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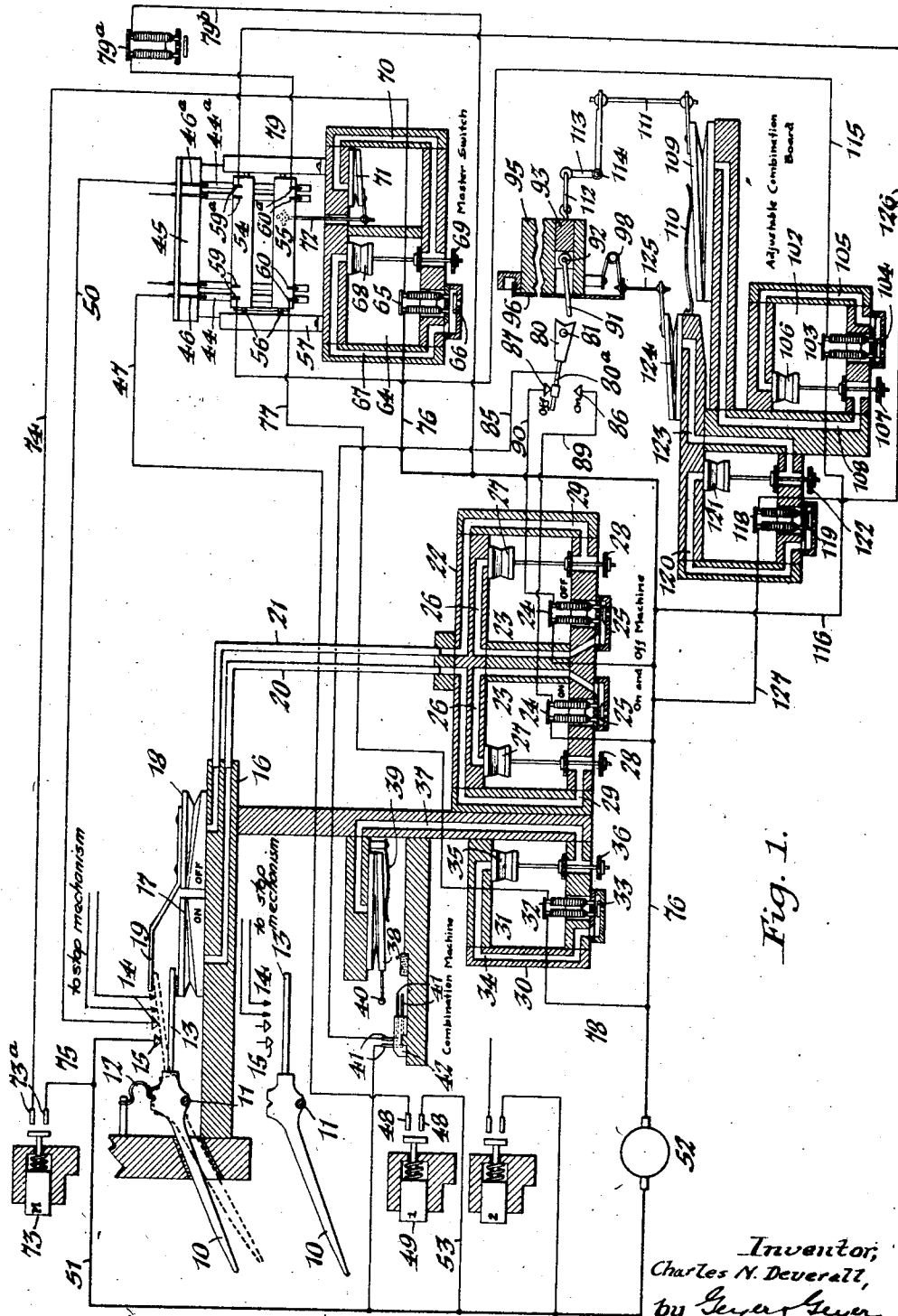
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COMBINATION STOP MECHANISM FOR ORGANS

