAGING SYSTEM

Filed March 22, 1926 4 Sheets-Sheet 3

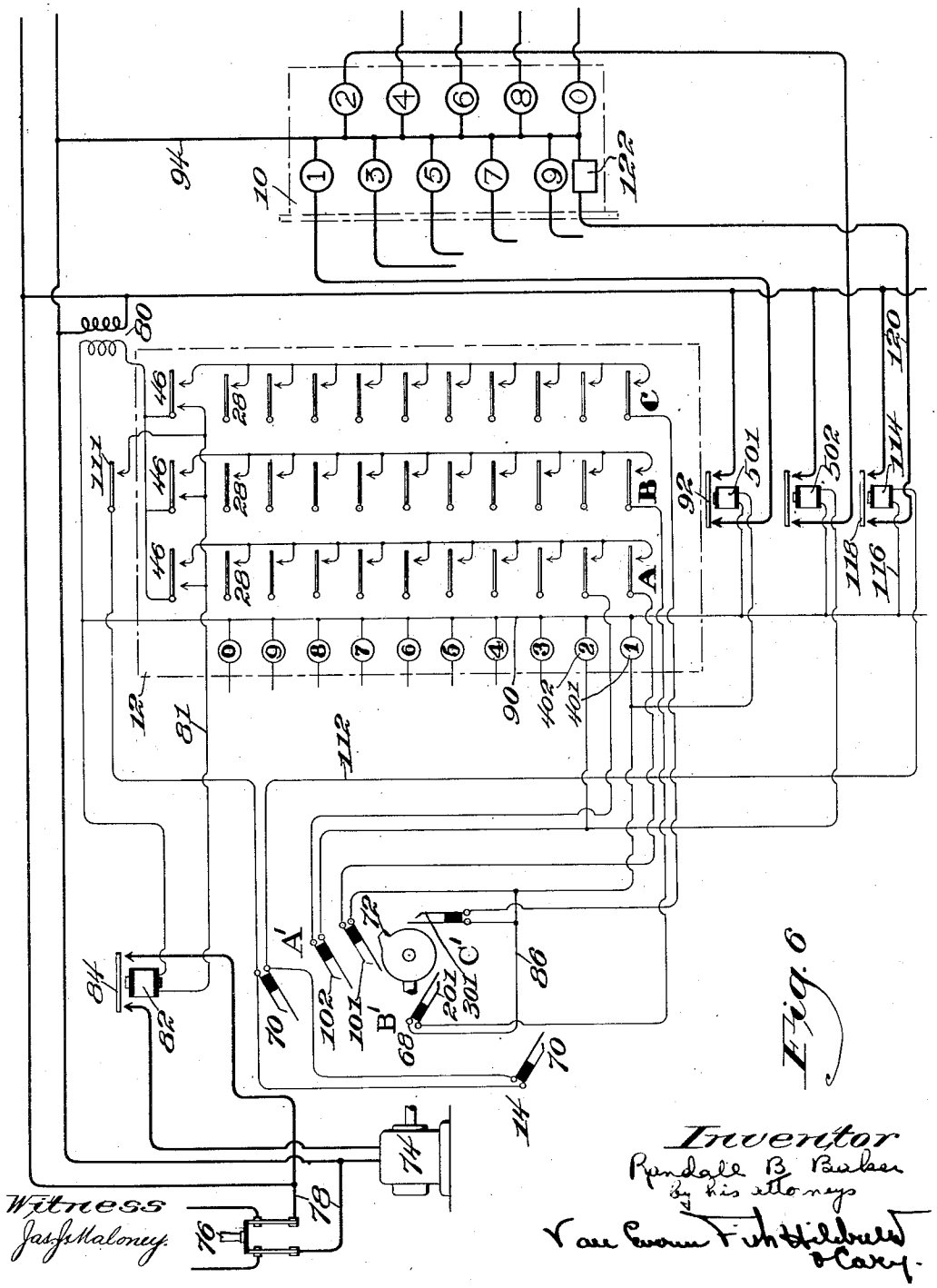


Fig. 6

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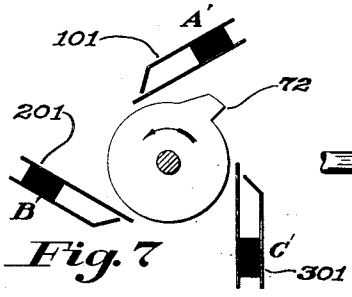
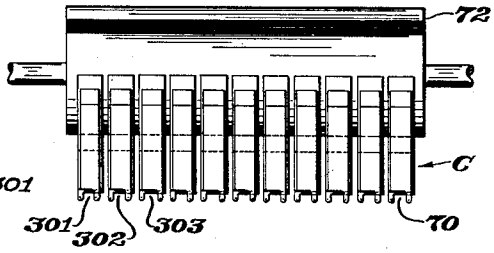


Fig. 7

Fig. 8



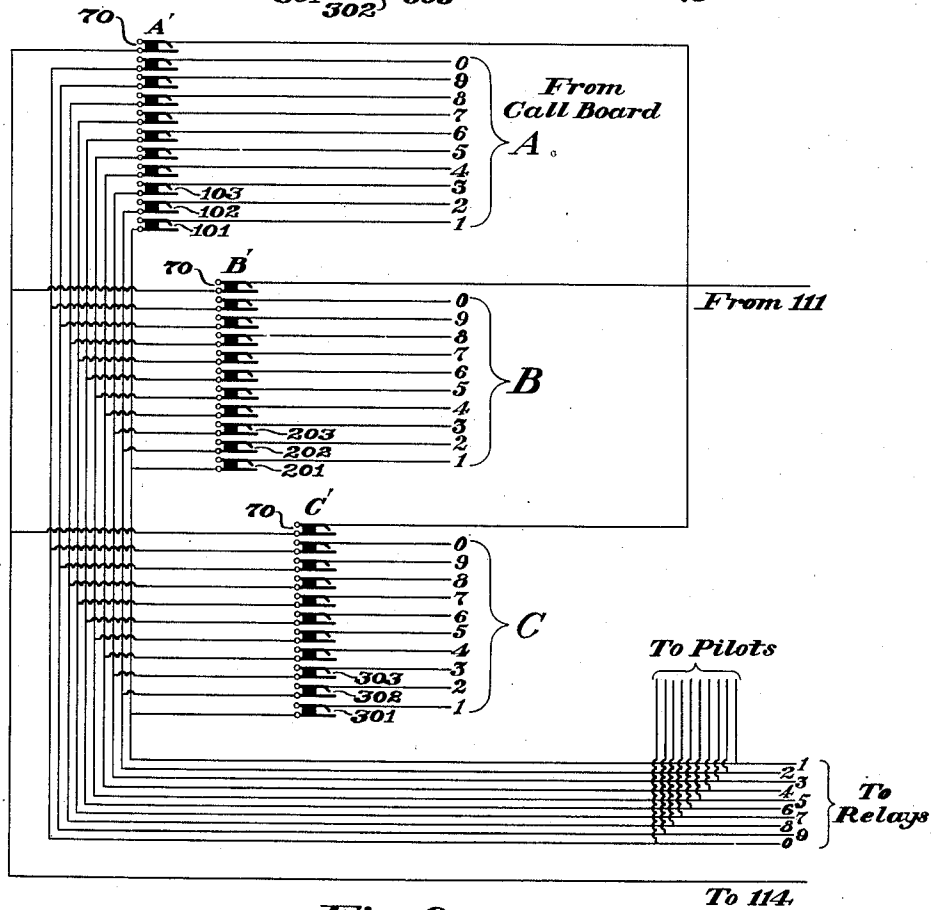


Fig. 9

Witness

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Patented Mar. 10, 1931 1,795,536

UNITED STATES PATENT OFFICE

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PAGING SYSTEM

Application filed March 22, 1926. Serial No. 96,475.

The present invention relates to paging systems.

The object of the present invention is to reorganize and improve the construction of paging systems with a view to affording a simple and conveniently operated apparatus for paging a number of different persons either successively or at the same time. To this end the present invention consists in the paging apparatus hereinafter described and particularly defined in the claims.

