

April 28, 1942.

J. P. NAES

2,281,373

DETECTING DEVICE

Filed Oct. 25, 1939

4 Sheets-Sheet 1

Fig. 1.

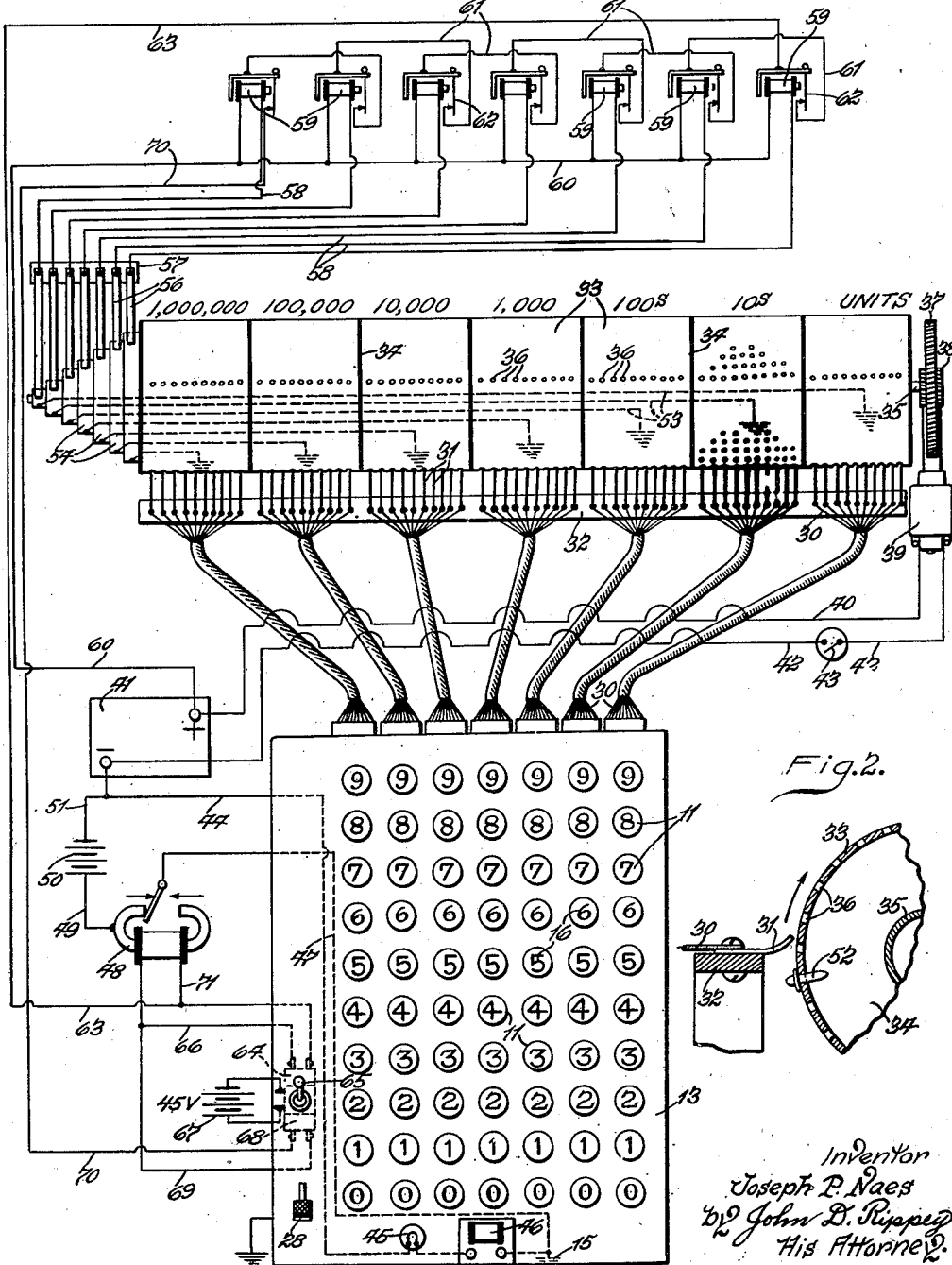


Fig. 2.