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2 Sheets-Sheet 1



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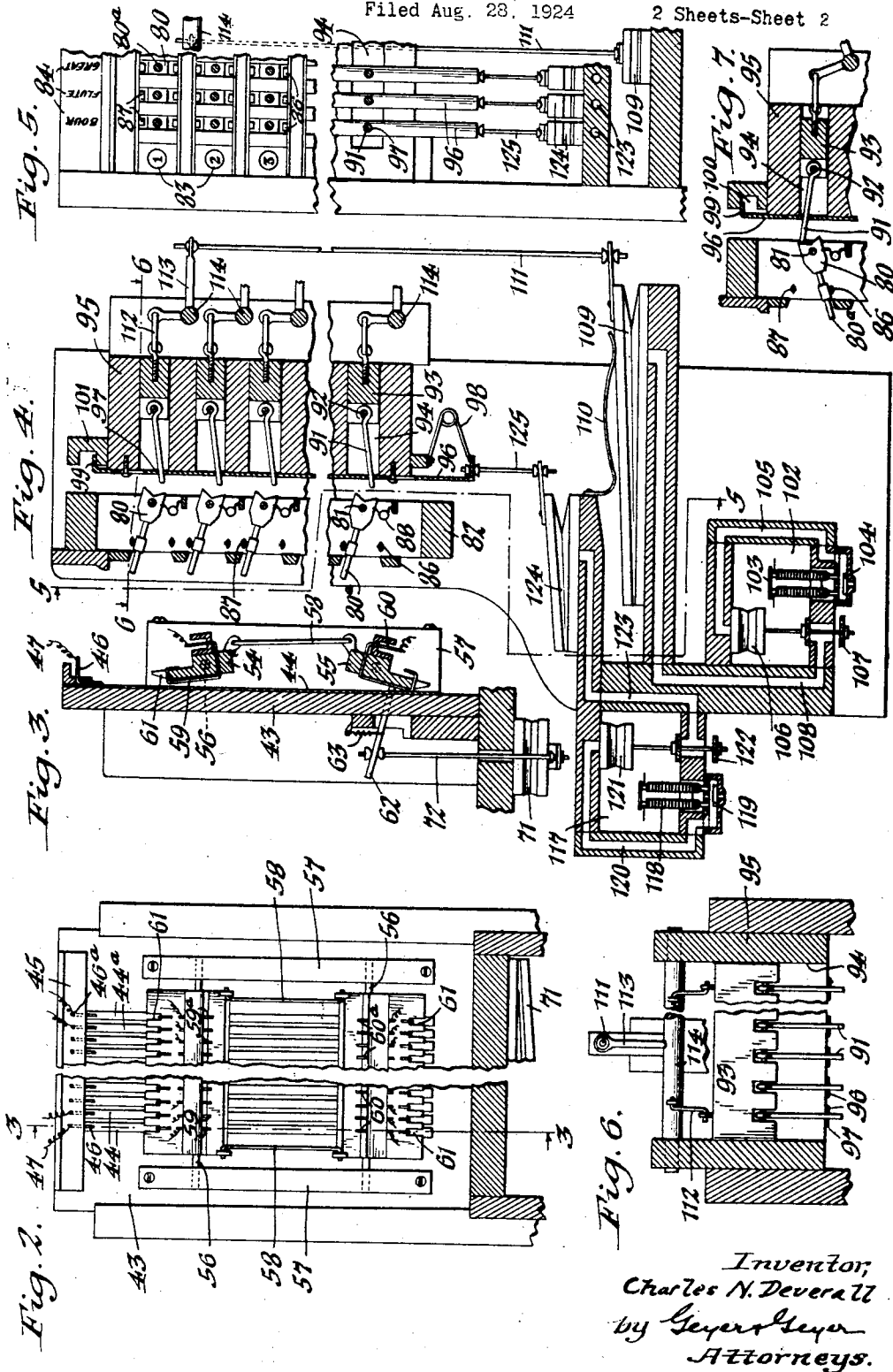
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COMBINATION STOP MECHANISM FOR ORGANS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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COMBINATION STOP MECHANISM FOR ORGANS.

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This invention relates generally to musical instruments and more particularly to electro-pneumatically operated organs such as are used in theatres and similar places.

5 Its principal object is to provide novel and reliable means for automatically setting and selecting different combinations of stop keys without the organist leaving the organ bench.

10 Another object of the invention is to provide an efficient switch mechanism for controlling the circuits governing the selection of different combinations of stop keys.

15 A further object is the provision of a simple and reliable adjustable combination or selective board for automatically controlling the movements of the stop keys.

The invention further consists in certain improvements and combination of parts hereinafter more fully described and pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a diagrammatic view of the stop mechanism embodying my improvements. Figure 2 is a fragmentary face view of the master switch mechanism controlling the circuits governing the selection of different combinations of stop keys. Figure 3 is a transverse vertical section thereof on line 3—3, Fig. 2. Figure 4 is a transverse vertical section of the combination board and associated parts. Figure 5 is a vertical section thereof on line 5—5, Figure 4. Figure 6 is a horizontal section on line 6—6, Fig. 4. Figure 7 is a fragmentary view, similar to Fig. 4 showing the parts in a different position.

Similar characters of reference indicate corresponding parts throughout the several views.

Organs of the type to which my present improvements are applicable, are usually provided adjacent the keys of each manual with a plurality of so-called "combination pistons" which function to draw, by pressing any one of them, a certain combination of stop keys simultaneously without the necessity of drawing each one individually. Associated with each set or row of combination pistons is a "master piston" which is pressed simultaneously with the act of drawing the individual stop keys desired in a given combination and pressing the "combination piston" to which they are to be in-

cluded. After thus setting the desired stop keys to be coupled with a particular "combination piston," the latter and the "master piston" are released and the drawn stop keys are returned to their initial undrawn position. Thereafter, every time this particular "combination piston" is pressed, the corresponding combination of stop keys is automatically drawn.