In the accompanying drawings, Fig. 1 is a front elevation of a call board forming a part of the improved paging apparatus; Fig. 2 is a side elevation partly in section of the call board shown in Fig. 1; Fig. 3 is a section on line 3—3 of Fig. 2; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a bottom plan view of the switch control apparatus of the call board; Fig. 6 is a wiring diagram of the system; Fig. 7 is a diagrammatic end elevation of the flasher unit; Fig. 8 is a side elevation of the flasher cam showing one row of flasher switches; and Fig. 9 is a wiring diagram of the flasher switches.

The illustrated embodiment of the invention comprises a doctor's paging system employing one or more annunciators adapted to be placed at desired locations in a hospital and arranged to give visible numerical signals as set up on a central call board. The system is of a flasher type and is designed to periodically give a series of different signals in quick succession, thus in calling three doctors their corresponding numbers will be simultaneously set up on the call board and the numbers will be successively flashed at intervals on the various annunciators. The showing of the signals is controlled by a flasher which is driven by an electric motor under the control of the call board operator. The annunciator lamps are operated from the usual lighting circuit while the call board and the flasher switches are preferably energized from a low voltage source in order to eliminate any possibility of arcing at the contacts of the switches. The numbers which are set up on the call board are made effective to operate the annunciator through a system of relays which are included in the main circuit. An audible signal which may be useful in case of emergency is made operative by a control at the call board and is operated with the annunciator lamps from the main lighting circuit.

Referring to Fig. 6 of the drawings, the system comprises an annunciator 10, a call board 12 and a flasher indicated generally at 14. The annunciator consists of ten lamps numbered from 1 to 0 which are arranged in staggered relation, five lamps on each side of the annunicator. The number which is indicated on the annunicator will ordinarily consist of three digits in ascending order such as 148, 357, etc.

The call board 12, as shown in Fig. 1, comprises three rows of buttons indicated at A, B and C, each row comprising numbered paging buttons 16 arranged from 1 to 0 as in the annunciator, a start button 18 at the top of the row and a stop button 20 at the bottom of the row. A row of pilot lights 22 is arranged opposite the rows of buttons to indicate to the operator the numerals which are being flashed on the annunciator. As shown in Figs. 3 and 4, each of the call board buttons 16 protrudes through a panel 24 and is movable through a subpanel 26 to operate a corresponding leaf spring switch 28. Each button has an insulating base 30 secured to the bottom of a plunger 32 which has a flattened surface 34 to co-operate with a bar 36 to prevent rotation of the button. A bar 36 is provided for each row of buttons and extends substantially the full length of the subpanel 26. Each bar 36 slightly overlaps the openings in the subpanel 26 through which the buttons extend to engage a shoulder 38 of each button and limit the upward movement thereof. A coil spring 40 surrounds the plunger portion of each button and acts between the bar 36 and the head of the button, tending to restore the button to its normal position. Upon being depressed, the button closes the two contacts of the spring switch 28 and the button is retained in depressed position by a pivoted latch 41, the end of which enters an annular groove 42 formed in the plunger portion of the button. A torsion spring 44 urges the latch toward the button.

The start button 18 of each row is similar in construction to the paging buttons 16 and operates a three contact spring switch 46. The stop button 20 has a conical base 48 which engages with the inturned end 50 of a release bar 52 which is slidingly received in grooves 54 of a series of retaining bolts 56 threaded into the bottom of the subpanel 26. The release bar is normally urged toward the position shown in Fig. 5 by means of a tension spring 58 secured between the upper end of the bar and a bracket 60 secured to the subpanel. The release bar is provided with a series of rectangular notches 62 within which are received pins 64 depending from the latches 41. Upon depression of the stop button, the release bar is cammed downwardly against the tension of the spring 58 and pulls on the pins 64 of such of the latches as have entered into engagement with the grooves 42 of the buttons, thereby releasing the buttons and permitting them to be restored to upper position by the springs 40. The apparatus is inclosed in a box 66 which may be supported upon a wall or table on in any suitable position convenient to the operator.

The flasher which is indicated generally at 14 comprises three rows of two contact switches indicated at A′, B′ and C′ corresponding to the rows A, B and C of the call board. Each row comprises ten annunciator operating switches 68 and an audible signal switch 70. The three rows of switches are arranged substantially 120° apart and are operated by a revolving cam 72 of insulating material. It is to be pointed out that the rows of switches are arranged along lines parallel to the axis of rotation of the cam but are indicated in Fig. 6 as being spread out in fan fashion for purposes of illustration. The cam 72 is driven by an electric motor 74.

