Nov. 22, 1927. 1,650,555

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ELECTRICAL CONTROLLING MEANS FOR ORGANS

Filed Jan. 25, 1924 2 Sheets-Sheet 1

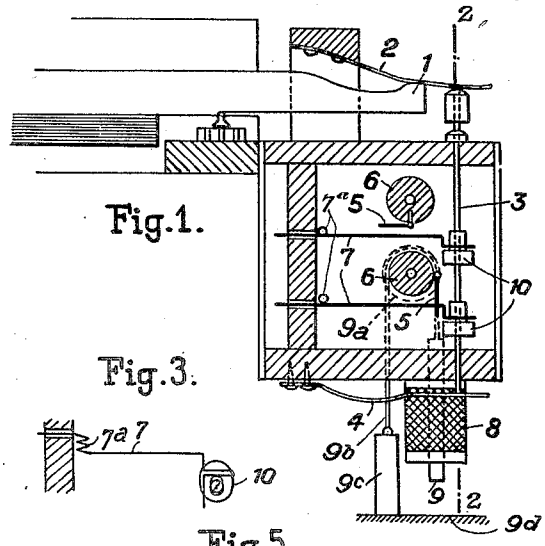


Fig.1.

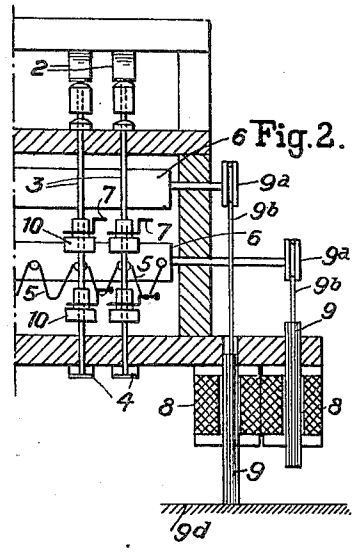


Fig.2.

Fig.3.

Fig.5.

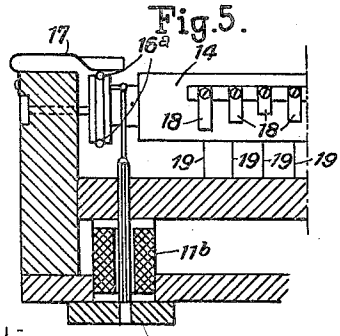
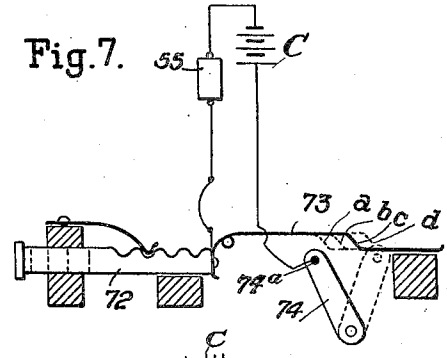


Fig.7.



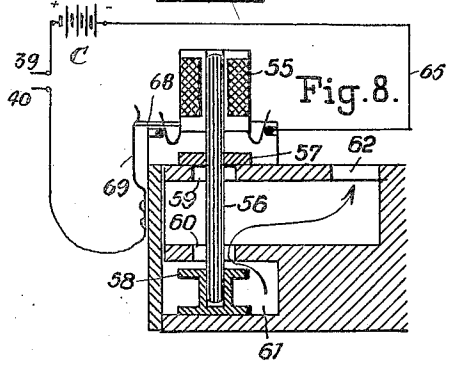


Fig.8.

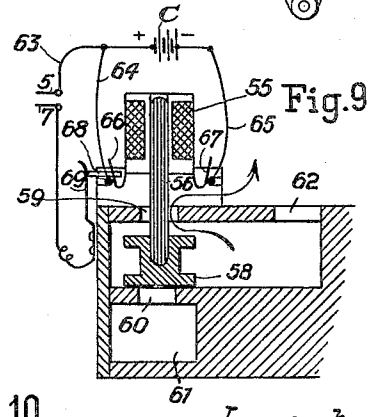


Fig.9.

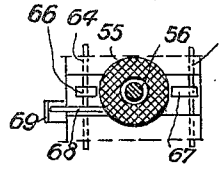


Fig.10.

