H. T. DEPUE.

COMBINATION ACTION FOR ORGANS.

APPLICATION FILED OCT. 31, 1916.

1,349,820.

Patented Aug. 17, 1920.

2 SHEETS—SHEET 1.

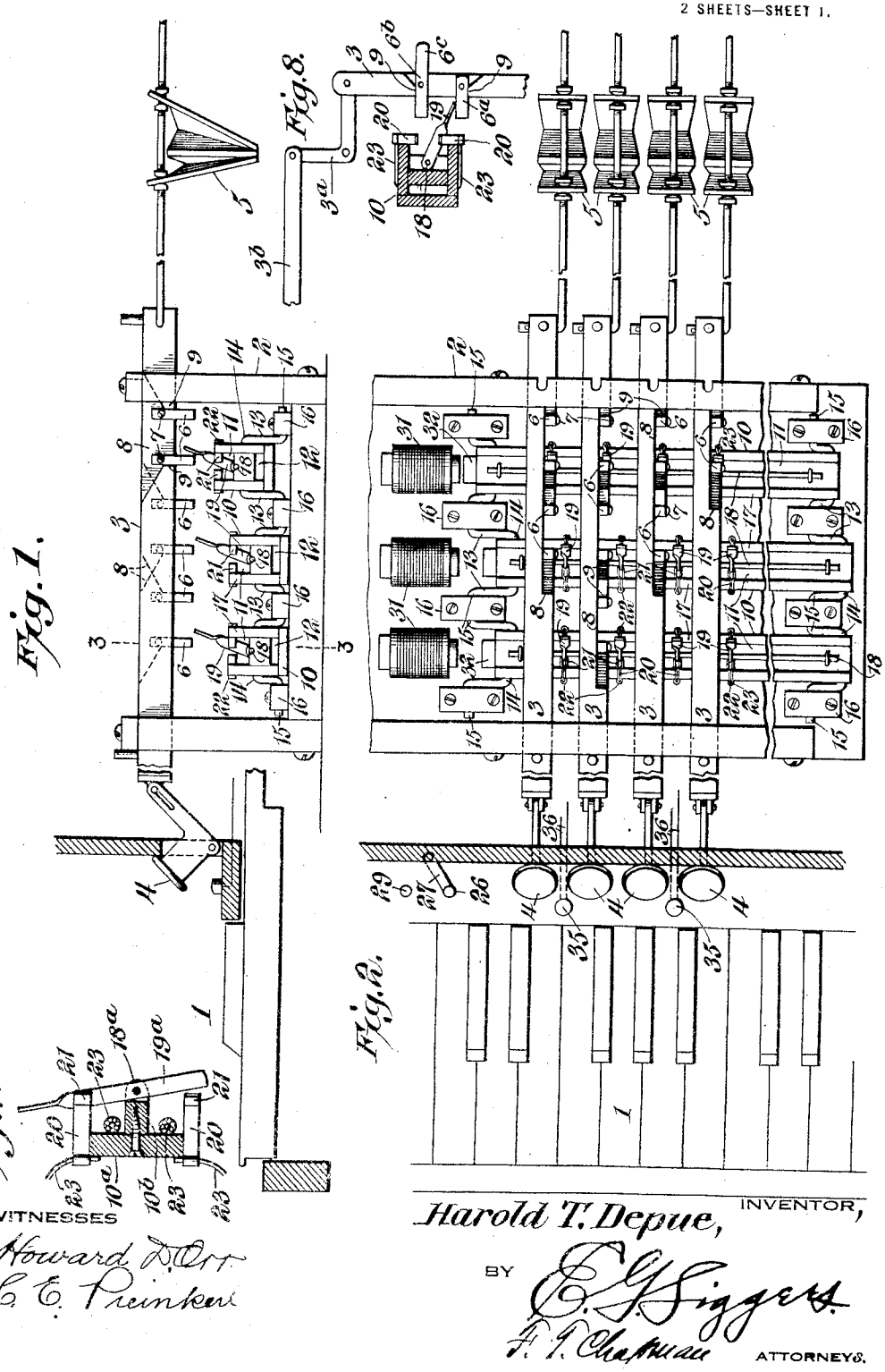


Fig. 1.