The system is energized from a main lighting circuit of 110 or 220 volts which is connected by a main switch 76 to a circuit 78 from which the motor 74 and the annunciator 10 are operated, while the control circuit passing through the call board and the flasher is of reduced voltage obtained by means of a transformer 80 the primary of which is connected across the main circuit and the secondary to the control circuit. In the drawings, the main circuit is indicated in heavy lines and the low voltage control circuit in light lines. One side of the secondary of the transformer 80 leads to one of the contacts of each of the three start switches 46 operated by the start button 18, and a second contact of each of the switches 46 leads to one of the contacts of each of the paging switches 28 of its corresponding row. The third contact of each of the start switches leads to a motor relay 82 which is connected to the opposite side of the secondary of the transformer. The armature 84 of the relay is arranged upon energization of the magnet to close the motor circuit and start the motor 74. It will thus be seen that upon depression of any one of the start keys 18 the motor is started and the circuit from the secondary of the transformer to the corresponding row of paging buttons 16 is completed. The paging buttons in the various rows are connected in series with corresponding flasher switches. Thus, if the button numbered 1 in row A of buttons is depressed, it will be seen that a circuit leads from the switch 46 through the contacts of the paging switch to the fixed contact of the switch number 1 in the A′ row of flashers. This contact is indicated at 101 in the drawings. Similarly, the next higher button corresponding to the number 2 of the A row controls a circuit leading to the second of the row of flasher switches A′, the fixed contact of which is indicated at 102. The remaining switches of the row A of the call board are connected to additional flasher switches of the row A′ in a similar fashion. The rows B and C of call board switches are similarly connected to switches in the flasher rows B′ and C′ indicated in the drawing by connections to contacts 201 and 301 controlled by the buttons number 1 of each of the rows B and C of the call board. The movable contacts of all the number 1 switches of the flasher are connected together by a wire 86 and the movable contacts of each of the corresponding numerically arranged flasher switches of the various rows are similarly connected together. These connections are not shown in Fig. 6 in order to avoid complications in the drawings, but the complete connections of the flasher switches are shown in Fig. 9. The wire 86 connects to a pilot light 401, a connection from the number 2 flasher switches runs to a pilot light 402 and so on. The pilot lights are all connected to a common return wire 90 which leads to the secondary of the transformer. In parallel with each pilot light is an annunicator relay, one for each of the digits of the calling system; thus in parallel to the pilot light 401 is a relay 501 and in parallel to the pilot light 402 is a relay 502. A series circuit is thus formed from the secondary of the transformer 80 through the start switch 46, any one of the numbered paging switches 28, a corresponding flasher switch, and the pilot light and relay. The armatures 92 of the relays are connected in circuit with their respective annunciator lamps 1, 2, 3, etc. which in turn connect to a common return wire 94 leading to the main supply line.

An audible signal switch 111 on the call board is connected to the wire 81 which leads from one of the contacts of the start switches 46 and is included in a circuit running to all of the audible signal flasher switches 70 in parallel. A common wire 112 connecting with all the audible flasher switches leads to

an audible signal relay 114 which has a return connection 116 to the return wire 90, the armature 118 of the relay serving to close an audible signal circuit 120 to actuate the audible signal 122 from the main supply.

It will be seen that the system provides a plurality of local annunciator circuits each consisting of the annunciator relay and the connections thereto, together with a plurality of call circuits for each local annunciator circuit, each call circuit consisting of paging switch and flasher or auxiliary switch contacts in series. For example, for the annunciator signal numbered 1, there is a local circuit which includes the relay 501 and this local circuit connects with three call circuits, the first call circuit consisting of the paging switch numbered 1 of row A in series with the auxiliary or flasher switch 101 of row A′, the second consisting of the paging switch numbered 1 of row B and the auxiliary switch 201 of row B′, and the third consisting of the paging switch numbered 1 of row C and the flasher switch of row C′. Similarly, local circuit numbered 2, which includes the relay 502, connects with three separate call circuits each of which includes the number 2 paging and flasher switches of the different rows.

