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1,930,613

COMBINATION ACTION FOR PIPE ORGANS

Filed April 6, 1932

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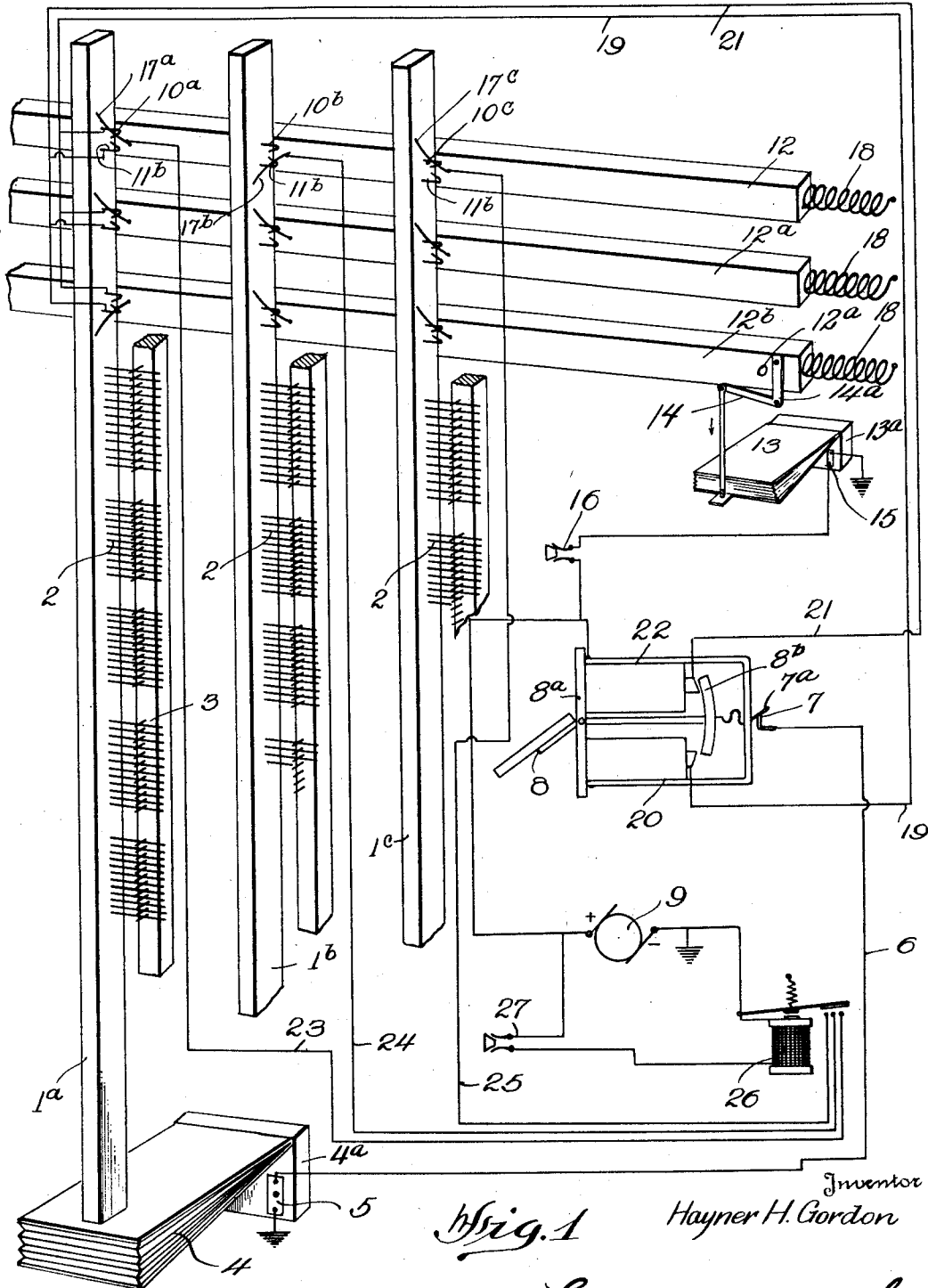