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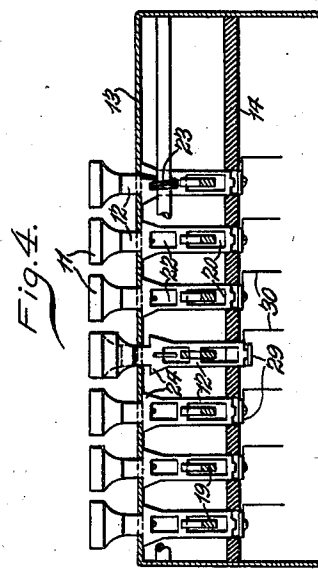
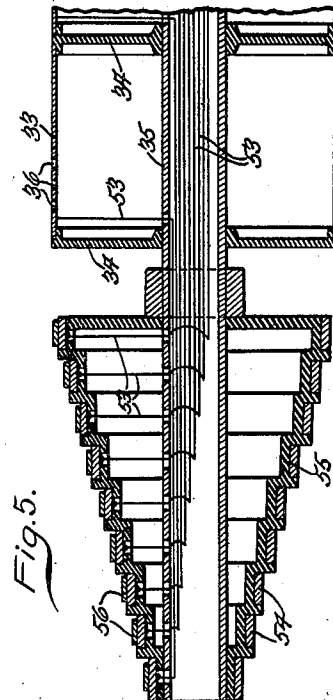
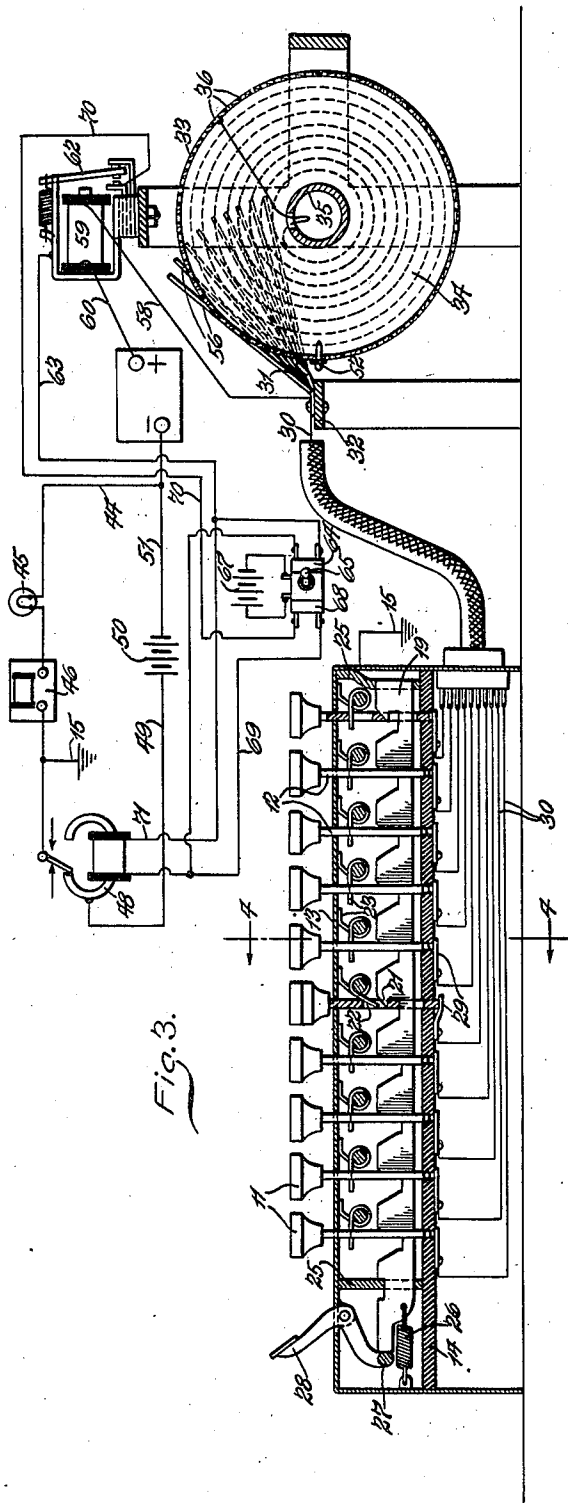
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DETECTING DEVICE