In operation of the system, the rotation of the motor successively closes the three rows of flasher switches and the series connection between the paging switches of the various rows and the corresponding flasher switches permits selective closing of the relay circuits in accordance with the numbers set up on the call board. Thus, in order to call a particular doctor, his number may be set up on any one of the rows of paging buttons of the call board. In setting up this number, it is convenient to employ a number of three digits. Upon depression and latching of the start button of that row, the motor is started and the flasher switches for that row will be closed once for each revolution of the flasher cam 72, and the electrical circuit through the depressed paging buttons and the corresponding flasher switches will thereby be closed. If it is desired to call more than one doctor at a time additional numbers may be set up on the other two rows of paging buttons. Thus it is possible to call three doctors at one time, the numbers being flashed periodically and in succession on the annunciator. The three calls which are periodically flashed on the annunciator may each consist of any number of characters, preferably three digits in ascending order, such as 148, 357, and 269. The audible signal switch which may be used in case of emergency connects with all of the audible signal flasher switches and thereby gives an audible indication for each 120° of rotation of the flasher cam. Upon acknowledgment of a signal by the doctor the flashing of his particular number may be stopped by depression of the stop button which releases the paging buttons and the start button of that particular row. This in no way interferes with the indication of other signals which may be set up on the other two rows of the call board. It will be seen also that the stop button may be employed to clear an erroneous setting of the paging buttons before the start button is depressed.

Although a single preferred embodiment of the invention has been described, it will be understood that the invention is not limited to this specific embodiment, but may be modified within the scope of the appended claims. Although the invention, as described, provides for periodic flashing of three calls by means of three rows of paging switches, it will be understood that the system may be made of any desired capacity having more or less than three banks of switches.

Having described the invention, what is claimed is:

1. A paging apparatus having, in combination, a flasher comprising a plurality of rows of simultaneously actuated switches, means for successively closing the switches of the several rows, an annunciator, a call board having a plurality of rows of paging switches corresponding to the separate rows of flasher switches, corresponding flasher and paging switches being connected in series, and circuit connections between the flasher and the annunciator for successively flashing on the annunciator the signals set up on each of the rows of paging buttons.

2. A paging apparatus having, in combination, a call board, a plurality of rows of paging switches, a flasher unit having a plurality of rows of flasher switches, series connections from each of the paging switches to its corresponding flasher switch, a start switch for controlling the flow of current to each row of paging switches, an annunciator having a plurality of visible signals, a relay adapted to operate each signal, means electrically connecting similar flasher switches of the various rows together, connections from the flasher switches to the relays and a motor for operating the flasher unit to periodically close the rows of flasher switches in succession.

3. A paging apparatus having, in combination, a call board provided with a plurality of rows of paging buttons, a paging switch associated with each paging button, a start switch in series with the paging switches of each row, means operating on depression of a button to retain it in depressed position, and a stop device for releasing the retaining means of each row.

4. A paging apparatus having, in combination a call board provided with a plurality of rows of numbered paging buttons, paging switches associated with the buttons, a plurality of rows of flasher switches corresponding to the rows of paging buttons, means for

periodically and successively closing the flasher switches, a series connection from each paging switch to a flasher switch, electrical connections between similar flasher switches of the different rows, a plurality of relays, connections from the flasher switches to the relays, an annunciator having a plurality of signals equal in number to the number of paging buttons in each row, and circuit connections for actuating the signals of the annunciator upon closing of the relays.

5. A paging apparatus having, in combination, an annunciator having a plurality of signal lamps, a flasher unit including a number of rows of flasher switches, each row comprising a plurality of switches corresponding to the lamps of the annunciator, means for periodically and successively closing the switches of the several rows, a call board having rows of paging switches equal in number to the rows of flasher switches, and means for connecting corresponding paging and flasher switches in series whereby a plurality of signals set up on the call board may be indicated on the annunciator periodically and in succession as the rows of flasher switches are closed.

6. A paging apparatus having, in combination, an annunciator having a plurality of signals, a flasher unit having a row of flasher switches, a call board having a plurality of paging switches in series with the corresponding flasher switches, flasher operating means for simultaneously closing all of the flasher switches, circuit connections for operating the annunciator signals corresponding to the signals for which the flasher and paging switches are closed, a start switch in series with the paging switches, and means operated by the start switch for actuating the flasher operating means.

