

March 6, 1951

A. H. DICKINSON
KEYBOARD

2,543,899

Filed Sept. 21, 1945

2 Sheets-Sheet 1

FIG. 2.

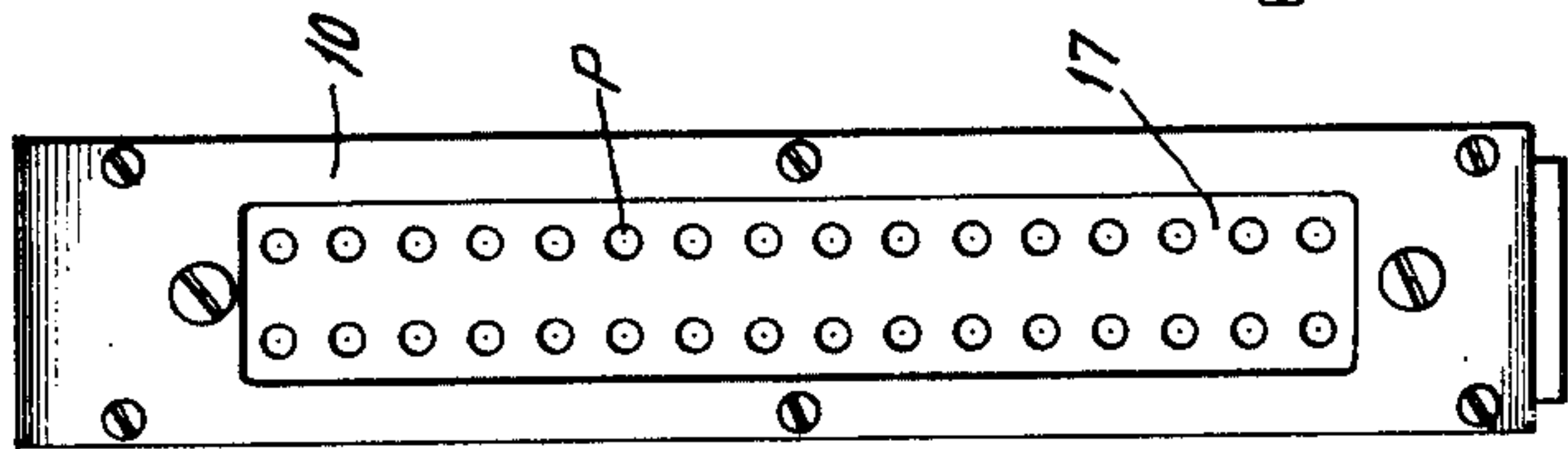
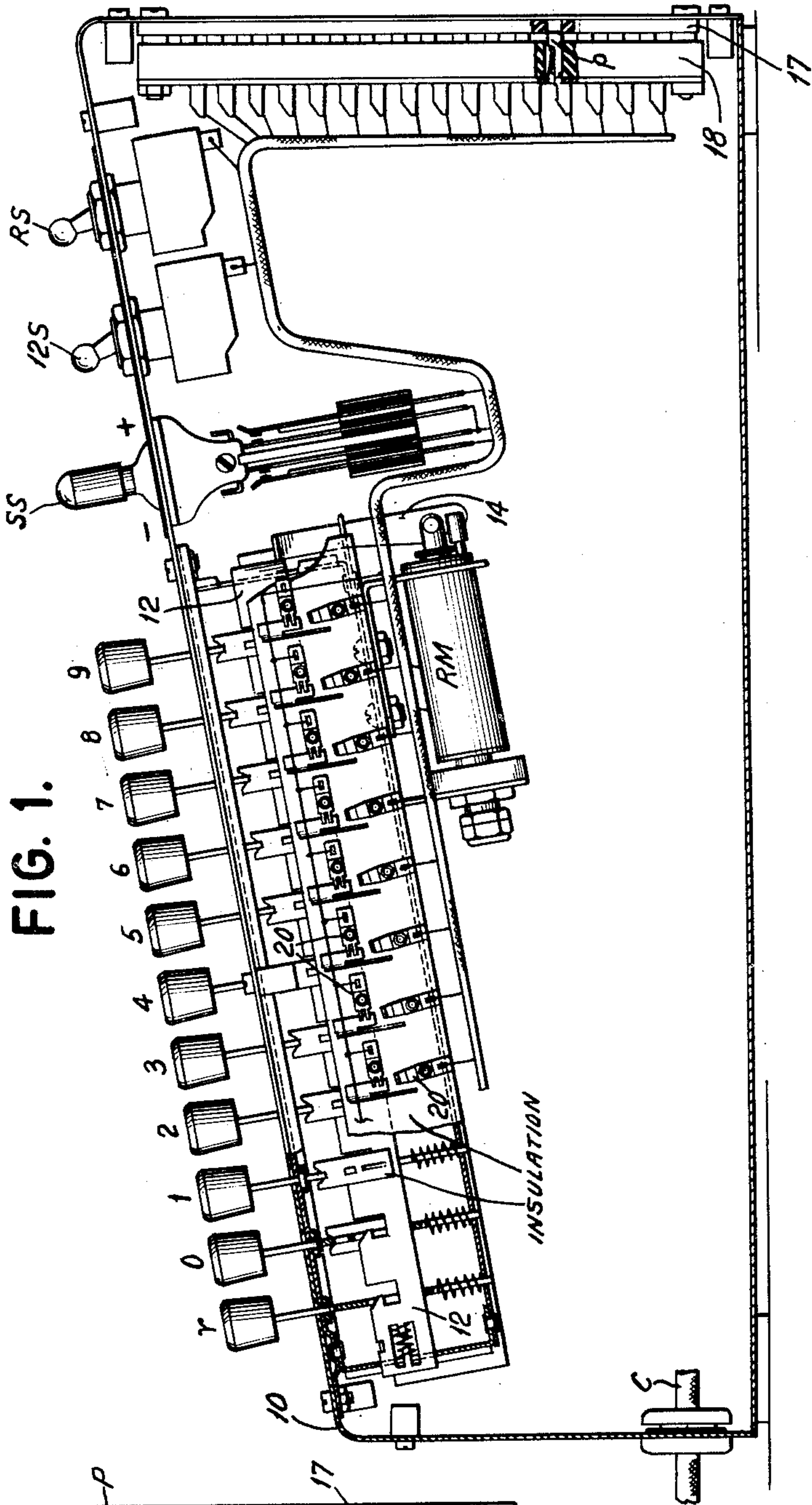