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4 Sheets-Sheet 2



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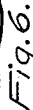
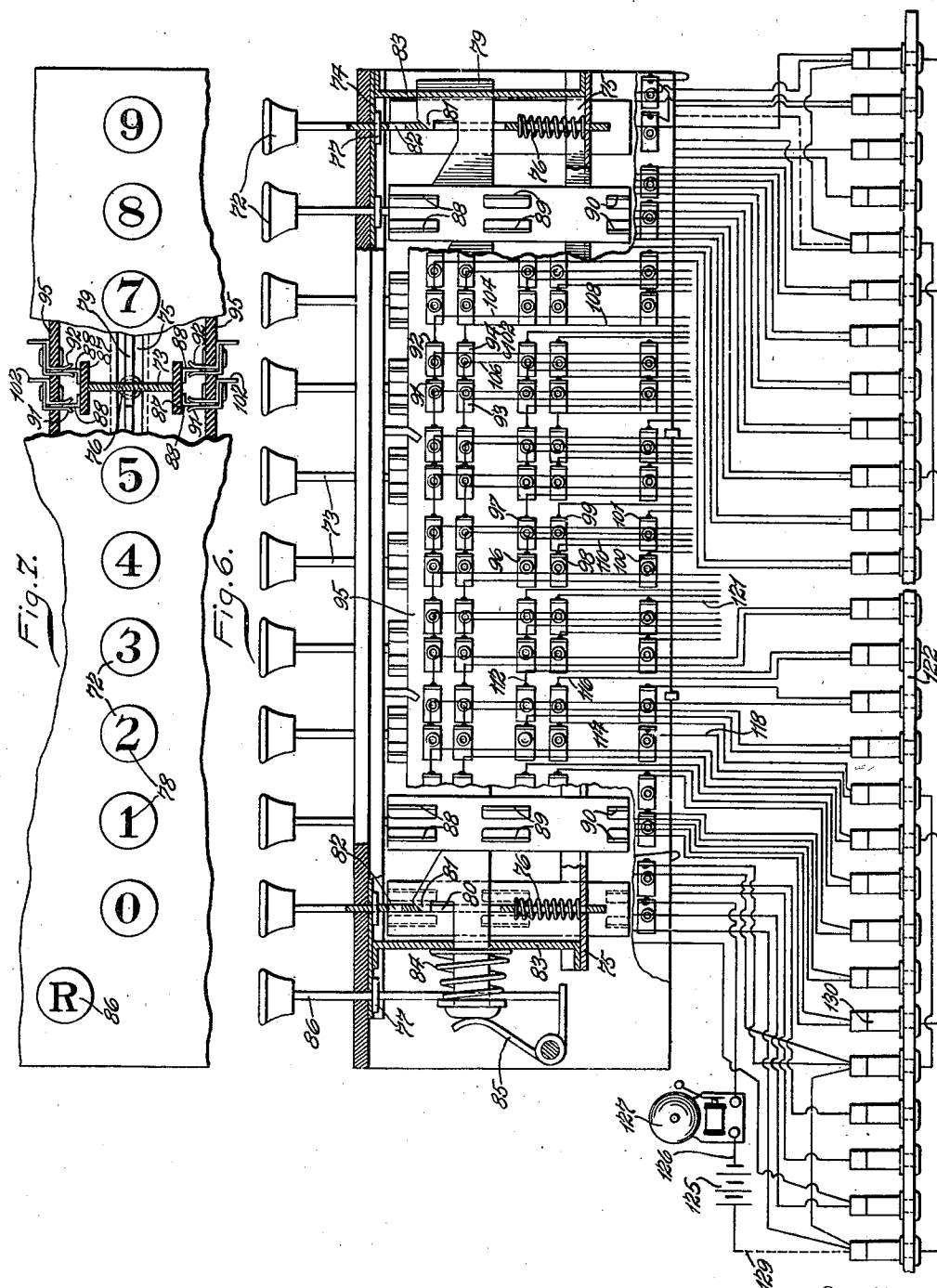
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4 Sheets-Sheet 3