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Fig.4.

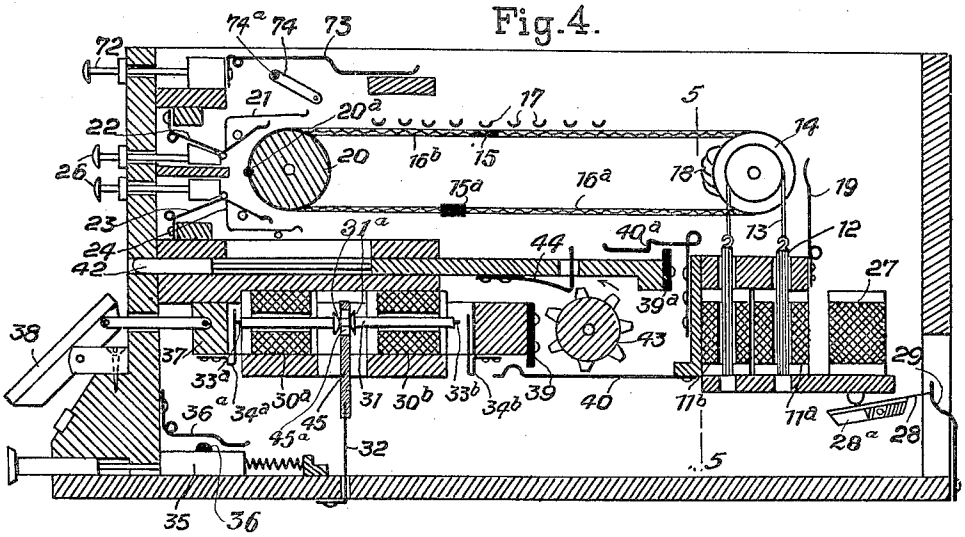
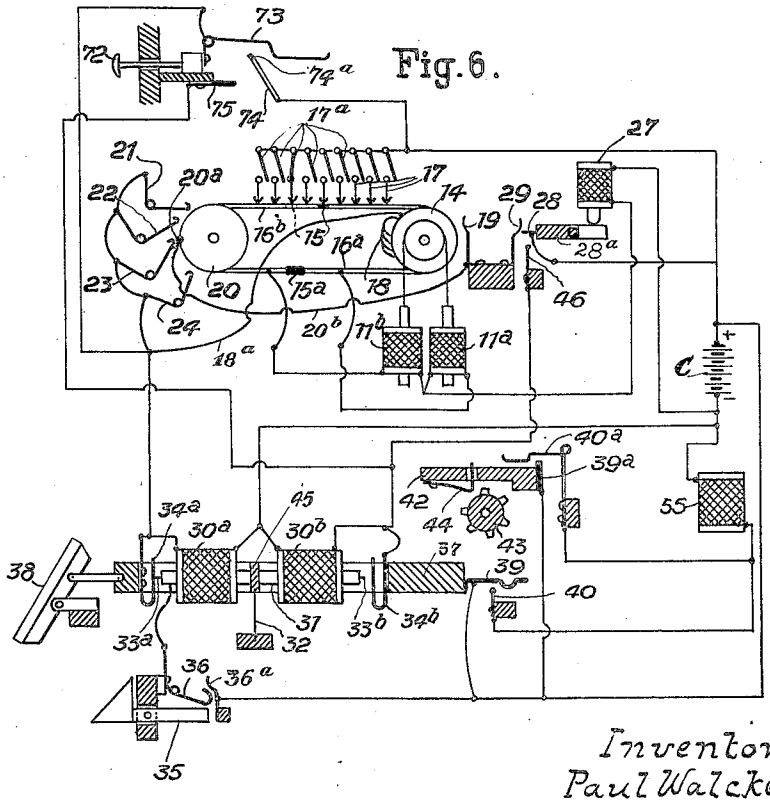


Fig.6.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL CONTROLLING MEANS FOR ORGANS.

Application filed January 25, 1924, Serial No. 688,482, and in Germany January 23, 1923.