FIG. 1.



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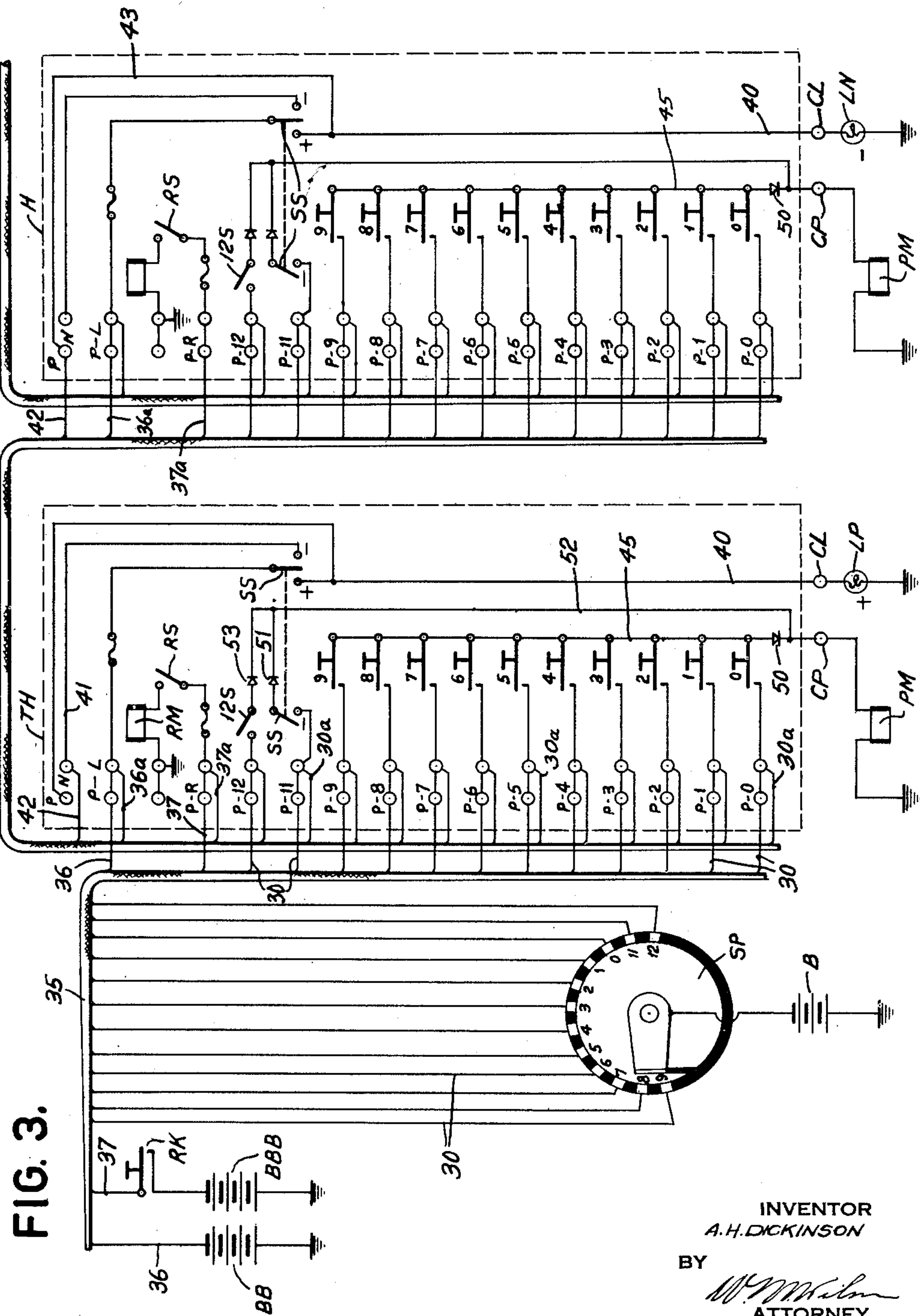
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UNITED STATES PATENT OFFICE