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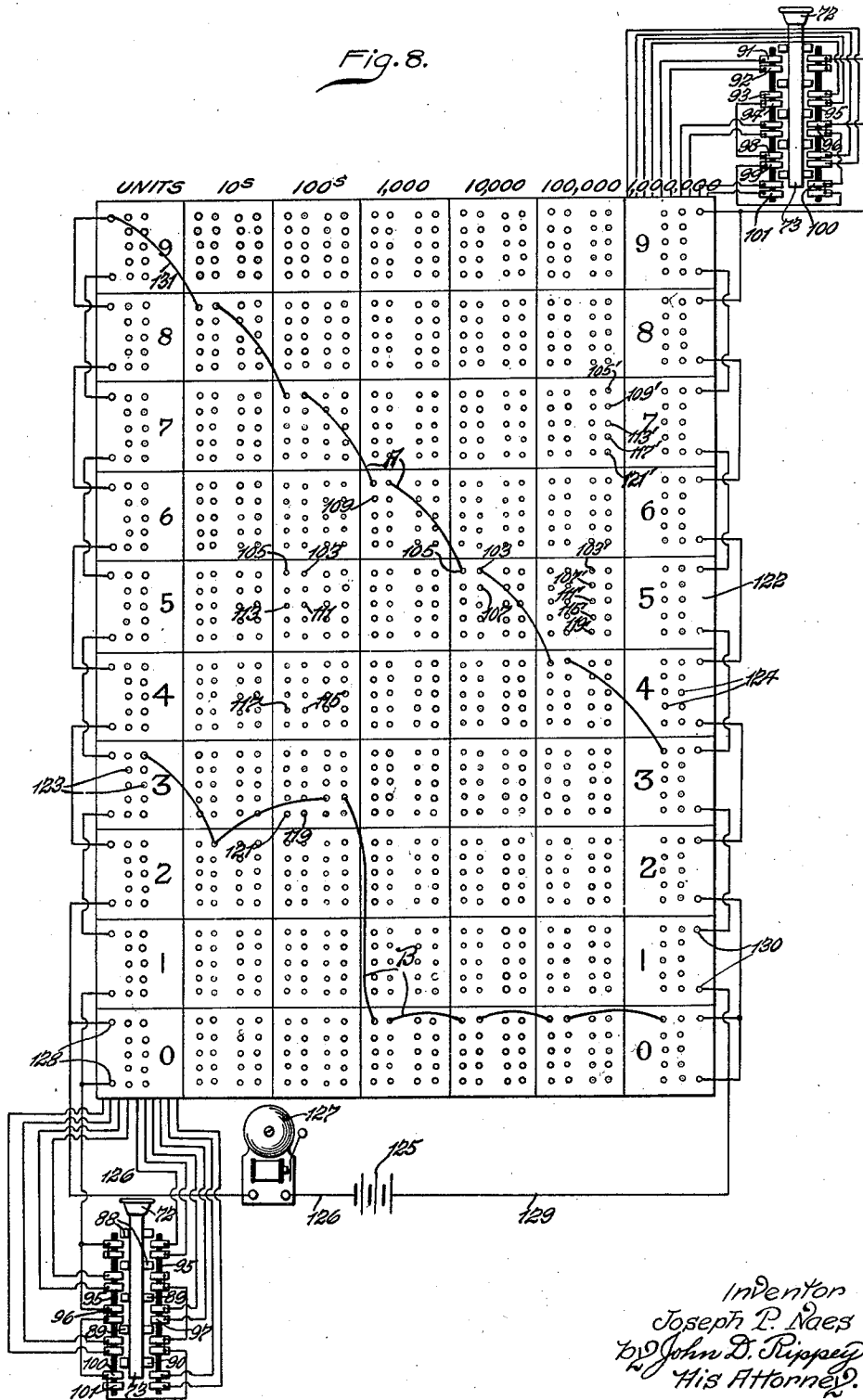
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DETECTING DEVICE

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4 Sheets-Sheet 4

Fig. 8.



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UNITED STATES PATENT OFFICE

2,281,373

DETECTING DEVICE

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Application October 25, 1939, Serial No. 301,163

10 Claims. (Cl. 177—311)

This invention relates to detecting devices; and it is specially designed for use in detecting and identifying numbers and symbols in general use on securities, currency, license plates of motor vehicles, etc.

A principal object of the invention is to provide a device of such dimensions and capacity that it may be conveniently mounted on discs or stands for use in offices, or in automobiles and used by law enforcement officers or others in detecting or identifying motor vehicles and the like, and including a series of rows of digital keys or switches arranged in denominational orders in the form of a keyboard, whereby different numbers may be indicated or represented on the keyboard comprising said keys or switches as, for instance, numbers corresponding to the numbers under observation, in combination with mechanism operative under control of said keys or switches to operate a signal when keys or switches corresponding to a license plate number being sought are operated, thereby indicating to the observer that the numbered article sought has been located and observed.

Another object of the invention is to provide a detecting device including series of denominational rows of digital keys or switches including in each row ten switches corresponding to the ten digits so that switches representing various numbers may be optionally closed, in combination with electrical mechanism adapted to be operated into circuit with said switches to operate a signal when the switches corresponding to a number represented by said keys are closed.

Another object of the invention is to provide an improved detecting device including series of keys or switches having ten thereof arranged in each of a plurality of denominational orders or rows, devices corresponding to said respective denominational orders or rows associated with mechanism for establishing electrical communication through said respective keys or switches to operate a signal when keys or switches corresponding to an observed number and to settable parts of said mechanism are closed.

Another object of the invention is to provide improved mechanism of this character for operating a signal to indicate the fact when switches corresponding to electrically connected depressible keys are closed.

Various other objects and advantages of the invention should be apparent from the following description, reference being made to the annexed drawings, in which—

Fig. 1 is a combined plan and diagrammatic view showing essential features of the invention in a machine adapted for use in detecting any of a wide range of numbers.

Fig. 2 is a detail sectional view showing one of the settable devices cooperating with the depressible keys or switches for closing electrical circuits to operate a signal.

Fig. 3 is a vertical longitudinal sectional view of the keyboard showing a denominational row of keys therein, a part of the electrical mechanism being diagrammatically shown.

Fig. 4 is a vertical cross-sectional view of the keyboard on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged longitudinal sectional view of a portion of the electrical mechanism that functions under control of the denominational rows of keys in the keyboard.

Fig. 6 is a sectional view of a keyboard containing denominational rows of digit keys, as in Fig. 1, showing another form of electric mechanism controlled by the keys for operating a signal when keys according to a predetermined number are operated.