This invention relates to electric organ controllers. A feature of the invention resides in the fact that instead of magnets of the type ordinarily used solenoids are employed which are arranged in such a manner as to enable them to be operated or energized by alternating currents. The motion of the solenoid core is utilized for the operation of contacts and for moving various organ control members such as valves, couplers and combinations.

By employing solenoids which draw in a core for operating contacts and moving members of valves, couplers and combinations in the organ, the particular advantage is obtained that the energizing current is enabled to cause an operating member to execute a comparatively large travel. This large travel renders it possible to employ in a novel manner rubbing contacts made of cheap metal. Furthermore it is possible by utilizing two solenoids in the register control mechanism for instance to set a member at will into any one of several positions. Another advantage of the solenoid is that it enables a valve to be produced which can be indirectly or directly controlled with the aid of alternating current. It also enables control mechanism to be produced for indirectly operated valves particularly for large valves of air. The solenoids can be provided in accordance with the invention with an anti-sparking resistance which may be wound in the form of a non-inductive coil on the solenoid.

The invention is illustrated by way of example in the drawing in which

Fig. 1 is a section of a tone-key controller.

Fig. 2 is a section of Fig. 1 on the line 2—2.

Fig. 3 is a top view of a detail from Fig. 1.

Fig. 4 is a section of a stop controller in which solenoids are employed for setting various combinations.

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

Fig. 6 is a wiring diagram of the stop controller of Fig. 4.

Fig. 7 illustrates a device for setting fixed combinations.

Fig. 8 shows a valve for controlling air passages which is directly controlled by the solenoid core.

Fig. 9 shows a similar valve for compressed air chambers.

Fig. 10 is a top view of a solenoid according to Figs. 8 and 9.

Fig. 1 shows the end 1 of a key arranged to lift a spring 2, 3 are tracker pins which are effected both by the top springs 2 and the bottom springs 4, 5 is a common return wire which is fixed to a coupler shaft 6, 7 are contact springs with loops 7^a, the short ends near the loops being fixed in a wall and the other ends resting on screw nuts 10 whose positions on the tracker pins are adjustable. The loops 7^a in the contact springs 7 enable their free ends to be easily moved in all directions. 8 are solenoids whose cores 9 are attached to cords 9^b or the like which pass over rolls or pulleys 9^a. The other ends of the cords are loaded by counter weights 9^c. The weight of a solenoid core is larger than that of its counter weight so that, as long as a solenoid is not energized, its core 9 rests upon a support 9^d. When a solenoid is energized its core 9 is lifted and the counterweight 9^c turns the associated pulley 9^a and therefore also the coupler shaft 6 upon which the common return wire 5 is mounted. When a coupler shaft 6 is set for a controlling operation as indicated by the lower shaft 6 in Figs. 1 and 2, the return wire 5 is in a position in which on the motion of the tracker pin 3 the contact spring 7 adjacent to the set bowed return wire 5 rubs against the latter, the spring being then deflected laterally by the bow that it rubs against. The distance between the springs 7 and a return wire 5 which is set for operation can be regulated by the insulated nuts 10. The lateral pressure of the contact spring against the return wire while rubbing against the latter ensures an intimate contact, the closure of the contact and opening of the same taking place at different parts of the bow. By this arrangement it is possible to use cheap metal instead of precious metal for the contacts. Besides with contacts of this type it is not absolutely necessary to employ spark extinguishing devices. These contacts serve for closing the circuits of electric tune relays, see for example Fig. 9, while the circuits of the solenoids 8 can be closed like those of the register relays.