2,543,899

KEYBOARD

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Application September 21, 1945, Serial No. 617,834

4 Claims. (Cl. 235—145)

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This case relates to electrical keyboards.

An object of the invention is to provide a sectional keyboard built up of individual key column sections so that the columnar capacity of a keyboard may be varied by utilizing a chosen number of key column sections.

An object of the invention is to provide a key column section so constructed that it may be electrically united with other such sections to compose a keyboard of chosen columnar capacity.

An object of the invention is to provide a key column section constructed with a plugboard which may be joined by plugwires to any other such section, whereby a keyboard composed of any chosen number of such sections, plugged to one another, may be built up.

An object of the invention is to provide a keyboard built up of individual, similar pluggable key column sections any one of which may be utilized as a feeder section to receive electrical power and feed the power to the remainder of the keyboard.

An object of the invention is to provide a keyboard built up of key column sections one of which has switching means for switching a control circuit to another of the sections.

An object of the invention is to provide novel key release or key column clearing controls.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of examples, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side sectional view of a key column section.

Fig. 2 is a rear view thereof.

Fig. 3 is an illustrative circuit diagram for the keyboard.

Referring to Figs. 1 and 2, the key column section has a casing 10. Mounted in the casing is a conventional key column unit. This unit has eleven keys, one of which is designated *r* and is merely a release key. The other ten keys are digit keys to select digits 0 to 9. Upon depression of a digit key, it is latched down, as usual, by a latch bar 12. The latched key may be released by depressing any other digit key in the column or by depressing the release key *r*. The key column section is provided, for purposes relating to the present invention, with a solenoid RM which, when energized, rocks a lever 14 to move the bar 12 to the left (Fig. 1) so as to release any latched digit key. This operation may be called the clearing operation.

The key column section includes the hand

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switches designated SS, 12S, and RS the functions of which will be explained in the later circuit description.

The rear wall of casing 10 is in the form of an open rectangle, the opening in which is closed by a plugboard. The plugboard includes two insulating panels 17 and 18 secured to each other and to the marginal, rear wall of the casing. Mounted on the panels 17 and 18 are plug sockets generally designated P. It is seen that the plugboard is an integral part of the key column section, and is accessible for plugging from the outside.