Fig. 7 is a plan view of one of the denominational rows of keys in the keyboard of the type shown in Fig. 6.

Fig. 8 is a bottom plan view of a complete keyboard device shown in Fig. 6.

The invention shown in Figs. 1 to 5, inclusive, comprises a series of rows of keys 11 arranged in denominational orders in the form of a keyboard assembly. The stems 12 of these keys extend for sliding movements through a metallic plate 13 and through a plate 14 of electrically non-conductive material. The plate 13 constitutes an electrical ground 15. There are ten keys 11 in each denominational row of keys, and said keys have digits 16 displayed thereon consecutively from one end of the respective rows bearing the character "0" to the opposite ends of said rows bearing the character "9." There may be any number of denominational rows of keys according to the requirements of the uses for which the invention is intended. Also, when desired, different symbols or characters may be provided on the keys 11, or other equivalent keys, and I do not restrict the invention to use of the numeral digits.

A latch bar 19 extends through slots 20 in the stems 12 of each denominational row of keys 11, and said latch bars are provided with hooks 21 adapted to engage in holes 22 in the respective stems 12 to hold said keys depressed in opposition to their springs 23, and formed to permit easy

depression of the various keys. Depression of any key will release the latch bar 21 from any other key in the same denominational row. Upward movement of the stems 12 is limited by shoulders 24 thereon engaging against the underside of the plate 13. The latch bars 12 are mounted for longitudinal movement in guides 25 and are actuated longitudinally in one direction by springs 26 (Fig. 3). A pivoted bail device 27 engages the forward ends of the latch bars 19 and is operative by a lever or key 28 to move all of the latch bars 19 rearwardly in opposition to the springs 26 far enough to release the hooks 21 from the holes 22 in any depressed keys. When the latch bars 19 are thus released from any depressed keys 11, said depressed keys are immediately raised to their unoperated positions by their springs 23.

Resilient electrical contact members 29 for the respective metallic stems 12 are attached to the underside of the panel 14. When the stems 12 are yieldingly held in their uppermost positions by the springs 23, said stems are out of contact with the members 29; and, when the keys 11 are depressed, the stems 12 of the depressed keys contact with the corresponding contact members 29 (Fig. 3). Conductor wires 30 lead from connection with the contact members 29 of each denominational row of keys 11 to connection with respective metallic brushes 31 attached to an insulation support 32. Thus, for units denominational row of keys 11, ten wires 30 extend to connection with respective brushes 31 attached in spaced relationship to the insulation support 32 so that said brushes 31 are out of electrical communication with each other. Each additional denominational row of keys 11 is similarly arranged, wires 30 connecting their contact members 29 with groups of spaced electrical brushes 31 attached to the insulation support 32.

A cylinder 33 constituting a carrier for removable and replaceable contact plugs is provided for each denominational row of keys 11. These cylinders 33 are of electrically conductive metal and are mounted in axial alinement on insulation supports 34 attached to a shaft 35 and extending between adjacent ends of adjacent cylinders. These supports 34 insulate the cylinders from each other and from the shaft 35 (Fig. 5). The cylinders 33 are formed with circumferential series of longitudinal rows of holes 36. There are ten holes in each longitudinal row of holes 36 in the cylinders 33 in complementary arrangement to the electrical brushes 31. Thus, there are ten keys 11 in each denominational row; ten brushes 31 arranged for electrical connection with the stems of the keys 11 when said keys are depressed and arranged in a longitudinal row adjacent to the corresponding cylinder 33; and there are ten holes in each longitudinal row 36 movable opposite the respective brushes 31 when the cylinders are rotated.

The insulation supports 34 are attached to the shaft 35 for rotation thereby. A worm gear or the like 37 is attached to the shaft 35 and is engaged by a worm device 38 rotated by the shaft of an electric motor 39. A wire 40 connects the motor with one side of the battery 41, and a conductor 42 including a switch 43 connects the opposite side of said battery with the motor. The switch 43 is operative to open and to close the circuit and thereby control operation of the motor. From that side of the battery 41 with which the conductor 42 is connected, a conductor 44 leads through the filament of a lamp 45, through

an audible signal device 46 to the ground 15, from which a conductor 47 leads to the movable part of a polarized relay 48. From one pole of the relay 48 a conductor 49 leads to a battery 50 having electrical connection 51 with the wire 44.