Fig. 8.

Fig. 2.

Fig. 7.

WITNESSES

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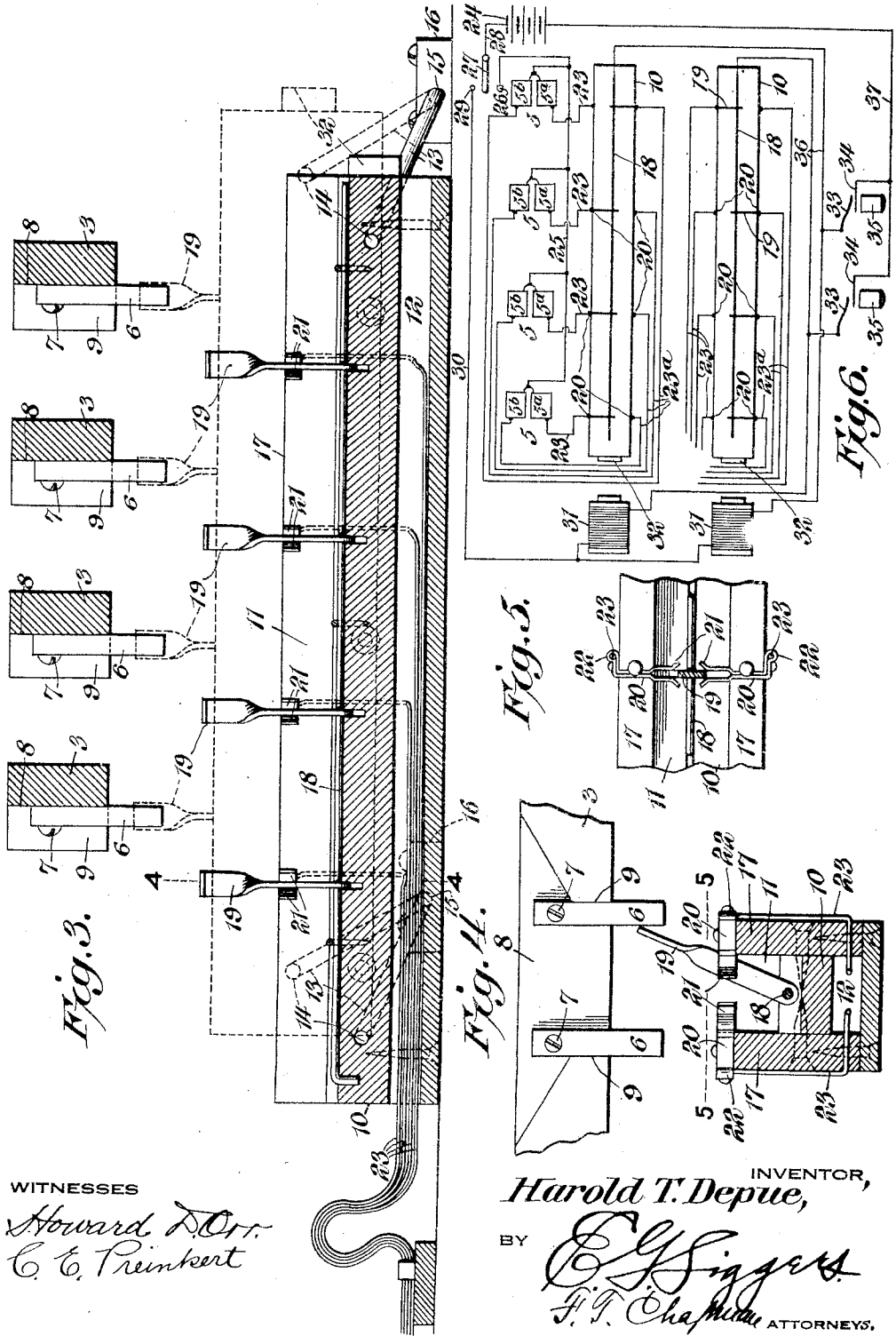


Fig. 3.

Fig. 6.

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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COMBINATION-ACTION FOR ORGANS.