In Figs. 4, 5 and 6 two solenoids 11^a and

11^b are shown, the cores 12 of which exert a pull on a cord or rope 13. The cores balance each other and are adapted to rotate by means of the cord a drum or barrel 14 into different positions. 20 is a second drum or barrel similar to barrel 14. The two drums are connected by an endless chain or the like built of spring coils, so as to get a firm contact with the drums, whereby the chain will travel to and fro and rotate drum 20 when the drum 14 is rotated by energizing one of the solenoids 11^a and 11^b. The endless chain consists of two parts 16^a and 16^b electrically insulated from each other by means of insulating members 15 and 15^a. Part 16^a of the chain is electrically connected with the beginning of the winding of the solenoid 11^a (Fig. 6) while the other part 16^b is in a similar connection with the beginning of the solenoid winding 11^b. The ends of the windings of the two solenoids are joined and connected with the cathode of a battery C. Arranged to rub against the conductors 16^a and 16^b are contacts 17 the rubbing surfaces of which are more narrow than the insulating members 15 and 15^a. Each of these contacts 17 forms one pole of a series of switches the counter poles of which are connected with the positive pole of the battery. On the drum 14 a series of contacts 18 are arranged side by side having different length as shown in Fig. 5 and being connected with each other and with the ends of solenoid-windings as afterwards described. The contacts 18 are adapted to come into touch with contacts 19 (Figs. 4 and 6) on the rotation of the drum 14. These contacts 19 are connected to one pole 29 of a contact 28, 29, the counter pole 28 being in electrical connection with the positive pole of the battery C.

The drum 20 bears a contact-bar 20^a extending over the whole of its length and having an electrical connection with the contact pole 29 as indicated by the wire 20^b Fig. 6, the ends of which may be secured to the bar 20^a and the contact pole 29 respectively. 21—24 are contact-poles each being under the action of a spring and adapted to be brought by means of a key-member 26 on the front of the stop-board out of the path of the contact-bar 20^a while in their normal position they are adapted to come into touch with the contact bar 20^a when the drum 20 is rotated.

In the drawings two key members 26 which act on the contacts 22 and 23 are shown. The number of these contacts is at will. The number of the contact poles 17 and switches 17^a correspond to the sum of the contacts 18 on the drum 14 and that of the movable contacts 21—24. A separate null-contact still to be described is arranged. The contacts 21—24 are connected by means of the wire 18^a with the above mentioned contacts 18. The contact pole 28 is arranged on a double acting lever 28^a being under the action of the core of a solenoid 27 in such a manner that the lever will rotate under the influence of its overweight at one side, when the solenoid 27 is energized and the core is lifted, so as to disconnect the contact 28 from the contact part 29. 30^a and 30^b are solenoids, and 31^a common core of these solenoids. This core penetrates a slot 45^a of a part 45 Fig. 4 which by means of a spring 32 is connected to the housing of the stop controller so that by means of projections 31^a on the core 31 the spring restores this core to its normal or central position when the solenoids are not energized. The width of the slot 45^a corresponds to the diameter of the core 31, its length being such as to allow the part 45 to make an oscillation around the fixed point of the spring on the housing. A plurality of such pairs of solenoids 30^a, 30^b are arranged side by side corresponding to the number of solenoids 55. The core 31 of each two solenoids 30^a, 30^b is provided with two pins 33^a and 33^b. A left point 33^a of the core is shown in touch with the contact-pole 34^a of a slidable member 37. This contact-pole is connected with the beginning of the winding of the solenoid 30^a with which the contacts 21—24 are also connected. The ends of the windings of the solenoids 30^a and 30^b are connected with the cathode of the battery. The beginning of the winding of the solenoid 30^b is connected with a second contact 34^b of the slidable member 37 and with a fixed contact pole 46 which forms another counter pole for the above mentioned contact pole 28 when the solenoid 27 is energized. The core 31 of the two solenoids is in electrical connection with a contact pole 36 which is adapted to be pressed by means of a key 35 usually called changing key against a counter pole 36^a which is in electrical connection with the positive pole of the battery C. The slidable member 37 is provided with a step-key 38 arranged at the front of the stop-controller housing and also adapted to move the slidable member 37. At its opposite end the slidable member is provided with a contact pole 39, being in electrical connection with the positive pole of the battery C and adapted to engage a contact spring 40 which through the winding of a stop solenoid 55 is in electrical connection with the cathode of the battery C. 43 is a crescendo-barrel which is adapted by means of projections arranged in staggered relation over the length of the barrel to act upon elastic hooks 44 of slidable members 42 arranged side by side so as when being turned to move the latter from the right to the left. Each of the slidable members 42 of which a member may be provided which corresponds to the number of the members 37 is provided

at one end with an indicating part which is adapted to step out of the front housing of the stop controller when the sliding members are moved from the right to the left, enabling the organ player to see which of the different slidable members 42 are moved by the crescendo roll 43. At the opposite end the slidable members 42 are provided with a contact pole 39^a which is electrically connected with the positive pole of the battery. By moving the sliding member by means of the crescendo roll 43 the contact pole 39^a comes into touch with the contact pole 40^a which is electrically connected with the negative pole of the battery through the windings of a stop solenoid 55. The number of solenoids 55 preferably may be the same as the number of slidable parts 37.