Electrical contact plugs 52 are insertable in and withdrawable from the holes 36 selectively. The brushes 31 do not contact with the cylinders 33, but are spaced therefrom so that said brushes are normally out of electrical communication with said cylinders (Fig. 2). The contact plugs 52 project beyond the cylinders 33 far enough to move against the complementary brushes 31 during rotation of the cylinders on which said jacks are mounted. In the specific arrangement shown, the brushes 31 of each group are in the sequence from "0" at the extreme left to "9" at the extreme right of the group. This arrangement may be varied without departure from the invention. Numbers may be set up on the cylinders 33 optionally by locating the contact plugs 52 in the holes 36. If the number to be set up contains a single digit in units denominational order, the contact plug 52 is inserted in a hole 36 corresponding to that digit. If the digit is "9", for instance, the contact plug 52 is inserted in a hole 36 at the extreme right of the units cylinder 33; if the digit is "4", for instance, the contact plug 52 is inserted in the fifth hole from the left, and so on. When the number to be set up comprises two or more denominational orders, plugs 52 are set in proper holes in longitudinally aligned rows of holes 36 in as many adjacent cylinders 33 as there are denominational orders in the number to be set up; and plugs are set in the zero holes of aligned rows of holes 36 in the cylinders 33 toward higher denominational orders beyond the highest denominational order of the number set up.

Wires 53 connect the respective cylinders 33 with metallic rings 54. The rings 54 are attached to an insulation support 55 (Fig. 5) secured to the shaft 35, and are out of electrical communication with each other. Brushes 56 contact with the respective rings 54 and are attached to an insulation support 57 (Fig. 1). Wires 58 lead from the respective brushes 56 to one side of corresponding magnetic relays 59, the opposite sides of which are connected with a conductor 59 leading to that side of the battery 41 with which the conductor 40 is connected. When a number is set on the keyboard by depression of the denominational digit keys 11 and the corresponding contact plugs 52 engage the brushes 31, the relays 59 are energized and the circuit through the conductors 51 is closed by operation of the relay element 62 into electrical communication with the respective conductors 61. A wire 63 from units relay 59 leads to one side 64 of a switch device 65. The side 64 of the switch 65 has electrical connection 66 with that side of the polarized relay 48 that is connected with the wire 49. A battery 67 of the type indicated is connected with the side 64 of the switch 65 and also with the opposite side 68 of said switch from which a wire 69 leads to connection with the wire 53 and the polarized relay 48. From the highest denominational relay 59 the conductor 70, corresponding to the remaining conductors 61, leads to connection with the side 68 of the switch 65. The side 64 of said switch has electrical connection 71 with the opposite side of the polarized relay 48 from the connection therewith of the wires 66 and 69.

In order to condition the device for use after

the numbers plugs 52 have been properly set in the respective cylinders 33 as described, the switch 43 is closed to operate the motor 39, and the switch 65 is moved to the position shown in Fig. 1 to energize the relay 48 through the connection 69. The circuit through the relay 48 is closed so that, when keys 11 corresponding to any number represented by the digit contact plugs 52 are depressed to close the circuits therefrom through the conductors 30, the relay elements 62 will be operated by the relays 59 to close the circuit through 61 and 70 to operate the signals 45 and 46. This is because the circuit through the relay 48 is closed when the circuits from the keys 11 through the wires 30 and the plugs 52 are closed. The circuit through the relay 48 remains closed and the signals 45 and 46 continue to operate until the switch 65 is moved to open the circuit at the side 68 and close the circuit at the side 64 of said switch. When the circuit from the side 68 of this switch to the relay 48 is deenergized and the circuit to the opposite side of said relay through 71 is energized, the relay switch is opened and the signals are stopped.

It will thus be apparent that a very large range of different numbers may be set up on the cylinders 33, the only limitation being that no two numbers be set up entirely in the same aligned rows of holes 36. The checking and detecting can be rapidly performed without the necessity of observing different records and comparing one with the other. This is because the comparison is automatically made as an incident to depression of the keys 11 to set up thereon any suspected number. If the suspected number that is set up on the keys 11 corresponds to any number that is set up by the plugs 52 on the cylinders 33, a correct number is detected and located. On the other hand, if the depressed keys 11 do not represent any number that is set up by the plugs 52, no signal will be given.

In the form of the invention shown in Figs. 6, 7, and 8, a series of rows of depressible keys 72 are arranged in denominational orders in the form of a keyboard assembly similar to the arrangement of the keys 11. The metal stems 73 of the keys 72 extend for sliding movements through metallic guiding plates 74 and 75. The keys 72 are actuated upwardly to their unoperated positions by springs 76, extent of upward movement being limited by collars 77 that are attached to the stems 73 and which engage against the underside of the plate 74. There are ten keys 72 in each denominational row of keys having digits 78 displayed thereon consecutively from one end of the respective rows having the character "0" to the opposite ends of said rows bearing the digit "9". There may be any number of denominational rows of these keys to meet the requirements of the uses to which the respective devices are to be applied.