In its general organization, this invention comprises four distinct actions, namely, (1) the bolster motors or pneumatics and the on and off machine which directly operate the stop keys, (2) the combination machine, (3) the reversing or master switchboard, and (4) the adjustable combination or selective board. The arrangement of the bolster pneumatics, the on and off machine and the combination machine is the same as on organs now in use, wherein the various combinations of stop keys are adjusted by hand at a distance from the organ bench. The novel features of the present invention reside in the construction and arrangement of the reversing switch board and the adjustable combination board which afford the selection of the different combinations of stop keys desired directly from the organ bench.

Referring now to the drawings, particularly Fig. 1, 10 indicates a stop key pivoted to a fulcrum pin or rod 11 and having a spring 12 in engagement therewith for maintaining it in either its operative or inoperative position. A rearwardly extending metallic arm 13 on this key is adapted to connect the contacts 14, 15 when the key is in its drawn or operative position. In such position, an electric circuit is closed which operates the stop mechanism that the key controls in the usual way.

Mounted on the bolster 16 of the organ for operative engagement with the stop key arm is a pair of motor pneumatics 17, 18, one being designated the "on" pneumatic which, when inflated draws the stop key to its operative position, while the other is designated the "off" pneumatic and acts, when inflated, to return said key to its inoperative position. As shown in Fig. 1, these pneumatics may be disposed one behind the other, the movable board of the "on" pneumatic underlying the arm 13 of the stop key and the corresponding board of the "off" pneumatic having an extension

19 overhanging said arm. The "on" and "off" pneumatics are connected by conduits 20 and 21, respectively, to what is termed the on and off machine which may be of any suitable and well known construction. That shown in the drawings, for example, comprises an action box 22 having two separate wind chests 23, 23, each containing an electro-magnet 24 controlling a disk-valve 25 that supplies air from the corresponding wind chest through a passage 26 to a pneumatic 27, which in turn actuates a valve 28 that controls the supply of air from said wind chest through a passage 29 leading to the corresponding conduits 20, 21, connected to the on and off pneumatics. The energizing of either electro-magnet 24 causes the inflation of the corresponding motor pneumatic 17 or 18 with the result that the stop key is likewise moved in one direction or the other to bring into or out of play the corresponding stop of pipes.

The combination machine preferably comprises an action box 30 having a wind chest 31 containing an electro-magnet 32 which controls a disk valve 33 that supplies air from said wind chest through a passage 34 to a pneumatic 35, which in turn actuates a valve 36 controlling the supply of air from the wind chest through a passage 37 leading to a pneumatic 38 which is normally held collapsed by a spring 39. The movable board of said pneumatic 38 carries a metallic bar 40 adapted to bridge contacts 41 applied to a block 42. When the electro-magnet 32 is energized, the pneumatic 38 is inflated, bringing its contact bar into engagement with the contacts 41 and closing an electric circuit for operating the on and off machine.

As before stated, the parts thus far described are in common use on present day organs. The new actions entering into the present invention consist of the reversible or master control switch and the adjustable combination board which parts function to control the on and off machine and the combination machine in order to automatically effect the selection of the stop keys desired without leaving the organ bench. The preferred form of switch shown in Figs. 2 and 3, consists of an upright board 43 provided on its face with a plurality of sets of bronze contact strips 44, 44^a arranged in parallel relation and suitably insulated from one another. At its upper end, this board is provided with a transverse spreader rail 45 having a plurality of sets of terminals 46, 46^a corresponding in number and in permanent contact with the bronze strips. Each terminal 46 of a set is connected by a wire 47 to one of the fixed contacts 48 of a combination piston 49, whose function is that of a switch, while each terminal 46^a is connected by a wire 50 with the contact 14 with which

the arm 13 of the corresponding stop key is adapted to engage, the companion contact 15 being connected by a feed wire 51 with a generator 52 or other suitable source of electrical energy. The other contact 48 of the combination piston is connected by a wire 53 joined to a wire 51 leading to the generator. It will thus be understood that the terminals 46 correspond in number to the combination pistons employed on the organ, while the terminals 46^a correspond in number to the stop keys used.

Movable alternately into and out of engagement with the bronze contact strips 44, 44^a are upper and lower switchheads 54, 55 which are mounted on horizontal fulcrum pins 56, 56 supported at their ends in suitable bearing blocks 57 secured to the front side of the switchboard 43. These switch-heads are tied together at their ends by links 58, so that when one of them is rocked in one direction the other is rocked in the opposite direction, or in other words, when one is "on" the other is "off".

The upper switch-head 54 carries a plurality of sets of contacts 59, 59^a preferably of wire, adapted to engage the corresponding sets of bronze strips 44, 44^a while the lower switch-head 55 has similar contacts 60, 60^a for the same purpose, the contacts on the switch-heads corresponding in number to said strips. As shown in Figs. 2 and 3, those ends of the contact wires which engage the strips 44, 44^a are free to pass loosely through slots 61 in the respective switch-heads, thereby permitting said wires to yield more or less and insuring good electrical contact with the bronze strips. The lower switch-head has a rearwardly extending actuating arm 62 to which a spring 63 is applied for normally holding the lower switch-head in its "on" position and the upper switch-head in its "off" position, as shown by full lines in the drawings, particularly Fig. 3. In this normal position of the switch, it functions to complete an electric circuit for controlling the on and off machine, while in the other position thereof, it serves to complete an electric circuit for controlling the adjustable combination board, as will hereinafter be described.