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To all whom it may concern:

Be it known that I, HAROLD T. DEPUE, a citizen of the United States, residing at Kensington, in the county of Montgomery and State of Maryland, have invented certain new and useful Improvements in Combination-Actions for Organs, of which the following is a specification.

This invention has reference to combination-actions for organs, and particularly of the type of organs known as electric organs.

The object of the invention is to simplify the action to a minimum number of parts, and thereby minimize or practically eliminate all liability of failure of the combination to properly operate.

In combination-actions in practical use there is a large amount of intermediate mechanism between the setter action and the devices, usually called motors, which actually move the organ stops themselves.

In accordance with the present invention there are as many groups of electric switches as may be necessary to provide the desired number of combinations. These groups of switches, because the switches of each group are associated to operate in whole or in part as a combination unit, are termed gang switches. The gang switches are under the direct control of the customary tablets or draw stops without the necessity of any intermediate mechanism or devices except what may be directly mounted on the draw bars or traces of the stop-setter-action. These switches each control certain devices called motors which in turn actuate the stops, whether such motors be electric or electro-pneumatic in construction and operation because of the elimination in greater part or minimizing of the intermediate mechanism or devices there is a corresponding minimizing and a practical elimination of liability of failure of some portion of the combination to operate, for great difficulty has heretofore been experienced in providing a combination action in which there is not the liability of some portion failing to properly work at a critical movement.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications come within the scope of the appended claims.

In the drawings:

Figure 1 is an end elevation of mechanism of the present invention making up a part of a combination action, certain other parts of the organ action being indicated partly in section.

Fig. 2 is a plan view of the arrangement of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1, but drawn on a larger scale.

Fig. 4 is a section on the line 4—4 of Fig. 3.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a diagram illustrating the electric connections.

Figs. 7 and 8 are detail views of modified forms.

Referring to the drawings there is shown a manual 1 of an organ, and this manual may be considered as part of a console containing as many manuals as desired.

Mounted in a suitable support or framework 2, which may be of any desired construction, are stop rods or traces 3 forming part of the stop setter action and varying in number and arrangement in accordance with the particular organ. Each trace 3 is under the control of a tilting tablet 4, or of a knob or of any manual device employed in organs for operating the stop setter actions, by which term couplers are intended to be included for simplicity of description. Each trace 3 is under the control of an actuating device 5 by which the trace may be moved out or in without manipulation of the tilting tablet 4 or other such member. The device 5 is customarily termed a motor, and so far as this invention is concerned such motor may be a pneumatically-operated device controlled electrically or it may be an electric device of any suitable form, such devices being common in either pneumatic or electric organs, or combinations of the two, and hence no particular description or specific showing of the device 5 is deemed necessary. The device 5 as shown in Figs. 1 and 2 and indicated in Fig. 6, is a double-acting device capable of moving the trace 3 either out or in. The structure of this device has nothing

to do with the present invention, which only demands that the motor 5 have the capabilities mentioned.

Each trace 3 carries one or more pendent one-way tappets 6, which in the particular construction illustrated in the drawings comprise relatively short pendent strips each hung from a pivot screw or pin 7 and lodged in a cut-away portion or recess 8 in the particular trace 3. Each tappet 6 is mounted to freely swing in one direction from a pendent position, but is held from swinging in the other direction by a shoulder 9 at one end of the recess 8. The tappets 6 are arranged in pairs spaced apart a suitable distance in the direction of the length of the respective trace 3 and capable of swinging on axes perpendicular to the length of the trace, so that each tappet will swing in a plane lengthwise of the trace 3. Each trace 3 may carry one or more pairs of opposed tappets 6, and these tappets perform a function which will hereinafter appear.

Mounted below the traces 3, but in coactive relation thereto, is a suitable number of gang switch carriers 10. Since in organ construction many of the parts are made of wood, each carrier 10 may also be made of wood in the form of a suitably elongated strip with longitudinal channels 11, and 12. Each carrier 10 is mounted near the ends on rocker arms 13, as shown in Figs. 1, 2 and 3, one end 14 of each arm being pivotally connected to a respective carrier and the other end 15 of each arm being pivotally mounted in a block or support 16, or in any suitable fixed part of the organ structure. The arrangement of the rocker arms 13 is such that when the carrier is moved in the direction of its length each end moves through an arc described about the axis of the pivot end 15 of the respective arms 13, so that a carrier when moved from a lower position of rest to a higher position moves both in the direction of the length of the carrier and through a rising arc. The arms 13 and the extent of travel of the carriers 10 are so related that when a carrier is moved to its elevated position it always has a normal tendency to drop back to the lower position by gravity.