Fig. 1

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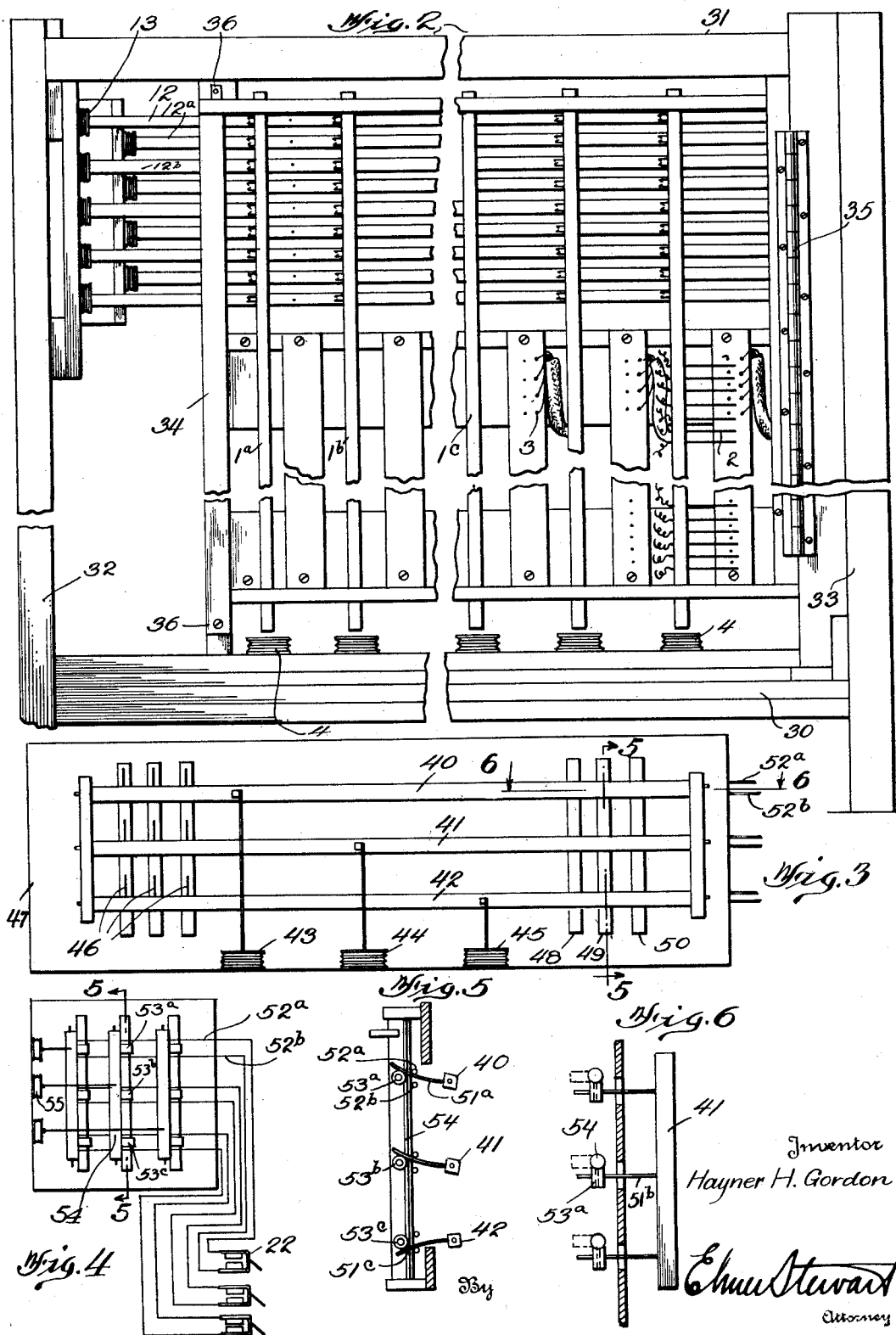
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

1,930,613

COMBINATION ACTION FOR PIPE-ORGANS

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Application April 6, 1932. Serial No. 603,629

10 Claims. (Cl. 84—345)

The invention relates more particularly to adjustable combination actions for pipe organs employing electro pneumatic or electric systems of control between the console and the organ pipes of the type in which certain stop controls and coupler controls may be selected by the organist to give any desired tonal characteristic and the group of controls so selected placed under the control of a single push button or device so that the particular tonal characteristic may be produced by the manipulation of a single control.