The key column unit is of the type in which the digit keys, upon depression, connect pairs of contact blades 20. Wires from blades 20 and from solenoid RM, switches SS, 12S and RS are cabled and connected at their emerging ends to a plurality of the plug sockets P. There are two columns of plug sockets P, and the connections of the key contacts, the solenoid, and switches to the sockets, and between the sockets themselves, are shown in Fig. 3.

Briefly, the key column section described above comprises a bank of keys, key contacts, key release means, electrical switches, and a plugboard internally wired to the key contacts and switches. Any desired number of such sections may be plugged externally to one another to compose a keyboard of desired columnar capacity. A chosen one of the key column sections also may be externally plugged to outside circuits to serve as a feeder for such circuits to the other section or sections of the keyboard. Each keyboard section also is provided with a cable C which passes through the front wall of the casing 10 (Fig. 1) of the keyboard section. The cable contains wires which lead to contacts inside the keyboard section and which terminate outside the casing of the section in plug elements of a conventional multiple plug connector. Two of these plug elements are shown for each keyboard section in Fig. 3. One of the two plug elements is designated CP and the other is designated CL.

Fig. 3 illustrates exemplary circuits which extend to and through a sectional keyboard composed of a plurality of similar key column sections. Two column sections are shown in Fig. 3 as the connections to other sections are generally similar and sufficiently clear from the illustration of the two column sections. The two shown sections are designated TH and H for convenience, but no structural distinctions between them are to be implied since the sections are interchangeable.

Referring to Fig. 3, the illustrative circuits include an emitter SP and magnets PM. These elements correspond, for example, to the similarly

designated elements of Patent No. 2,355,389 (Fig. 37c), or of application Serial No. 585,996 (Fig. 19b), filed March 31, 1945, now Patent No. 2,506,470. Briefly, a magnet PM is intended to be energized at a differential time of a cycle to control the punching of a digit designation in a record card column. Whenever punching is to be effected, the emitter SP is operated for a cycle and emits differentially timed impulses which are selectively applied by the key contacts of a keyboard column section to the associated column magnet PM. Thus, the key column section selects the differential time of energization of the magnet PM in order that punching of the key-selected digit designation may be effected. No attempt is made here to show the punching means and the means for effecting cycles of the emitter SP as such means are well known and may be understood from the previously mentioned patent and application. Moreover, it is to be understood that magnets PM may serve in the manner of magnets 77 or 223 of Patent No. 1,976,617 (Fig. 29) to control accumulation or printing or, for that matter, any other digit manifesting function. It is to be understood, further, that numbers 11 and 12 are to be considered as digits since their designations may be punched into index positions of a record card column.

There is one magnet PM plugged to the plug element CP of each key column section. The emitter SP is common to all the key column sections, wires therefrom being plugged to a chosen feeder section. The wires connected to emitter spots 9 to 0, 11 and 12 are designated 30. They are gathered in a cable 35 and their emerging ends are plug-tipped to enable them to be plugged into sockets P of the chosen key column section. For convenience, one column of sockets P of a key column section may be referred to as the input column and the other column of sockets as the output column. As viewed in Fig. 3, the input column is the left hand column. Except for the uppermost pair of sockets from the two columns, the similarly marked sockets of the two columns, which sockets occur in pairs, are internally wired to each other. The wires 30 connected to the emitter spots 9 to 0, 11 and 12 are plugged to sockets P marked 9 to 0, 11 and 12 of the input column of the chosen feeder section TH. The brush of the emitter SP is wired to the plus side of the source of potential, shown here as a battery B.

An indicating lamp bank such as shown in Fig. 19a of the aforementioned application Serial No. 585,999 is plugged to wires in cable C (Fig. 1) which lead to key contacts, other than the ones shown, of the keyboard. The lamp bank and related key contacts are not shown since they form no essential part of the present invention. But two of the lamps, designated LP and LN are shown in Fig. 3 because the control of these lamps is a feature of the present invention. It is understood that lamps LP and LN are elements of two columns of lamps which are plugged respectively to the key column sections TH and H. The lamp LP, plugged to plug element CL of the keyboard section TH, is to be lit to indicate a positive amount setting of the keyboard and the lamp LN, plugged to the plug element CL of the section H, is to be lit to indicate a negative amount setting. Power for the lamps is derived from a source shown in Fig. 3 as a battery BB. A plug wire 36 connected to the plus side of battery BB enters cable 35 and at its emerging end

is plugged to the socket P—L of the input column of the chosen section TH.