Each channel 11 has side walls 17. Extending lengthwise through each channel 11 is a rod 18 which may be made of a metal wire since the rod 18 is utilized as an electric conductor, as will hereinafter appear.

Mounted upon the rod 18 so as to swing crosswise of the carrier are switch arms 19 which may be in the form of flat strips of metal pivoted on the rod 18. In the path of each switch arm 19 at the extremities of its movement are clips 20 terminating in spring fingers 21 so associated as to receive the switch arm 19 between them after the manner of an ordinary knife switch. Each clip may be conveniently made of a strip of sheet metal appropriately bent upon itself to constitute the body of the clip and the opposed spring fingers 21, and the intermediate portion of the strip may then be formed into an eye 22 to receive and hold one end of a conductor 23. A carrier 10 may be provided with as many switches 19 as are desired. There are, of course, an appropriate number of conductors 23, and these may be located within the channel 11 and carried out through one end thereof in the form of a bundle or cable. The conductors 23 may be of small gage and therefore a bundle of conductors is relatively quite flexible and sufficiently flexible to avoid interference with the easy movement of the carriers 10 on their pivot supports.

The tappets 6 are so related to the switches 19 that when a gang switch carrier 10 is elevated the switch arms 19 are in the path of the tappet 6. Now, if under such conditions a rod or trace 3 be moved lengthwise one or the other of the tappets 6 will engage the switch arm 19. If the movement be such that the side of the tappet toward the corresponding shoulder 9 be the one engaging the switch arm, the tappet 6 will simply ride idly over the switch arm and drop to the other side thereof. If the switch arm be so related to the tappet that the latter engages the switch arm on the side remote from the corresponding shoulder 9, then the tappet will move the switch arm on its pivot until it is carried away from the particular clip with which it was in engagement and is moved into engagement with the opposite clip 20. By this means the switch arms may be readily set into engagement with one or the other of the pair of clips belonging to it by corresponding movements of the stop rods or traces, but this occurs only when the respective carriers 10 are lifted away from their normal lowered position, so that the switch arms are in the path of one or the other of the tappets 6 of the respective pairs thereof.

The circuit connections have in most part been omitted from Figs. 1 to 5, but are shown in the diagram of Fig. 6 where the mechanical parts are in the main illustrated diagrammatically rather than structurally.

While any suitable source of electric current may be employed, whether such source be in the form of a battery or a suitable dynamo-electric generator, or street current be utilized, there is shown in Fig. 6 a battery 24, which is to be taken as indicative of any suitable current source. The conductors 23 leading from one of each pair of clips 20 are each connected up to one side 5^a of a respective motor 5, while the conductors leading from the other clips 20 of the pairs of clips, and for differentiation designated as conductors 23^a, each lead to

the other side of the motor 5, designated 5^b in Fig. 6. These motor members 5^a and 5^b may be of the electric type or the electric-pneumatic type, neither of which is indicated in detail in the drawing, because of their known construction. In Fig. 6 the two members 5^a and 5^b of the motors 5 are schematically indicated by simple rectangles. Each motor member 5^a and 5^b is connected on one side to a common conductor 25 leading to a switch contact 26 in the path of a switch arm 27 connected by a conductor 28 to one side of the current source 24. In the path of the switch arm 27 is another contact terminal 29 connected by a conductor 30 to electromagnets 31 designed to actuate the carriers 10, and for this purpose the latter may each have at one end an armature 32 within the field of influence of the respective magnet 31. Here, again, electro-pneumatic motors may be employed instead of electromagnets, and since both forms of motor devices are well known in the organ art, no particular showing or description thereof is deemed necessary. Each magnet 31 has its other side connected to a respective one of contact terminals 33 having other contact terminals 34 associated therewith and under the control of push buttons 35, which in the organ art are customarily known as pistons. The respective terminals 33 are connected by corresponding conductors 36 to respective rods 18 of the switch carriers 10. The contact terminals 34 controlled by the pistons 35 are connected to a common return conductor 37 in turn connected to the other terminal of the current source 24.