73 is one of a row of contact springs arranged side by side and movable by means of stop pulls 72. As shown in Fig. 6 the springs 73 are electrically connected with the negative pole of the battery in a similar manner as the contact poles 21—24. The turnable bar 74 is at its upper end provided with a contact bar 74^a or the like which is electrically connected with the positive pole of the battery and adapted by turning of the bar 74 to come into touch with the contact spring 73. 75 (Fig. 6) is a yielding contact-pole which is arranged in the way of the contact-bar 74^a and adapted to come transitorily into touch with the said contact bar. The contact pole 75 is connected to the beginning of the winding of the solenoid 30^b. As many parts 72, 73, 75 preferably are provided as there are solenoids 55 in the organ.

In Fig. 8 55 is a solenoid whose core 56 carries a disk 57 and rests upon a double acting valve member 58. 59 is an opening between the pipe air channel and the external air. 60 is an opening between the wind trunk 61 and the pipe air channel. The opening 62 leads to an extension of the pipe channel. When the solenoid 55 is energized the core 56 is raised and communication is then established between the pipe or channel and the external air while the connection between the wind trunk 61 and the pipe air channel is closed due to the valve member 58 being pressed upward by the wind. As the valve member 58 is loose on the end of the solenoid core slight up and down movements of the latter do not effect the member 58. Such slight up and down movements of the core may arise when alternating current is used for energizing the solenoid. The device in Fig. 8 thus represents a flow out relay.

In the arrangement according to Fig. 9 parts corresponding to those of Fig. 8 have similar reference numerals. In this figure the part 58 is a double acting valve between the opening 60 that connects the wind trunk 61 with the pipe air channel and the opening 59 that connects the pipe or channel with the exterior air. The double acting valve 58 is held by the solenoid core 56 in the position shown against the wind in the wind trunk. When the solenoid core is attracted the double acting valve is pushed up and closes the opening between the pipe air channel and the external air. In this modification the double acting valve is also independent of vibrations of the core 56. The arrangement shown in this figure is a pressure air valve which may be used for example to transfer the effect of the circuit closure of parts 5, 7 in Figs. 1 and 2 to the wind chest.

The arrangements of Figs. 8 and 9 may be used either for controlling registers or tunes although in the former figure a register control is shown.

Figs. 9 and 10 illustrate the simple manner in which a solenoid can be inserted into its position in the circuit. This is accomplished by means of the contact springs 66 and 67. The latter connects the solenoid to the common return 65 and the former connects a non-inductive resistance which is wound on the solenoid while the lead for the solenoid coil is connected by means of the parts 68 and 69.

The device works as follows:

The stop solenoid 55 is able to be energized by a range of different means. Firstly the sliding member 37 is manually movable by means of the key member 38 to close the contact 39, 40. The restoring in this case may also be worked by hand.

Secondly one of the above mentioned switches of the contact poles 17, f. e. as shown in Fig. 6 the third switch 17^a from the left, may be closed, with the result, that the current flows from the battery over this contact pole 17, chain 16^b, solenoid winding 11^b, and solenoid-winding 27 back to the battery. The solenoid 11^b is energized and rotates the drum 14 until the insulating part 15 meets that contact part 17, whose switch 17^a is closed. In this moment the insulating part 15 interrupts the current energizing the solenoid 11^b. At the same time with the closing of the switch 17^a the solenoid 27 is energized and disconnects the contact 28, 29 hereby closing the contact 28, 46, so that all solenoids 30^b, in the following called: "restoring solenoids" are energized. This has the effect that, owing to the moving of their respective sliding members 37 from the left to the right, all contact poles 39 and 40 which possibly had been brought into touch, are disconnected.