A remote control for a clearing operation of the keyboard is provided. This remote control comprises a key switch RK which is connected at one side to a battery BBB and at the other side to a plug wire 37. Wire 37 is brought into cable 35 and its emerging end is plugged to the socket P—R of the input column of chosen section TH.

As explained above, the wires 30, 36, and 37, which may be termed circuit service lines, are connected to input sockets P of the chosen feeder section of the keyboard. To feed the power from service lines 30, 36, and 37 to the next section of the keyboard, corresponding plug wires 30a, 36a, and 37a are plugged between the output sockets of the feeder section and the input sockets of the next section of the keyboard. Specifically, the sockets P—L, P—R, P12, P11, and P—9 to 0 of the output column of sockets of chosen feeder section TH are connected by plug wires 37a, 36a, and 30a to the similarly marked sockets of the input column of the next section H. In practice, the adjacent sections of the keyboard are close together and short plug wires may be run between the corresponding output and input sockets of the adjacent sections. To simplify the showing in Fig. 3, the connecting plug wires are shown as cabled. The output column of sockets of section H may be plugged by such connecting plug wires to the input column of a third section (not shown) of the keyboard, and so on, from one section to the next. It is thus seen that a single set of service wires may be plugged to a chosen feeder section of the keyboard and that the several sections of the keyboard may be plugged, each to the next, to "common" the keyboard sections to the service wires. Further, the keyboard may be built up of any desired number of pluggable key column sections. Any section may be quickly and readily detached from the keyboard simply by unplugging it from the remaining sections.

The various operations relating to the keyboard will now be described. The clearing operation, by which is meant the unlatching of digit keys of the column sections will be explained first. There is a dual control for clearing of each section. One portion of the control is common to all the sections and comprises the key switch RK. The other portion of the control is individual to each key column section and comprises its switch RS. Only those sections whose switches RS are closed will be cleared upon the closure of the remote key switch RK. Assume, for instance, that switch RS of section TH is open, while the switch RS of section H is closed. Upon the closure of key switch RK, potential is fed from the battery BBB to plug wire 37, thence to the socket P—R of the input column of section TH, the bridge to the paired socket P—R of the output column, thence via plug wire 37a to socket P—R of the input column of section H, the bridge to the paired socket, and via the switch RS of section H, through the solenoid RM of this section, to ground.

Upon energization of solenoid RM of section H, it operates lever 14 (Fig. 1) to move latch bar 12 in a direction to release the depressed digit key. The solenoid RM of section TH is not energized because the switch RS of this section has been left open. Hence, the key setting of the section TH remains in effect.

The next operation to be explained is the selective illumination of amount sign indicating

lamps LP and LN. The lamps LP and LN are plugged to sections TH and H, respectively, but the single switch SS of section TH will control the selective illumination of the lamps. If the switch SS of section TH is set at the + position (Fig. 1), then lamp LP will be lit, but if this switch is set at the minus (—) position, the lamp LN will be lit. When switch SS is in neutral position, both sides of the switch are open. When in + position, a blade of the switch engages a + terminal of the switch. When in the minus position, the switch blades engage minus terminals. Assume the switch SS of section TH is set in + position. Accordingly, potential from battery BB is fed by plug wire 36 to the sockets P—L of section TH, thence to a blade of the switch SS of this section, the engaged + terminal, and via a wire 40 through lamp LP, to ground. Assume, instead, that switch SS is set in the minus position. Potential from battery BB is fed via plug wire 36 to plug sockets P—L of section TH, thence to the right hand blade of switch SS of this section, the engaged right hand minus terminal of the switch, and a wire 41, to the output socket P—N. This socket of section TH is connected by a plug wire 42 to the input socket P—N of section H. Hence, the potential fed to output socket P—N of section TH is transmitted to the input socket P—N of section H, and is applied via a wire 43 and the wire 40 of the section H, to lamp LN. It is clear from the above description that the switch SS of the section TH selectively controls the illumination of the lamp LP connected to this section as well as the lamp LN connected to the section H. Stated generically, a switch of one key column section selectively controls operation of a pair of electrical devices, plugged respectively to this section and another section of the keyboard.