This reversible or master switch is electro-pneumatically controlled, and to this end an action is provided including a wind chest 64 containing an electro-magnet 65 which operates a disk valve 66 that supplies air from said wind chest through a passage 67 to a pneumatic 68, which in turn actuates a valve 69 controlling the supply of air from the wind chest through a passage 70 leading to a pneumatic 71 connected by an upright rod 72 with the actuating arm 62 of the lower switch-head. The energizing of the electro-magnet 65 results in the inflation of the pneumatic 71 which acts to rock the

lower switch-head 55 to its "off" position and the upper switch-head to its "on" position. The circuit, including this magnet is controlled by a "master piston" 73, which acts as a switch, one of the terminals 73^a thereof being connected by a wire 74 to one of the magnet-coils, while the other terminal is joined by a branch-wire 75 with the feed wire 51 leading to the generator 52, the other magnet-coil being connected by a return wire 76 with the opposite side of the generator. Thus, when the master piston is pressed, the circuit including the electro-magnet 65 is closed and the master switch is actuated in the proper direction to bring its upper head into contact with the bronze strips 44, 44^a and its lower lead out of contact with such strips.

In the normal position of the reversible switch, wherein the contact wires 60, 60^a of the lower switch-head 55 are in contact with the bronze strips 44, 44^a, two separate circuits are established, one including the stop key and the stop action, which latter has not been deemed necessary to show in the drawings, but which is of any suitable and well known construction, and the other including the combination piston 49 and the electro-magnet 32 of the combination machine. For this purpose, each of the lower switch-head wires 60 has connected thereto a wire 77 which leads to one of the coils of the electro-magnet 32, the other coil being connected by a branch wire 78 with the return wire 76 of the generator, while each of the companion contact wires 60^a is connected by a wire 79 with one of the coils of the electro-magnet 79^a of the stop action, the other coil being connected by a branch wire 79^b with said generator return wire. When the stop key 10 is depressed or drawn to the position shown by dotted lines in Fig. 1, the corresponding stop of pipes connected therewith is brought into play, the circuit established including the stop arm 13, contact 14, wire 50, terminal 46^a on the spreader rail 45, bronze strips 44^a, contact wire 60^a on the lower switch-head 55, wire 79 to the stop action magnet 79^a, thence to the return wire 76, generator 52 and feed wire 51 to the companion contact 15. When the combination piston 49 is pressed, the combination machine is brought into action, the circuit established including one of the contacts 48, wire 47, spreader rail contact 46, bronze strip 44, contact wire 60 on the lower switch-head, wire 77, electro-magnet 32, wire 78, return wire 76 to the generator 52 and thence over the feed wire 51, and branch wire 53 to the companion piston-contact 48. This will cause the pneumatic 38 of the combination machine to be inflated, bringing its bar 40 into engagement with the contacts 41, thereby establishing another circuit for operating the on and off machine through

the medium of the so-called adjustable combination board to be presently described.

In its preferred construction, shown in Figs. 1, 4, 5, 6 and 7, this combination board comprises a plurality of vertically swinging switch levers 80 fulcrumed at 81 in a suitable frame 82 and arranged in horizontal rows, there being as many rows as there are combination pistons on a given-sized organ and as many switches in each row as there are stop keys. In other words, if there are ten stop keys and five combination pistons, there would be five switch levers arranged vertically one above the other for each stop key, or fifty in all. As shown in Fig. 5, the rows of switch levers are provided at one side thereof with indicators or numerals 83 which correspond to those on the combination pistons, while above the switch arms in line with the columns thereof are identifying characters 84 corresponding to those on the stop keys. This arrangement merely affords an identifying system of associating the different switch levers with their corresponding stop keys and combination pistons. Each switch lever 80 carries a forwardly projecting metallic arm 80^a which is electrically connected by a wire 85 with one of the block-contacts 41 of the combination machine and which is adapted to engage one or the other of a set of "on" and "off" contacts 86, 87, respectively. A spring 88 applied to the switch lever acts to maintain it in one position or the other in substantially the same manner as the stop key 10 is held. The "on" switch contact 86 is connected by a wire 89 with the magnet 24 controlling the corresponding "on" pneumatic 17 of the on and off machine, while the "off" switch contact 87 is connected by a wire 90 with the other magnet 24 controlling the corresponding "off" pneumatic 18 of said machine. When the switch lever is moved to its "on" position, the corresponding pneumatic 17 is inflated to move the stop key to its drawn position and when said switch lever is moved to its "off" position, the corresponding pneumatic 18 is inflated to return the key to its initial position.