It is an object of the present invention to provide a simple form of adjustable combination action, which may be easily manufactured at a minimum cost.

It is a further object of the present invention to combine a combination action and unit switch action into a unitary construction thereby reducing the number of parts and structural details. Certain embodiments of my invention are illustrated in the accompanying drawings in which:—

Fig. 1 shows in diagrammatical form the electric circuits and mechanical structure of an embodiment.

Fig. 2 is a front elevational view of an embodiment comprising a combined switch and combination action of the sliding-bar type.

Figs. 3 and 4 show the front and rear views of a modification embodying the roller top of switch.

Fig. 5 is a section on the line 5—5 of Figs. 3 and 4.

Fig. 6 is a partial section along section line 6—6 of Fig. 3.

As shown in Fig. 1, the stop action comprises a series of vertical movable slide bars 1—1 each carrying the usual set of 61 contact pins 2 which cooperate with the set of fixed contact pins 3. When the bars or slides 1 are raised by a pneumatic motor 4 the movable contact pins 2 cooperate with the fixed contact pins 3 to close circuits from the keys or relays to a chest or coupler action in a manner well understood by those skilled in the art.

The pneumatic motor 4 which has its upper surface movable is controlled in the conventional manner by an action box 4a and which is under control of a conventional organ magnet, the valve plate of which is indicated by reference numeral 5. When the stop tablet 8 which is pivoted at 8a is depressed, the rear end 8b of the stop member is raised into the position shown thus depressing the rear projecting end 7a of the over-center spring into contact with the fixed con-

tact 7, thus causing current to flow from the generator 9 through the frame 22 of the stop action to contact 7 and through circuit 6 to magnet 5 operating pneumatic motor 4 to raise slide bar 1 and close the circuits to the chest action or coupler action under the specific control of stop key 8 in the conventional manner.

The slide bars 1 are extended above the bars carrying the fixed contacts 3. This extended portion of the vertical slide bars carry a series of hooked contacts 10—11, 10a—11a, 10b—11b. A series of combination bar or slide members 12a 12b, are mounted to the rear of the upper or extended portion of the vertical slide members 1a 1b. These combination slides are mounted for a sliding or axial movement in a frame not shown in order to simplify the drawings. This sliding movement is at 90° to the movement of the vertical bars or slide members 1a and 1b.

As illustrated, the combination slides are biased to the right by a series of springs such as is indicated by reference numeral 18. They are actuated toward the left by a series of pneumatic motors under the control of setter buttons or piston; only one pneumatic motor 13 and its corresponding controlling piston or button 16 being illustrated for the purpose of clarity.

The pneumatic motor 13 which has its lower portion movable is controlled in the usual manner by a conventional action box 13a having the usual magnet 15.

Pneumatic motor 13 when actuated pulls down on the left hand end of the bell crank 14 mounted on a fixed pivot at 14a. The vertical portion of the bell crank presses against a pin 12c carried by bar 12b and thus forces the bar to the left against the tension of spring 18. This action occurs when setter button or piston 16 is pressed and causes magnet 15 to become energized. The other combination bars 12 and 12a are similarly capable of a sliding movement to the left under control of the pneumatic motors and combination setter-buttons similar to the one shown connected to the slide bar 12b. Each of the horizontal slide bars, or combination of bars, carry a series of resilient contact wires or members 17a, 17b, 17c, each one of these adapted to cooperate with a pair of hooked contacts carried by the vertical slide bar. These resilient contact members 17a, 17b, 17c are so mounted at such a position on the combination bars so that when the same are in normal position to the right which is maintained by tension springs such as shown at 18, they are engaged by one of the pair of cooperating hooked contacts to such an extent that they are some-