The next operation to be explained is the amount manifestation. The differentially timed energization of the magnets PM will determine which digits are manifested. Differentially timed impulses will be fed from emitter SP to the keyboard during an amount manifesting cycle. Impulses emitted at differential times corresponding to the closed key contacts of the key column sections will be passed through to the magnets PM plugged to the respective sections. In short, the digit keys of the column sections select the digits to be manifested by allowing the magnets PM to be energized at differential times such as to cause the selected digits to be recorded or manifested. Assume, for instance, that key 7 of section TH is depressed. During a manifesting cycle, when the brush of emitter SP wipes its 7 spot, a pulse is fed via the connected plug wire 30 to sockets P—7 of the section TH, thence via the now-closed "7" key contacts to the common wire 45, and via a rectifier 50 to the magnet PM plugged to this section. Magnet PM of section TH, being energized by this circuit at the 7 differential time of the cycle will cause the digit 7 to be manifested, as by the recording of a 7 designation in a card column. Assume, further, that in section H, the 5 key is closed. Hence, at the 5 differential time of the cycle, as the emitter brush wipes its 5 spot, potential is fed via the connected plug wire 30 to sockets P—5 of the feeder section TH, thence via a plug wire 30a to the sockets P—5 of section H, the closed "5" key contacts of section H, the wire 45 and rectifier 50 of this section, and through the magnet PM plugged to section H. Accordingly, the 5 digit will be manifested under control of the magnet PM plugged to key column section H. In a similar manner, digits se-

lected by other key column sections (not shown) will be manifested during a cycle.

When a negative amount is set on the keyboard, it is desired, in addition to lighting the lamp LN, to produce an "11" manifestation during a manifesting cycle to signify the negative sign of the manifested amount. This can be understood best in relation to a manifestation by the punching of designations in a card field, an understanding of which can be had by reference to the previously mentioned application. The punching of an "11" index position in the card column associated with keyboard section TH will designate a negative sign. With switch SS of section TH set in minus position, potential will be fed at the "11" differential time of the cycle from the brush and 11 spot of the emitter SP, to the connected plug wire 30, the sockets P—11 of section TH, the left hand minus terminal and blade of switch SS of section TH, a rectifier 51, and a wire 52 to the magnet PM plugged to section TH.

The "12" digit also may be manifested, as by punching the "12" index position of a card column. To select a "12" digit to be manifested, during a cycle, in a chosen card column, the switch 12S of the key column section associated with this column is closed. A "12" timed pulse is fed from the emitter SP during a cycle to sockets P—12. Assuming switch 12S of section TH is closed, the "12" pulse is transmitted by this switch and a rectifier 53 to wire 52 and thence to the magnet PM plugged to section TH.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A sectional keyboard including separate self-supporting key column sections, each including digit keys and key contacts operable thereby for setting up negative or positive amounts, each section also including a plugboard to which the key contacts are internally wired and whereby the sections may be flexibly electrically connected, in any desired grouping, by plug wires so as to connect the digit key contacts of the grouped sections to digit input circuit lines, a first chosen section including a sign selecting switch having a positive sign side and a negative sign side and settable according to the sign of the amount for which the keyboard has been set, one sign manifesting electrical element electrically connected to a corresponding sign side of the switch of the first chosen section, the opposite sign side of the switch being wired to the plugboard of the first chosen section, an opposite sign manifesting electrical element electrically connected to the plugboard of a second chosen key column section, a plugwire between the plugboards of the two chosen sections to place said opposite sign side of the switch in the first chosen section in control of said opposite sign manifesting element of the second chosen section, and an outside source of electrical potential plugged to the plugboard of the first chosen section so as to apply power through said switch selectively to either the sign manifesting electrical element connected to the first chosen section or the opposite sign manifest-

ing element connected to the second chosen key column section depending on the setting of said switch.