Adapted for operative engagement with each switch lever 80, whereby the same is shifted to one position or the other, is an actuating member consisting of vertically-swinging push rod 91 fulcrumed at 92 to a guide head or carrier 93 arranged for horizontal movement in a guideway 94 formed in a support 95 disposed in the rear of the switch-frame 82. Each push rod is located directly in rear of its companion switch lever and is adapted to engage the rear end of the same above or below the axis of its fulcrum 81. In order to bring the push rods of each column to their proper position above or below the pivotal axis of the corresponding switch levers, a plurality of ver-

tically-movable selector bars 96 are provided which are guided on the front face of the support 95 and which contain a series of openings 97 through which the free ends of the push rods extend. It is to be noted that there are as many selector bars as there are stop keys and that there are as many push rods in a row as there are switches. Each selector bar is held normally in its lower position by a spring 98 applied to the lower end thereof, while its upper end terminates in a stop flange 99 adapted to abut against the lower and upper faces of a horizontal groove 100, formed in a rail 101 secured to the top of the support 95, for limiting the downward and upward movements of the selector bar, respectively. In the lowered position of the latter, the column of push rods associated therewith act to shift the companion switch levers to their "off" position, as shown by full lines in Fig. 4, when the guide heads 93 are projected forwardly, while in the elevated position of said bar, the push rods assume the proper position to shift such switch levers to their "on" position, as shown by full lines in Fig. 7, when said guide heads are actuated.

Each of the guide heads 93 and selector bars 96 is actuated by electro-pneumatic mechanism controlled by the combination piston 49 and stop key 10, respectively. The mechanism for actuating the guide-head corresponding to a given combination piston preferably comprises a wind chest 102 containing an electromagnet 103 which operates a disk valve 104 that supplies air from the wind chest through a passage 105 to a pneumatic 106, which in turn actuates a valve 107 controlling the supply of air from said wind chest to a passage 108 leading to a pneumatic 109 normally collapsed by a spring 110, said last-named pneumatic being connected to the guide head by links 111, 112, joined to the arms of a bell crank 113 mounted on a rock shaft 114. One coil of this electro-magnet is connected by a wire 115 with one of the contact wires 59 on the upper master switch-head 54 which is included in the circuit controlled by the combination piston 49, while the other coil is connected by a branch wire 116 with the return wire 76 leading to the generator. Thus, when the master piston 73 is pressed to bring the upper head of the master switch into operation and the combination piston is likewise pressed, the proper circuit is established to cause the inflation of the pneumatic 109 which functions to rock the bell crank 113 and project the corresponding guide head 93 to bring its push rods into play for moving the companion switch levers 80 to their "on" or "off" position, if they are not already in one or the other of such positions. Should the switch levers, at the time, be in a position to which the push rods would

otherwise move them, they will of course remain in such position.

The mechanism for actuating the selector bars 96, whereby the selection of the particular stop keys is automatically effected without leaving the organ bench, comprises a wind chest 117 containing an electro-magnet 118 which operates a disk valve 119 that supplies air from the wind chest through a passage 120 to a pneumatic 121, which in turn actuates a valve 122 controlling the supply of air from said wind chest to a passage 123 leading to a pneumatic 124 connected by a link 125 with the lower end of the corresponding selector bar. This electro-magnet is included in the circuit controlled by the stop key 10, one of its coils being connected by a wire 126 to the corresponding contact wire 59^a on the upper reversible switch-head 54, the other coil being connected by a branch wire 127 with the generator return wire 76. Thus, when the master piston 73 is pressed to bring the upper head of the reversible switch into operation and the desired stop key is drawn, the proper circuit is established to cause the inflation of the pneumatic 124, which acts to elevate the corresponding selector bar and swing the push rods attached thereto to the position shown in Fig. 7, ready to be projected, when the combination piston is pressed, for moving the companion switch levers 80 to their "on" position.

From the foregoing, it will be understood; that the function of the master piston 73 is to actuate the reversible or master switch-heads 54, 55 which establish or break two separate and distinct circuits controlled by the stop keys and the combination pistons, each stop key being electro-pneumatically connected with a selector bar 96 and each combination piston 49 being similarly connected with a row of push rods 91 which actuate the switch levers 80 for controlling the on and off machine. It will also be understood that for each stop key on the console there are as many switch levers, and push rods on the combination board, arranged one above the other, as there are combination pistons. In the diagrammatic arrangement of the invention shown in Fig. 1, only one complete unit has been illustrated for the sake of clearness. This is, a combination piston is shown connected with a particular push rod and companion switch lever, and a single stop key is shown controlled by such combination piston, while in practice, a single combination piston may control a plurality of stop keys desired for a given combination.

The operation of the mechanism is as follows:

In the ordinary playing of the organ, the stop keys may be manually drawn at will in the usual manner. When a stop key is

so drawn, the stop key arm 13 bridges the contacts 14, 15 and an electric circuit is established including the wire 50, spreader terminal 46^a and the corresponding bronze strip 44^a, contact wire 60^a on the lower switch head 55 which is normally "on," wire 79^a to the stop action magnet 79^a, wire 79^b, and thence over the return wire 76, generator 52, and feed wire 51 to the contact 15.