A latch bar 79 extends through slots 80 in the stems 73 of each denominational row of keys 72. These bars have hooks 81 adapted to engage in holes 82 in the respective stems 73 to hold said keys depressed in opposition to their springs 76 and formed to permit easy depression of the keys. Depression of any key will release the latch bar 79 from any other key in the same denominational row. Said latch bars 79 are mounted for longitudinal movements in guides 83 and are actuated longitudinally in one direction by springs 84. A pivoted bail device 85 engages the forward ends of the latch bars 79 and is operative by a release key 86 to move all of

the latch bars 79 rearwardly in opposition to the springs 84 to release the hooks 81 from latching engagement in the holes 82 of any depressed keys. When the latch bars 79 are thus released from any depressed keys, the latter are immediately raised to their unoperated positions by their springs 76.

A pair of insulation strips 87 is attached to and operated by each key stem 73. In the arrangement shown, each insulation strip 87 has attached thereto an upper pair of brushes 88, an intermediate pair of brushes 89, and a lower pair of brushes 90, all of which are insulated from each other. For each upper pair of brushes 88, four contact members 91, 92, 93 and 94 are mounted on an adjacent insulation support 95; for each intermediate pair of brushes 89, four contact members 96, 97, 98 and 99 are mounted on said adjacent insulation support 95; and for each lower pair of brushes 90, two contact members 100 and 101 are mounted on said adjacent insulation support 95. The respective contact members 91 at one side of each row of keys 73 have electrical connection 102 with sockets 103; the contact members 92 have electrical connection 104 with sockets 105; the contact members 93 have electrical connection 106 with sockets 107; the contact members 94 have electrical connection 108 with sockets 109; the contact members 96 have electrical connection 110 with sockets 111; the contact members 97 have electrical connection 112 with sockets 113; the contact members 98 have electrical connection 114 with sockets 115; the contact members 99 have electrical connection 116 with sockets 117; the contact members 100 have electrical connection 118 with sockets 119; and the contact members 101 have electrical connection 120 with sockets 121.

The contact members 91, 92, etc. at the opposite side of each row of keys have similar electrical connections with complementary sockets designated by the same reference numerals with exponents. The sockets that are electrically connected with said contact members are preferably arranged in rows on a supporting insulation panel 122, there being two rows of sockets for the contact members 91, 92, etc. at one side of each key, and two rows of complementary sockets for the contact members at the opposite side of each key. Therefore, depression of any key 72, excepting the keys in units denominational order and the keys in highest denominational order, places its stem 73 in electrical communication with twenty different sockets in the specific embodiment of the invention shown for illustrative purposes; although it will be understood that the number of sockets may be varied as desired without departure from the principle of the invention. For the keys in units denominational order, two rows of sockets 123, corresponding to the two rows of sockets 103, 105, etc., are provided; and, for the row of keys in highest denominational order, two rows of sockets 124, corresponding to the two rows of sockets 103', 105', etc., are provided.

A battery 125 has electrical connection 126 through a signal 127 with sockets 128 adjacent to the sockets 123 for the keys of units denominational order. The sockets 128 are electrically connected in series so that, when any units key is depressed, it is placed in electrical communication with the battery. The battery 125 has electrical connection 129 with sockets 130 adjacent to the sockets 124 for the keys in highest denomina-

tional order. The sockets 130 are electrically connected in series so that, when any key in highest denominational order on the keyboard is depressed, it is placed in electrical communication with the battery. Sockets in the various series of sockets for the keys in the different denominational orders may be electrically connected by contact plug devices 131 insertable in and withdrawable from the sockets 103, 105, etc., or 103', 105', etc., from the sockets 123 to the sockets 124 to form complete circuits when keys corresponding to these electrically connected sockets are depressed.

As shown in Fig. 8, the contact plugs are connected with sockets to form two numbers which are to be checked or detected by depression of the keys 72. The series of contact plugs A are plugged in to form the number "3456789", reading from right to left of Fig. 8, which represents the base or contact plug board inverted. The series of contact connections B represent the number "323", electrical communication with the connection 129 being formed through "0" keys, as shown. When keys 72 corresponding to either of these numbers are depressed, complete electrical circuits are formed and the signal device 127 is operated to indicate the fact that the number being sought is that number which is being observed and which corresponds to the depressed keys.

The invention may be varied in other particulars so that signals may be operated when keys of predetermined value are depressed. It should be apparent from the preceding description and annexed drawings that the invention is capable of wide variation without departure from the nature and principle thereof.

I claim:

1. A detecting device comprising a series of denominational rows of keys movable from unoperated to operated positions and vice versa, means for holding said keys in their operated positions, a signalling device, a movable contact carrier, manually settable contacts arranged on said carrier, means for establishing electrical communication from said contacts to said signalling device during movement of said carrier, means controlled by said keys regulating electrical communication from said contacts to said signalling device and causing operation of said signalling device when said keys are in their operated positions during movement of said carrier, and other means controlling duration of operation of said signalling device after operation thereof has been initiated by depression of keys complementary to said contacts and of the same denominational and digital value.