2. A sectional keyboard of flexible columnar capacity for cooperating with outside digit-corresponding circuit lines, said keyboard being composed of a variable number of like, interchangeable key column sections, each including a set of digit keys and related digit key contacts and means for interrelating the keys for maintained depression of only one key at a time to operate its related contacts, each section being completely self-contained and provided with its own individual self-supporting and mounting frame mechanically independent of the other sections and fully mounting and housing the keys and contacts of the section, so that the sections may be placed in positions remote from one another or contiguous to one another as desired, the frame of each section having one outside closure wall formed by a plugboard secured to the frame and provided with an input set of digit plug sockets and an output set of digit plug sockets, the corresponding sockets of both sets being electrically commoned in the plugboard and internally wired to the corresponding digit key contact of the column section, said outside digit-corresponding circuit lines being pluggable by plug wires to the input set of digit sockets of the plugboard of any chosen one of the column sections, the output set of digit sockets of said chosen section being pluggable by plug wires to the input set of sockets of any other one of the sections, and the output set of the latter section being pluggable by plug wires to the input set of still another column section, and so on from section to desired section, whereby the corresponding digit key contacts of as many sections as desired may be paralleled and connected via the input set of sockets of said chosen section to the corresponding outside circuit lines, any of said column sections being removable from the keyboard by unplugging its input and output sockets from the other sections, whereby the number of column sections in the keyboard may be varied at will to provide a keyboard of flexible columnar capacity.

3. A sectional electrical keyboard for cooperating with outside digit-corresponding circuit lines to control orders of digit manifesting electrical devices, said keyboard being built up of a variable number of like, interchangeable key column sections, each having its own individual fully self-supporting, mounting frame, each such frame completely mounting and housing a set of digit keys and related key contacts, whereby the key column sections may be placed contiguously to or remotely from one another, as desired, the frame of each section being formed in one outside wall with an opening, a plugboard secured to the marginal edges bounding said opening so as to close said opening and be accessible from outside of the frame, said plugboard having an input set of digit plug sockets and an output set of digit plug sockets with corresponding digit sockets commoned to each other and to the corresponding digit key contacts, said outside digit corresponding lines being pluggable by plug wires to the input sockets of any chosen one of the column sections to place the key contacts of said chosen socket in series with the corresponding outside digit lines, the output sockets of the chosen section being pluggable by plug wires to the input sockets of any other of the column sections and the output sockets of the latter sec-

tion being similarly pluggable to the input sockets of still another of the sections, and so on from section to section in any desired grouping of the sections, so that the corresponding digit key contacts of the grouped sections may be paralleled with one another and connected via said chosen section to the outside digit lines, each section having a common circuit connection between its digit key contacts and which connection is pluggable to an order of the digit manifesting devices, whereby the digit manifesting devices plugged to the grouped sections are selectively operable by circuits extending from the outside digit lines and via selectively operated key contacts of the section to manifest the digits corresponding to the operated contacts, any of said sections being removable from the keyboard by unplugging its input and output sockets from the other sections, whereby the number of column sections in the keyboard may be varied at will to provide a keyboard of flexible column capacity.

4. A keyboard having columns of keys for setting up positive or negative amounts and including a pair of like, interchangeable self-supporting and mounting key column sections, each including a set of digit key contacts and a sign switch having a common input blade and positive and negative sign poles, the blade being adjustable to a neutral position or to a position in engagement with the positive pole or to another position in engagement with the negative pole, a pair of like electrical elements each inherently capable of manifesting a positive sign or a negative sign, one of these elements being connected to one sign pole in one of said sections and the other element being similarly connected to the corresponding sign pole in the other of said sections, each of said sections mounting a plurality of accessible plug sockets, a first one of said sockets in each section being internally wired to the common input blade in the section, a second of the sockets in each section being internally wired to said one sign pole of the switch in the section and to which sign pole the manifesting element associated with the section is wired, and a third one of the sockets in the section being wired to the opposite sign pole of the switch, an outside source of potential plugged to said first socket of either chosen one of said column section so as to apply potential to the common input blade of the switch in said chosen section, and a plug wire between said third socket of the chosen section and said second socket of the other column section, whereby the sign switch in the latter section may be left in neutral position and the sign switch of the chosen section may be adjusted to control the manipulation of the sign of the amount set on the keyboard, the common blade of the switch in the chosen section being adjustable to engage one sign pole of this switch to transmit the applied potential to the sign manifesting element wired to this section for operating the latter element to manifest this one sign, said blade in the chosen section being alternately adjustable to engage the opposite sign pole to transmit the applied potential via the latter pole and the plugging between said third socket of the chosen section and said second socket of the other section to the sign manifesting element associated with the latter section for operating the latter element to manifest said opposite sign.

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