10 Assume that the stop key 10, together with other stop keys, is to be coupled to the combination piston 49, identified as No. 1, so that at a predetermined point in the playing of a given selection, the selected stop keys will be automatically drawn by simply pressing such combination piston. First, press the master piston 73, which as heretofore described, actuates the master switch, moving its lower switch head 55 out of contact with the bronze strips 44, 44^a and its upper switch head 54 into contact therewith. Second, while holding the master piston, draw the stop keys desired to be included in the combination. The drawing of each stop key closes a circuit including the wire 50, spreader terminal 46^a, strip 44^a, contact wire 59^a on the upper switch head, and wire 126 to magnet 118, thereby inflating the pneumatic 124 and elevating the corresponding selector bar 96 together with the push rods 91 connected therewith to the piston shown by dotted lines in Fig. 4, wherein the free ends of said push rods are above the pivotal axes of the companion switch levers 80. Third, while still holding the master piston, press the particular combination piston 49 desired, in this instance No. 1, which establishes a circuit including the wire 47, spreader terminal 46, bronze strip 44, contact wire 59 on the upper switch head, and wire 115 to the magnet 103 of the combination board, thereby inflating the pneumatic 109 and shifting the row of push rods coupled therewith to the projected position, shown in Fig. 7. The projection of those push rods, which were previously elevated by the selector bars coupled with the drawn stop keys, causes the companion switch levers 80 to be rocked downwardly bringing their metallic arms 80^a into engagement with the corresponding "on" contacts 86 of said switch levers, as shown in Fig. 7. Fourth, return the drawn stop keys to their initial position and release the master piston and combination piston. In this way the complete combination is set without the necessity of the organist leaving his bench and by the one operation of pressing the combination piston while the master piston is held.

Assume now, that the organist has reached the place in his selection where he wants to throw into play the combination of stops previously selected. He simply presses the

particular combination piston coupled with the desired stop keys and the latter will be automatically drawn. The pressing of the combination piston establishes a circuit including the wire 47, spreader terminal 46, bronze strips 44, contact wire 60 on the lower switch head 55 which is now in its normal or "on" position, wire 77 to the magnet 32 of the combination machine, thereby inflating the pneumatic 38 and bringing its metallic bars 40 into engagement with the block-contacts 41, from which the current passes over wire 85 to the switch arms 80^a which are at this time engaged with the "on" contacts 86. The circuit then continues over wire 89 to the "on" magnet 24 of the on and off machine which becomes energized, causing the inflation of the corresponding pneumatic 17 and moving the stop keys to their drawn position.

Any of the switches 80 which happen to be in their "on" position at the time of setting a given combination of stop keys and which are not supposed to be included in such combination will be automatically shifted to their "off" position the moment the particular combination piston is pressed. That is, if certain stop keys are not drawn during the setting of a combination, their selector bars 96 are likewise not actuated and the moment the combination piston including the chosen stop keys is pressed the corresponding push rod supporting head 93 is projected forwardly and those switch levers 80, which happen to be "on", either remain in such position if the corresponding key has been selected or are shifted to "off" position, should they not already be in such position, if their corresponding stop keys have not been selected.

When it is desired to set all the switch levers 80 of the combination board in their "off" positions, it is merely a matter of putting all the stop keys up, pressing the master piston 73, and all the combination pistons 49. This will place the adjustable combination mechanism in correct position for making new selections or combinations.

I claim as my invention:—

1. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism arranged for connection with said actuating devices for controlling desired stop-combinations, an electric circuit including said actuating devices and said combination mechanism and selecting switches in said circuit for coupling said combination mechanism with said actuating devices, said selecting switches being controllable from the organ bench and governing the stop key actuating devices.

2. In an electropneumatic organ, the

combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism arranged for connection with said actuating devices for controlling desired stop-combinations, an electric circuit including said actuating devices and said combination mechanism, shiftable switch members in said circuit independent of but operatively connected with the stop key actuating devices and the combination mechanism for governing the movements of the stop-keys, and means controlled from the organ bench for operating said shiftable switch members.

3. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices, a plurality of electric circuits including the actuating devices and the combination mechanism, switches in said circuits movable to "on" and "off" positions for governing the corresponding movement of the stop keys, and means controllable from the organ bench and independent of said actuating devices and said combination mechanism for automatically operating said switches.

4. In an organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism arranged for connection with said actuating devices for controlling desired stop-combinations, shiftable means connecting said combination mechanism with said actuating devices for governing the latter, and means operated from the organ bench and under the control of the combination mechanism and the stop keys for operating said shiftable means.

5. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, adjustable mechanism operatively connected to said actuating devices for selectively controlling the movement of a predetermined combination of stop keys, a combination piston controlling the stop key actuating devices, and automatic means under the control of the stop keys and said combination piston for setting the adjustable mechanism to effect the simultaneous drawing of such stop key combination when said piston is operated.

6. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, shiftable members controlling said actuating devices, a combination mechanism connected with the stop key actuating devices through said shiftable members, a combination piston for said mechanism, means for actuating said shift-

able members, and a master control device connected with said stop keys and said combination piston for governing the actuating means of said shiftable members.

7. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, shiftable members controlling said actuating devices, a combination mechanism connected with the stop key actuating devices through said shiftable members, a combination piston for said mechanism, means for actuating said shiftable members, a master control device for governing said actuating means, said device being connected to said stop keys and said combination piston, and a master piston connected with said control device for actuating it.

8. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices, a plurality of electric circuits including the latter and said combination mechanism, shiftable members forming parts of said circuits for selectively controlling the movement of a predetermined combination of stop keys, a combination piston adapted to close said circuits for rendering the stop key actuating devices operative, means for actuating said shiftable members, and an electrical control device for said actuating means connected to said stop keys and said combination piston.

9. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices, a plurality of electric circuits including the latter and said combination mechanism, shiftable members forming parts of said circuits for selectively controlling the movement of a predetermined combination of stop keys, a combination piston adapted to close said circuits for rendering the stop key actuating devices operative, electrically-operated mechanism for actuating said shiftable members, electric circuits connecting said mechanism with the stop keys and said combination piston, and switches for separately controlling said first- and last-named circuits, one of the switches being on when the other is off and vice versa.

10. In a combination stop mechanism for musical instruments, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices, a combination piston, an electrical circuit including each of the aforesaid elements, switch arms in said

circuit connecting the stop key actuating devices with the combination mechanism for selectively controlling the movement of a predetermined combination of stop keys, and means for setting said switch arms from the organ bench, comprising electro-pneumatically operated devices for moving said switch arms to their "on" and "off" positions, a second circuit therefor, a master switch included in said first- and second-named circuits for rendering said electro-pneumatically operated devices operative when said stop keys and said combination piston are successively actuated and a master piston for controlling said master switch, the latter being constructed to separately control the first- and second-named circuits, respectively.

11. In a combination stop mechanism for musical instruments, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices, a combination piston, an electrical circuit including each of the aforesaid elements, switch arms in said circuit connecting the stop key actuating devices with the combination mechanism for selectively controlling the movement of a predetermined combination of stop keys, electrically operated mechanism for actuating said switch arms, a second electrical circuit connecting said mechanism with the stop keys and the combination piston, and a switch for separately controlling said first- and second-named circuits, said switch including two switch-heads alternately movable to one or the other of two operative positions, one switch-head controlling the circuit including the stop keys, combination mechanism, combination piston and stop key actuating devices, and the other switch-head controlling the circuit including the stop keys, combination piston, and switch-arm actuating mechanism.

12. In an organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, controlling means for said actuating devices, and mechanism controllable from the organ bench for operating said controlling means to their "on" and "off" positions, said mechanism including movable members arranged to engage said controlling means for moving them to one position or the other, and selecting means connected with said movable members for setting them in a predetermined position preparatory to effecting their operative movement.

13. In an organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, shiftable members movable to one or the other of two positions for controlling said actuating devices, adjustable means co-

operating with said shiftable members for governing their movement, and selecting means controlled by the stop keys for actuating said adjustable means.

14. In an organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, rock levers movable to one or the other of two positions for controlling said actuating devices, push rods arranged to engage said levers either above or below the pivotal axes thereof for rocking them in one direction or the other, and selector bars connected with said push rods for moving them in one or the other of such positions relative to said rock levers.

15. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop combinations, a piston for controlling said combination mechanism, an electrical circuit including the aforesaid elements, a plurality of switch arms in said circuit governing said actuating devices, and adjustable mechanism controlled from the organ bench for operating said switch arms, comprising push rods arranged to engage said switch arms for moving them to their "on" or "off" positions, means in said circuit and controlled by said combination piston for actuating said push rods, selecting members connected with said push rods for setting them in position preparatory to being actuated, and means in said circuit and controlled the stop keys for actuating said selecting members.

16. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop combinations, a piston for controlling said combination mechanism, an electrical circuit including the aforesaid elements, a plurality of pivoted switch arms in said circuit governing said actuating devices, and adjustable mechanism controlled from the organ bench for operating said switch arms, comprising push rods arranged in rear of said switch arms for engagement therewith, said rods being fulcrumed for movement in the plane of the switch arms for bringing their ends opposite the latter on one side or the other of their pivots, a plurality of shiftable selector bars disposed between said switch arms and said push rods and connected with the latter for adjusting them to one position or the other, and means in said circuit and controlled by the combination piston and the stop keys for actuating said push rods and said selector bars, respectively.