When it is desired to set one or more of the combinations the switch arm 27 is moved into engagement with the contact 29, thus coupling the magnets 31 up to the current source 24 so far as the switch arm 27 is concerned. Now, a suitable one of the pistons 35 is manipulated, thus closing the circuit between the corresponding terminals 33 and 34. The appropriate one of the magnets 31 is thus energized and a corresponding carrier 10 is drawn from its normal lowered or drop position to the elevated or active position. If the stop knobs or tablets 4 be manipulated so as to insure that all the switch arms 19 be in one position in the carrier 10, then the knobs or tablets it is desired should be included in the combination are drawn out, whereby all the switches 19 corresponding to such stop knobs are moved from the first position into engagement with those clips 20 on the opposite side of the carrier, the remaining switches staying in the first position. Now, the particular piston 35 first manipulated and held to maintain the switch carrier 10 in the elevated position is released, whereupon the switch carrier 10 drops to the lower position out of the way of any of the tappets on the traces associated with such carrier 10. The same operation is performed with respect to such other gang switches as it is desired should be set to provide for combinations.

After all the combinations have been set, and these combinations may include both the ordinary stops and couplers, the switch arm 27 is moved from the contact 29 and either allowed to remain in the open position until needed, or moved directly on to the contact 26. If, now, an appropriate one of the pistons 35 be moved to close the corresponding contacts 33 and 34, there is established a circuit which may be traced from the current source 24 through the conductor 37, contacts 33 and 34, and by way of an appropriate conductor 36 to the corresponding rod 18, and thence by way of the switch arms 19 to one side 5^a or the other side 5^b of the respective motors 5, and by way of the return conductors 25 again to the current source 24. The result is that those sides of the motors 5 included in the circuit are all energized and the stop rods or traces 3 if not already in the position to which they would be moved by the respective motor elements, are so moved, so that the stops which it is desired should be included in the combination are all simultaneously moved to the active position.

Suppose that in the course of the rendition of a piece of music another combination is desired. Then another one of the pistons 35 is moved to close the corresponding circuit and another grouping of stops is brought about, and as the second set combination may include the same stops as the first combination, but with the motors coupled up differently to produce the second combination, some of those stop knobs or tablets which have been projected will be withdrawn and others which were previously in the withdrawn position will be projected.

The presence of the combination action does not in any manner interfere with individual use of the stop knobs or tablets and they may be drawn out or pushed in, as desired.

In the showing of Figs. 1 and 2 it is assumed that the action is arranged for three combinations with as many stops as desirable and, moreover, the parts are shown in position where one gang switch is ready for the manipulation of the stop tablets to set a desired combination on the gang switch. If more than one combination is desired then another one or more of the gang switches is subsequently elevated and arranged to provide the desired combination.

In Fig. 6 the assumption is that there are two gang switches, although, of course, any number may be employed. These gang switches are assumed to embrace the same

stops and the switches 19 of each gang switch are connected to the same motors 5.

Suppose, now, that after the desired combinations have been set it is desired to play the organ, but not with the particular combinations controlled by the set gang switches. The stop knobs or tablets may be manipulated in the usual way. This does not affect the gang switches, since they are out of the path of the stop rods or traces. If in the course of the playing of the organ it should become desirable to employ the particular combinations for which the gang switches are set, an appropriate one of the pistons 35 is pushed in to close the circuit at the terminals 33 and 34 until the motors 5 have been energized and have actuated the respective stops in the proper directions. In this way those stop knobs which may have been pulled out in the preliminary playing, but are not included in the combination, are drawn back and those stop knobs which are not already out but are included in the combination are projected. When one of the other combinations is desired the appropriate piston 35 is pushed and the new combination becomes active.

The entire action is marked by extreme simplicity of construction.

Each stop or coupler has two automatic operating means, one to move the stop rod or trace out and the other to draw it in. There are as many gang switches as there are combinations to be made, and each gang switch has a motor and piston or push button for moving it into setting or resetting position, that is, into operative relation to the stops. Each gang switch has the same number of individual switches as there are stops and couplers in the manual to which it belongs. In the case of more comprehensive arrangements, which in some instances may include the whole organ, there are as many individual switches as there are stops and couplers in the entire instrument.