7. A paging apparatus having, in combination, an annunciator having a plurality of signals, a flasher unit having a plurality of rows of flasher switches, a call board having a plurality of rows of paging switches, corresponding flasher and paging switches being connected in series, flasher operating means for successively closing the flasher switches of the several rows, circuit connections for operating the annunciator signals corresponding to the signals for which the flasher and paging switches are closed, a start switch in series with the paging switches of each row and controlling the flow of current thereto, and connections between the start switch and the flasher operating means for actuating the latter.

8. A paging apparatus having, in combination, an annunciator having a plurality of signals, a flasher unit having a row of flasher switches, a call board having a plurality of paging switches in series with the corresponding flasher switches, a motor for operating the flasher unit to simultaneously close all of the flasher switches, circuit connections for operating the annunciator signals corresponding to the signals for which the flasher and paging switches are closed, a start switch in series with the paging switches, and means operated by the start switch for actuating the motor.

9. A paging apparatus having, in combination, an annunciator having a plurality of signals, a flasher unit having a plurality of rows of flasher switches, a call board having a plurality of rows of paging switches, corresponding flasher and paging switches being connected in series, a motor for operating the flasher unit to successively close the flasher switches of the several rows, circuit connections for operating the annunciator signals corresponding to the signals for which the flasher and paging switches are closed, a start switch in series with the paging switches of each row and controlling the flow of current thereto, and connections between the start switch and the motor for actuating the latter.

10. A paging apparatus having, in combination, an annunciator having a plurality of signals, a local annunciator circuit for each signal, a plurality of call circuits connected with each local circuit, each call circuit including manually operated paging contacts and independently operated auxiliary contacts in series therewith, the separate paging contacts being arranged in banks, each bank including contacts for all of the annunciator signals, the auxiliary contacts being similarly arranged in corresponding banks, and means for periodically closing the separate banks of auxiliary contacts in succession.

11. A paging apparatus having, in combination, an annunciator having a plurality of signals, a call board having a plurality of banks of paging switches, each bank having a switch for each annunciator signal, a similar number of banks of auxiliary switches, each paging switch being connected in series with a corresponding auxiliary switch to form a call circuit, a local circuit for each annunciator signal, each local circuit being connected with all the corresponding call circuits, and means for periodically closing the several banks of auxiliary switches in succession to successively connect the paging switches of the different banks with their corresponding local circuits.

12. A paging apparatus having, in combination, an annunciator having a plurality of signals, a local circuit for each signal, a plurality of banks of paging switches, each bank having a switch for each annunciator signal and each switch having manually operable contacts, auxiliary switches having contacts arranged in banks equal in number to the banks of paging switches, a plurality of call circuits for each signal, each call circuit including a paging switch and an auxiliary switch in series, the several call circuits for a single annunciator signal being connected

with the local circuit for said signal, and means for periodically closing auxiliary switches of the separate banks in succession.

13. A paging apparatus having, in combination, an annunciator having a plurality of signals, a local annunciator circuit for each signal, a plurality of call circuits connected with each local circuit, each call circuit including manually operated paging contacts and independently operated auxiliary contacts in series therewith, the separate paging contacts being arranged in banks, each bank including contacts for all of the annunciator signals, the auxiliary contacts being similarly arranged in corresponding banks, and a rotating flasher unit for periodically closing the separate banks of auxiliary contacts in succession.

14. A paging apparatus having, in combination, an annunciator having a plurality of signals, a source of electrical supply, a plurality of local annunciator circuits, one for each annunciator signal, connected with one side of the source, a plurality of call circuits for each local annunciator circuit, all of the call circuits being connected with the other side of the source, and all of the call circuits for each local annunciator circuit being connected with said circuit, two switches in each call circuit including a manually operable paging switch and an automatically operable switch, the paging switches being arranged in banks, each of which banks includes a switch for each annunciator signal, the automatically operable switches being arranged in similar banks, and means for periodically closing the banks of automatically operable switches in succession.

In testimony whereof I have signed my name to this specification.

RANDALL B. BAKER.