17. In an electro-pneumatic organ, the

combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a piston for controlling said combination mechanism, an electrical circuit including the aforesaid elements, a row of pivoted switch arms in said circuit governing said actuating devices, and adjustable mechanism controlled from the organ bench for operating said switch arms, comprising a cross head arranged in rear of and guided for movement toward and from said row of switch arms, rods fulcrumed on said cross head for engagement with the switch arms on one side or the other of their axes whereby they are moved to their corresponding "on" or "off" positions, the switch arms and rods in such row corresponding in number to the stop keys, a plurality of shiftable selector bars interposed between the switch arms and the cross head and constituting guides for said push rods for moving the latter to one position or the other, and means in said circuit and controlled by the combination piston and the stop keys for actuating said cross head and said selector bars respectively.

18. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements, a plurality of rows of switch arms in said circuits for governing said actuating devices, there being as many rows of switch arms as there are combination pistons and as many switch arms in each row as there are stop keys, means for engaging the switch arms of a row for shifting them to their "on" or "off" positions, means in said circuits and controlled by the combination pistons for actuating said shifting means, a plurality of selecting devices each operatively connected to a column of said switch arm-shifting means for setting the latter in a predetermined position, and means in said circuits and controlled by the stop keys for actuating said selecting devices.

19. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements, a plurality of rows of switch arms in said circuits for governing said actuating devices,

there being as many rows of switch arms as there are combination pistons and as many switch arms in each row as there are stop keys, cross heads arranged in rows opposite the corresponding rows of switch arms, shiftable rods carried by said cross heads and adapted for engagement with the corresponding row of switch arms for moving them to their "on" or "off" positions, means in said circuits and controlled by the combination pistons for actuating said cross heads and their rods toward and from said switch arms, a plurality of parallel selector bars, one for each stop key, each operatively connected with one of the shiftable rods of a row, and means in said circuits and controlled by the stop keys for actuating said selector bars.

20. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements and each separately controlled by the stop keys and the combination pistons, a plurality of rows of switch arms for governing said actuating devices included in the circuits of said combination pistons, selecting devices for controlling the setting and movement of said switch arms to their "on" or "off" positions, said selecting devices being included in both the stop key and combination piston circuits, and a master control switch in said circuits for rendering the stop key and combination piston circuits both operative in one position thereof, and for rendering only the combination piston circuits operative in its other position.

21. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements and each separately controlled by the stop keys and the combination pistons, a plurality of rows of switch arms for governing said actuating devices included in the circuits of said combination pistons, selecting devices for controlling the setting and movement of said switch arms to their "on" or "off" positions, said selecting devices being included in both the stop key and combination piston circuits, a master control switch in said circuits for rendering the stop key and combination piston circuits both operative in one position thereof, and for rendering only the combination piston circuits operative in its other position.

tion, and electro-pneumatic means for operating said master switch, said switch being normally in position for rendering the combination piston circuits operative.

22. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements and each separately controlled by the stop keys and the combination pistons, a plurality of rows of switch arms for governing said actuating devices included in the circuits of said combination pistons, selecting devices for controlling the setting and movement of said switch arms to their "on" or "off" positions, said selecting devices being included in both the stop key and combination piston circuits, a master control switch in said circuits for rendering the stop key and combination piston circuits both operative in one position thereof, and for rendering only the combination piston circuits operative in its other position, said master switch including two sets of fixed contacts connected to the stop keys and combination pistons, respectively, and two switch-heads alternately movable into and out of engagement with said fixed contacts, said switch heads having corresponding sets of contacts, the contacts of one switch-head being electrically connected to the organ stops and to the combination mechanism, and the contacts of the other switch-head being electrically connected to the selecting devices.

23. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a plurality of combination pistons for said mechanism, a plurality of electrical circuits including the aforesaid elements and each separately controlled by the stop keys and the combination pistons, a plurality of rows of switch arms for governing said actu-

ating devices included in the circuits of said combination pistons, operating members for moving the switch arms to their "on" and "off" positions, selecting devices for controlling said operating members, said operating members and said selecting devices being included in the circuits of the combination pistons and stop keys, respectively, a master switch in said circuits having two sets of fixed contacts connected to the stop keys and combination pistons and two switch-heads operatively connected to each other and alternately movable into and out of engagement with said fixed contacts, said switch-heads having corresponding sets of contacts, the contacts of one switch-head being electrically connected to the organ stops and to the combination mechanism, and the contacts of the other switch-head being connected to said switch arm operating members and said selecting devices, and a master piston for controlling the movement of said master switch, the latter being normally in position for rendering the combination piston circuits operative.

24. In an electro-pneumatic organ, the combination of a plurality of stop keys, actuating devices for moving them to their "on" and "off" positions, a combination mechanism connected with said actuating devices for controlling desired stop-combinations, a piston for controlling said combination mechanism, an electrical circuit including the aforesaid elements, a row of pivoted switch arms in said circuit for governing said actuating devices, the rear ends of said switch arms having portions extending above and below their pivotal axes, push rods arranged in rear of said switch arms for engagement with their rear portions and capable of adjustment above or below the axes thereof, means in said circuit and controlled by said combination piston for actuating said push rods in a direction to move said switch arms to their "on" or "off" positions, selecting means for adjusting said push rods relative to the rear portions of said switch arms, and means in said circuit and controlled by the stop keys for actuating said selecting means.

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