The rotation of the drum 14 has the result that the drum 20 also rotates until f. e. the contact bar 20^a is adapted to touch the contact pole 23, if this pole is set by means of its key 26. In the latter case the following circuit is closed: + pole, contact 28, 29,

wire 20^b, contact bar 20^a, contact pole 23, winding of the solenoid 30^a — pole of the battery C. The energizing of the solenoid 30^a effects a movement of the core 31 from the right to the left and the core 31 takes with it by means of its point 33^a touching the contact part 34^a the slidable member 37. Hereby the contact part 39 comes into touch with the contact part 40 so as to close the circuit of the solenoid 55.

In the case that the fifth switch 17^a from the left was set, the drum 20 had been rotated to a point where its contact bar 20^a may come into touch with the contact pole 21. Corresponding to each solenoid 55 one series of contact poles 21—24 may be provided, the total of the contact poles 21, 22, 23 and 24 respectively being arranged each in a horizontal row. Hereby the organ player is enabled at his will to prepare a plurality of stop combinations by setting a certain number of contact poles in each said rows. By switching on the fifth switch 17^a from the left the stop-combination, which formerly had been prepared in the row of the contact-poles 21, is thrown on. By switching the third switch 17^a from the left, the stop combination, prepared in the row of the contact poles 23, will be thrown on. The organ player every moment is enabled to alter the different stop-combinations by adding or subtracting stops.

The above mentioned disconnection of the contact 28, 29 prevents that during the rotation of the drum 20, contacts 21—24 which possibly were set and therefore come into touch with the contact bar 20^a, effect the energizing of the respective setting solenoids.

Thirdly: In case the eighth switch 17^a from the left is switched on, the like circuit as above mentioned, is closed and a rotation of the drums 20 and 14 takes place. The insulating member 15 now travels from the left to the right until it strikes the eighth contact 17 from the left. Now the contact bar 20^a of the drum 20 is outside the reach of the contact poles 21—24 while the contact springs 18 of the drum 14 come into touch with the contact poles 19. These contact poles being of different length, (Fig. 5) a greater or smaller number of contact poles 18 will come into touch with the respective poles 19 according to the degree of the rotation of the drums. During this rotation the above mentioned disconnection of the circuit of the setting solenoids takes place by energizing the solenoid 27. After the drums are come to a stillstand owing to the meeting of the insulating member 15 with the contact pole 17 switched on, the circuits of the respective setting solenoids are closed as above described. The setting solenoids each of which is connected to one contact pole 18 effect the moving of their sliding members 37 and the switching on of the contacts 39, 40. This device may serve for the controlling of fixed or crescendo combinations. According to the position of the contact 17 switched on, more or less of stop-combinations are throw on.

Fourthly:

The stop solenoid 55 may also be energized by turning the member 74. In its movement the contact part 74^a always strikes against the fixed flexible contact 75. In this moment all restoring solenoids 30^b are energized so that by means of the contact between the poles 73 and 74^a every time before the setting solenoids are energized, stops, which are not wished to sound, are thrown off during the movement of the member 74. The same effect i. e. the throwing on of all restoring solenoids takes also place in the return movement of the member 74.

Fig. 7 illustrates more especially an arrangement similar to that represented by the parts 72—74 in Fig. 4. In this modification the pull 72 can be set into different positions so that the spring 73 also goes into different positions *a*, *b*, *c*, *d*. The pivoted lath 74 is also arranged to be turned into different positions, this being preferably accomplished by means of a device similar to that shown in Fig. 4 for the rotation of the drums 14 and 20. The contact springs 73 which have been pulled into position *a* corresponding to the fixed combination "pianissimo" therefore first come into engagement with the contact bar 74^a connected to the pivotal member 74. On further turning the bar the group of those contact springs 73 are added which are pulled into position *b* and then the group of contact springs pulled into position *c* and *d* respectively are added. The latter position *d* corresponds to the fixed combination "fortissimo". In this manner the fixed combinations from pianissimo to fortissimo which, in themselves, may be changed in any desired manner, can be switched on in succession by one and the same device.