When many gang switches are to be used, it is advisable to make them as narrow as possible, so that they may occupy a minimum floor space. For this purpose the structure shown in Fig. 7 is advantageous. In such structure the carrier comprises a body strip 10^a with another strip 10^b at about midway and carrying a conducting rod 18^a on which a gang of double-ended switch blades 19^a are mounted. Also mounted on the carrier are switch terminals 20 like those already described and in the path of the opposite end portions of the blades 19^a. Otherwise the structure may be the same as described with reference to the preceding figures of drawing.

Where the space to the rear of the console is too limited to permit the gang switches to be arranged as shown in the preceding figures, the switches may be set, as shown in Fig. 8, in an upright series with the stop rods 3 also arranged upright and connected by bell crank levers 3^a to other rods 3^b controlled by the tablets or knobs 4. In such case the tappets 6 are replaced by other tappets 6^a and 6^b, the tappets 6^a being similar to the tappets 6, while the tappets 6^b have extended or counterweighted ends 6^c for holding said tappets 6^b in a horizontal position against the corresponding shoulders 9. The operation of the structure of Fig. 8 is the same as that of Fig. 1 and associated figures and requires no special description.

What is claimed is:—

1. A combination action for electric or electro-pneumatic organs provided with a stop-setter action, groups of associated electric switches and means for moving each group as a whole into and out of operative relation to the stop setter action for the selective actuation of the switches by said stop setter action.

2. A combination action for electric or electro-pneumatic organs having stop setter actions, comprising groups of associated electric switches with each group movable as a whole into and out of operative relation to the stop setter action for the selective actuation of the switches by said stop setter action, electrically controlled motive means for the stop setter action, electric connections from the switches of the groups to said motive means, and circuit controlling means common to all the switches of a group.

3. A combination action for an electric or electro-pneumatic organ, comprising a stop setter action and electrically controlled motive means for said stop setter action, a gang switch provided with as many individual switches as there are stops to be controlled by said gang switch, setting means on the stop setter action for directly actuating the individual switches of the gang switch, electric connections between each individual switch of the gang switch and a corresponding motive means for a stop, and circuit closing and opening means common to all the circuits between the individual switches of the gang switch and the corresponding motive means for the stop setter action.

4. A combination action for electric or electro-pneumatic organs comprising stop-setting devices and motive means therefor, a gang switch including a group of switches movable into and out of operative relation to a group of stop-setting devices, said switches having contacts and connections therefor to the motive means for the stop setting devices for moving each device in one direction when the switch is on one contact and in the other direction when the switch is on another contact, and means on each stop-setting device for actuating a respective individual switch of the gang switch

when the latter is in operative relation to the stop setting device.

5. A combination action for an electric or electro-pneumatic organ, provided with manually operable stop setting devices each having motive means for moving the stop into or out of active position, electric means for causing the actuation of the stop setting devices in one direction or the other and comprising a gang switch having individual switches and contacts therefor with connections to the motive means for the stop setting devices to cause the latter to be actuated in one or the other of the two directions of movement, means on the stop setting devices for actuating the switches of the gang switch, and circuit-controlling means for causing the simultaneous energization of all the motive means connected to the gang switch.

6. A combination action for electric or electro pneumatic organs having stop-setting devices, and electrically controlled motive means for the stop setting devices, a gang switch including a group of switches mounted to move into and out of operative relation to a group of stop setting devices and having contacts individual to the switches, connections between the contacts and respective motive means for the stop setting devices, and means on the stop setting devices for engaging the switches when the gang switch is in operative relation to the stop setting devices to move the switches into engagement with one or the other of the contacts individual thereto.

7. A combination action for electric or electro-pneumatic organs having stop setting devices and electrically controlled motive means for the latter, a gang switch including a plurality of switches and mounted to move into and out of operative relation to a group of stop-setting devices and provided with contacts individual to the switches, connections between the contacts and respective motive means for the stop setting devices, and means on the stop setting devices for engaging the switches when the gang switch is in operative relation to the stop setting devices to move the switches into engagement with one or the other of the contacts individual to the respective switches, the gang switch having a normal tendency to move out of operative relation to the stop setting devices, and means for moving the gang switch into operative relation to the stop setting devices.