2. A detecting device comprising a series of denominational rows of keys movable from unoperated to operated positions and vice versa, a movable contact carrier, a number of contacts settable in positions on said carrier corresponding to digital and denominational values, means controlled by said keys for establishing electrical communication to said contacts, a signalling device, and a switch controlling operation of said signalling device when keys of the same digital and denominational value of a series of contacts are operated.

3. A detecting device comprising a series of denominational rows of keys movable from unoperated to operated positions and vice versa, a movable contact carrier, a number of contacts settable in positions on said carrier corresponding to digital and denominational values, means

controlled by said keys for establishing electrical communication to said contacts, a signalling device, and a switch controlling operation of said signalling device when keys of the same digital and denominational value of a series of contacts are operated and also controlling duration of operation of said signalling device irrespective of whether said keys are returned to unoperated positions or not.

4. A detecting device comprising a series of denominational rows of keys movable from unoperated to operated positions and vice versa, a rotary contact carrier, a number of contacts settable in positions on said carrier corresponding to digital and denominational values, means controlled by said keys for establishing electrical communication to said contacts, a signalling device, a switch controlling operation of said signalling device when keys of the same digital and denominational value of a series of contacts are operated and also controlling duration of operation of said signalling device irrespective of whether said keys are returned to unoperated positions or not, and devices for releasing said holding means from said keys and returning said keys to their unoperated positions.

5. A detecting device comprising a source of electrical energy, a signalling device, a series of rotary cylinders having sockets arranged in denominational orders respectively, a series of contacts adjustable in said sockets to represent numbers, electrical circuits controllable by said contacts during rotation of said cylinders to operate said signalling device, a series of denominational rows of keys, means controlled by said keys for conditioning said circuits for effective operation of said contacts by said cylinders to cause operation of said signalling device as aforesaid, means for continuing operation of said signalling device irrespective of the positions of said contacts after operation of said signalling device has been initiated by said contacts, and optional means for stopping further operation of said signalling device.

6. A detecting device comprising a source of electrical energy, a signalling device, a series of rotary cylinders having sockets therein, electrical connections for operating said signalling device, a series of contacts adjustable in said sockets for cooperation with said connections to cause operation of said signalling device, and a series of denominational rows of keys for conditioning said electrical connections for effective operation of said contacts.

7. A detecting device comprising a source of electrical energy, a signalling device, a series of rotary cylinders having sockets therein, electrical connections for operating said signalling device, a series of contacts adjustable in said sockets for cooperation with said connections to cause operation of said signalling device, a series of denominational rows of keys for conditioning said electrical connections for effective operation of said contacts, electrical means for continuing operation of said signalling device irrespective of the positions of said contacts after operation of said signalling device has been initiated as aforesaid, and an optionally operative device for disabling said electrical means and thereby stopping operation of said signalling device.

8. A detecting device comprising a source of electrical energy, a series of rotary cylinders corresponding to denominational orders and each having series of sockets therein corresponding respectively to the numeral digits, a signalling

device, electrical connections for operating said signalling device, a series of contacts adjustable in said sockets to represent numbers and establish electrical communication through said connections to said signalling device and to operate the latter, and a series of denominational rows of keys movable manually from unoperated to operated positions to condition said electrical connections for effective operation of said contacts.

9. A detecting device comprising a source of electrical energy, a series of rotary cylinders corresponding to denominational orders and each having series of sockets therein corresponding respectively to the numeral digits, a signalling device, electrical connections for operating said signalling device, a series of contacts adjustable in said sockets to represent numbers and establish electrical communication through said connections to said signalling device and to operate the latter, a series of denominational rows of keys movable manually from unoperated to operated positions to condition said electrical connections for effective operation of said contacts, mechanism for returning said keys to their unoperated positions, and electrical means for continuing

operation of said signalling device irrespective of the positions of said keys and said contacts after operation of said signalling device has been initiated.

10. A detecting device comprising a source of electrical energy, a signalling device, a series of rotary cylinders arranged in denominational orders and each having series of sockets corresponding respectively to the numerical digits, mechanism for rotating said cylinders, electrical connections for operating said signalling device, series of contacts adjustable in denominational orders in said sockets to represent various numbers and for energizing said electrical connections to operate said signalling device, a series of denominational rows of digit keys movable from unoperated to operated positions to condition said electrical connections for effective operation of said contacts to operate said signalling device when digit keys corresponding to any number represented by said contacts are operated, and optional means for stopping operation of said signalling device after operation thereof has been initiated as aforesaid.

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