The changing-key 35, 36 operates as follows: By energizing a setting solenoid 30^a or moving a stop key 38 the respective slidable member 37 is moved from the right to the left and closes the contact 39, 40. Owing to this movement of the sliding member and owing to the fact, that the core 31 each time the energization of the solenoids 30^a or 30^b is interrupted, is restored to its central position by means of the spring 32. The contact between the point 33^a of the core and the contact pole 34^a of the sliding member is disconnected while the point 33^b of the core comes into touch with the contact pole 34^b of the sliding member. By setting the changing key 35 the following circuit is closed: + pole, contact 36^a, 36, core 31, contact poles 33^b, 34^b, solenoid winding 30^b, — pole. This has the effect that

one or more restoring solenoids are energized and disconnect the contact 39, 40 of their respective stop solenoids 55. The changing key automatically retakes its normal position, when released, and disconnects the contact 36, 36ª so as to open the above mentioned circuit. The core 31 is brought to its normal or central position by means of the spring 32 when the solenoids are no more energized, and its point 33ª now strikes again on the contact pole 34ª of the sliding member 37 which also has been brought into its normal position. When the changing key now is switched on, the circuits of the respective setting solenoids 30ª are closed and therewith the respective stop solenoids may be energized, the arrangement being such that the particular solenoid which was not last energized will have its circuit prepared for completion.

The restoring of the contacts switched on and of the parts, which effect this switching, may be performed e. g. in such a way that simultaneously with the restoring of the sliding members 37, which had been moved by energizing their setting solenoids, the sliding members 42 moved by the crescendo barrel 43 are brought back into a position where the contact poles 39ª and 40ª are out of touch. It may be desirable to provide means for simultaneously and quickly switching off all contacts 39, 40 and 39ª, 40ª. These means may be pivoted lathes or barrels or the like devices.

Each time when one of the switches 17ª, which corresponds to a contact pole 17, is switched off after having been switched on to effect a rotation of the drums 14 and 20, a null contact, f. e. the first contact 17 and switch 17ª from the left in Fig. 6 automatically may be switched on. This has the effect that the following circuit is closed: — pole, null contact, chain 16ᵇ, solenoid 11ᵇ, solenoid 27, + pole. The energization of the solenoid 11ᵇ hereby effected has the result that the drums 14 and 20 are rotated in a contrary direction until the insulating member 15 strikes upon the null contact pole 17 and opens the said circuit. Now, when a switch is switched on, the null contact automatically may be switched off.

I claim:—

1. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, means for keeping the said member in a first position, a solenoid for bringing the member from the said first position into a second position, and other means for preventing the energized solenoid from acting on the said member while the latter is in its second position.

2. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, two operating means adapted to operate the said member, a solenoid for counteracting a said operating means, and other means for temporarily making the said member independent of the influence of the said operating means counteracted by the said solenoid.

3. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, two operating means adapted to operate the said member, a solenoid core adapted to serve as one of the said operating means, a solenoid for drawing in the said core, and other means for making the said member independent of the influence of the core when it is drawn in by the solenoid.

4. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, two solenoids each with a core, the cores being adapted to move the said member in opposite directions, and means for alternatively exciting the said solenoids.

5. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, two solenoids each with a core, the cores being adapted to move the said member in opposite directions, means for alternatively exciting the said solenoids, and other selective means for interrupting the movement of the cores in different predetermined positions.

6. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, a single solenoid core adapted to operate the said member in opposite directions, two means for keeping the said core in a position of rest, and two solenoids each adapted to act on the said core against a said means.

7. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, a spring, a single solenoid core adapted to operate the said member in opposite directions, the said core being kept in its position of rest by gravity and a spring, and two solenoids adapted to act on the said core against gravity or the said spring respectively.

8. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, a single solenoid core adapted to operate the said member in opposite directions, two means for keeping the said core in a position of rest, two solenoids each adapted to act on the said core against a said means, circuits for exciting the said solenoids, and a circuit closer in the circuit of each of the solenoids, a contact part of each of the said closers being movable together with the core, the other contact part of the said closers being adapted to be moved by means of the core, whereby the circuit closers are alternately adapted to close preparatorily the circuit of that solenoid which was not last excited.

9. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, a single solenoid core adapted to control the said member in opposite directions, a single means for keeping the said core in a position of rest, two solenoids each adapted to act on the said core against a said means, circuits for exciting the said solenoids, and a circuit closer in the circuit of each of the solenoids, a contact part of each of the said closers being movable together with the core, the other contact part of the said closers being adapted to be moved by means of the core, whereby the circuit closers are alternately adapted to close preparatorily the circuit of that solenoid which was not last excited.

10. In a controlling device for controlling a valve of a wind-chest of an organ, an electrically controlled member, a single solenoid core adapted to control the said member in opposite directions, means for keeping the said core in a position of rest, two solenoids each adapted to act on the said core against a said means, circuits for exciting the said solenoids, and a circuit closer in the circuit of each of the solenoids, a contact part of each of the said closers being movable together with the core, the other contact part of the said closers being adapted to be moved by means of the core, whereby the circuit closers are alternately adapted to close preparatorily the circuit of that solenoid which was not last excited.

11. In a controlling device for controlling a valve of a wind-chest of an organ, a turnable member, means adapted to turn the said member in one direction of turning, a solenoid core in combination with a solenoid, adapted to turn the said member in the other direction of turning, and other means for preventing the solenoid core from acting on the said member when the solenoid is excited.

12. In a controlling device for controlling a valve of a wind-chest of an organ, a turnable member, two solenoid cores adapted to turn the said member in different directions and to balance each other, two solenoids for moving the said cores, circuits adapted to excite one of the said solenoids at time in the circuit of each said solenoids, a first contact part, adapted to be moved by means of the said turnable member, a plurality of second contact parts each adapted to rub on the said first contact parts and singly to be thrown into a said circuit, and an insulating means between the said two first contact parts adapted to separate therefrom a said second thrown in contact part.

13. In a controlling device for controlling a valve of a wind-chest of an organ two turnable members, two solenoid cores adapted to turn a said member and to balance each other, two solenoids for moving the said cores, circuits adapted to excite one of the said solenoids at time, in a circuit of each of the said solenoids a first contact part, these contact parts being electrically isolated from each other and both adapted to be moved by means of a said turnable member, and a plurality of second contact parts, each adapted to rub on the said first movable contact parts and singly to be thrown into a said circuit, whereby the isolating position between the said first contact parts having a width exceeding the breadth of the said second contact parts.

14. In a device according to claim 1 the said member being a turnable carrier of a bowed contact of a circuit closer the other contact part of which being a shiftable part that is adapted to make contact when the said carrier is turned and itself is shifted.

15. In a device according to claim 1 the said member being a turnable carrier of a common return of a plurality of individually shiftable circuit closers.

16. In a device according to claim 1, the said member being a closing member adapted to close an opening in the said wind-chest and being in such connection with the core of the said solenoid that the gravity of the core of the not energized solenoid keeps the closing member against the wind pressure of the wind chest in its closing position.

17. In a device according to claim 1, a plurality of members, a first said member being a first closing member adapted to close a first opening in the said wind chest and being in such connection with the core of the said solenoid that the gravity of the core of the not energized solenoid keeps the said closing member in its closing position against the wind pressure of the wind chest, and a second said member being also a closing member adapted to close a second opening of the said wind chest this second closing member being held under the action of the gravity of the same not energized core in its opening position and adapted to close the said second opening solely under the action of the wind of the wind chest when the solenoid is energized.

18. In a device according to claim 1, the said member being a closing member adapted to close alternately two openings in the said wind chest and being in such connection with the core of the said solenoid that the gravity of the core of the not energized solenoid keeps the closing member against the wind pressure of the wind chest in its closing position for one of the said openings the said member being in a loose guiding connection with the said core and adapted to close the second opening under the action of the wind of the wind chest.

19. In a device according to claim 1, a plurality of members, a first said member

being a first closing member adapted to close a first opening in the said wind chest and being in such connection with the core of the said solenoid that the gravity of the core of the not energized solenoid keeps the said closing member in its closing position against the wind pressure of the wind chest, and a second said member being also a closing member adapted to close a second opening of the said wind chest this second closing member being held under the action of the gravity of the same not energized core in its opening position and adapted to close the second opening solely under the action of the wind of the wind chest when the solenoid is energized while it is in a loose guiding connection with the said core.

In testimony whereof I have affixed my signature.

PAUL WALCKER.