8. A combination action for electric or electro-pneumatic organs having stop setting means with electrically controlled motive means for moving the stop setting means on or off, a group of switches corresponding in number to a chosen group of stop setting means, a mounting for the switches for moving the group of switches bodily into and out of operative relation with the stop setting means, and means on the stop-setting means for actuating the switches when in operative relation to the stop setting means into position to control the motive means for the stop setting means.

9. A combination action for electric or electro-pneumatic organs having stop setting devices and electrically controlled motive means for moving the stop setting devices on or off, a group of switches corresponding in number to a chosen group of stop setting devices, a mounting for the group of switches, electrically controlled means for moving the mounting into position to bring the group of switches into operative relation to chosen stop setting devices, and means on the stop setting devices for actuating the switches when in operative relation thereto into position to control the motive means for said stop setting devices.

10. A combination action for electric or electro-pneumatic organs having stop setting devices and electrically controlled motive means for moving the stop setting devices on or off, a group of switches corresponding in number to a chosen group of stop setting devices, a carrier for the group of switches, electrically controlled means for moving the carrier into position to bring the group of switches into operative relation to chosen stop setting devices, and means on the stop setting devices for actuating the switches when in operative relation thereto into position to control the motive means for said stop setting devices, said combination action also including switch means common to all of the first-named switches for simultaneously closing the circuit therethrough to the motive means for the stop setting devices.

11. A combination action for electric or electro-pneumatic organs having manually controllable stop-setting means and provided with electrically controlled motive means for moving the stop setting means on and off, a group or gang of switches and a carrier therefor with each switch having two contacts associated therewith and into engagement with either of which the switch is movable, said contacts being connected to the motive means for controlling the latter, means on the stop setting means for causing the actuation of the switches to establish a combination, means for bodily moving a gang of switches into operative relation to the stop setting means to permit the setting of the combination, said carrier being movable to another position out of operative relation to the stop setting means, and a switch common to all the group or gang of switches for closing the circuits through the switches to the motive means, whereby a set combination may be made effective directly through the stops.

12. A combination action for electric or electro-pneumatic organs having stop setting means with electrically controlled motive means therefor, comprising as many gang switches as the greatest number of combinations to be established at any one time, each gang switch comprising a group of switches and a carrier therefor movable into and out of operative relation to a chosen group of stop-setting devices, each individual switch of a gang switch having a pair of contacts connected to a motive means for a corresponding stop setting device to cause the projection or withdrawal of said device in accordance with the contact with which the switch is in engagement, electrically controlled means for moving each gang switch into operative relation to a respective group of stop-setting devices, with the gang switch having a normal tendency to move out of operative relation to said stop setting devices, circuit-controlling means for including the electrically controlled means for moving the gang switch or the motive means for actuating the stop setting devices, and circuit controlling means for establishing electric circuits for the actuation of the first-named circuit controlling means.

13. A combination action for electric or electro-pneumatic organs having manually controlled stop setting devices each provided with electrically controlled motive means for the projection or retraction of said stop setting devices, gang switches in number corresponding to the number of combinations for which the organ is designed, each gang switch comprising a carrier with as many individual switches thereon as there are stops in the group for which the gang switch is adapted, each individual switch of the gang switch having a pair of contacts into engagement with either of which the individual switch is movable, electrical connections from each contact to a respective one of the motive means for the stop setting devices, a mounting for the carrier on which it may be moved into operative relation to a corresponding group of stop setting devices from a position out of operative relation thereto, electrically controlled means for effecting the movement of the carrier to bring the gang switch into operative relation to the stop setting devices, one-way devices on each stop setting device for engaging respective switches of the gang switch, and circuit connections to the electrically controlled actuating means for the gang switch carriers and to the motive means for the stop setting devices.

In testimony whereof I have affixed my signature in the presence of two witnesses.

HAROLD T. DEPUE.

Witnesses:
JOSEPH KISS,
L. FRED KLOOZ.