what flexed or biased and, therefore, tend to remain in an electrical contacting relationship with the particular hooked contact member irrespective of the vertical movement to off or on position of the vertical slide bar which carries the hooked contact members. More specifically, as shown in the drawings, the resilient contact 17a is shown in an engagement with the upper contact hook 10a of vertical slider 1a, and resilient contact 17b is in a resilient engagement with the lower hook contact 11b of the vertical slide member 1b, and they will remain in this engagement irrespective of any vertical movement of the slider bars 1a and 1b as long as the combination bar 12, which carries resilient contact numbers 17a and 17b, remains in the position shown in which it is biased to the right by means of the spring member 18. If, however, any of the combination bars 12a or 12b are moved to the left by actuation of a combination setter-button such as 16 in the manner illustrated as the pneumatic motor 13 illustrated connect with the bar 12b, such movement will free the resilient contacts 17a, 17b and 17c from any of the hook contacts that they may be engaged in, and upon the release of the corresponding combination setter-button the combination slide bar under its control again assumes its normal position to the right causing the series of resilient contact members carried thereby to engage the particular series of hooked contacts which are at that time in a favorable position for such an engagement. This position of the hooked contacts will be controlled by the position of the vertical slide member which carries the hooked contacts. For instance, if it is assumed the vertical slide member 1a is raised and the stop controlled thereby is in "on" position and the combination setter-button which actuates the combination slide bar to the left is momentarily pressed, the flexible contact 17a will be carried out of engagement with the hooked contact 10a, and when the combination slide 12 again moves to its normal position to the right, the flexible contact 17a will then become engaged with the lower hooked contact member 11b of this pair where it will remain irrespective of the subsequent movements of the stop slide bar 1a.

As illustrated in connection with the stop slide member 1a, all of the upper hook contacts are connected in parallel to a common lead or conductor 19 which is connected to the off-magnet 20 of the stop control device on the console. Similarly the bottom hook contact members are all connected in parallel by the circuit 21 to the on-magnet 22 of the stop action which controls the stop slide bar 1a. All of the flexible contacts carried on any one of the horizontal combination slide members, are connected for simultaneous energization by a relay, one relay being provided for each of the combination slide members as shown by the flexible members 17a, 17b, 17c which are connected through conductors 23, 24, and 25, to relay contacts which are simultaneously closed when the magnet 26 of the relay is energized by means of the combination button 27. It will, therefore, be seen that when button 27 is energized the electric current will be supplied to flexible contact 17a as this is shown in engagement with the upper contact 10a which is connected through conductor 19 with the off-magnet of the stop action 8. The stop tablet will accordingly be moved to the off-position thus opening the stop contact 7 and thereby causing the stop slide member 1a to move to the off-position due to the open circuit through conductor 6 and the

consequent ceasing of operation of the pneumatic motor 4. In a similar manner all stop slide bars which have their upper hooks engaged by the resilient contact members carried on the combination bar 12 and which are energized by combination button 27, will be returned to the off-position, if they are on, while any stop slide bars which have their lower contacts engaged will be automatically moved to the on-position.

While the stop control device 8 is illustrated with a direct electrical action for moving it to on-or-off-position, it is to be understood that the same result would be accomplished where electro-pneumatic action is used for this purpose.

In summation it may be stated that the manipulation of any combination setter-button such as 16 which produces a releasing of the resilient contact members carried by a corresponding horizontal combination slide member and their re-engagement to a new series of hooked contact members dependent upon the positioning of the vertical stop slide members existent at that time, will, in fact capture the stop combination or tonal characteristics on at that time, and such combination of tonal characteristics may at any subsequent time be reproduced by an actuation of the relay under control of a combination button functioning to simultaneously energize the entire set of flexible or resilient contacts carried by that particular combination slide member.

While the system just described as illustrated in Fig. 1, affects all of the stop slide members through a medium of a single relay actuated by a combination piston the same may be modified to use a double touch piston, or two pistons, to actuate two relays one of which will cause energizing of one set of hook contacts and the other relay causing energization of the second set of hooked contacts, both of the relays being connected to flexible contacts maintained on the same combination slide member. By such modification a combination of stops or tonal characteristics including pedal stops and couplers may be captured or engaged, and by the initial manipulation of the combination piston only the normal stops will be affected, or on further depression of the piston the second relay connected thereto will be energized and the pedal stops or couplers will be affected.

While the structure diagrammatically shown in Fig. 1, described above, is of the type in which the stop-action and combination-action are combined and the stop slider bars possess the dual function of operating the stop-switch mechanism and the combination setting mechanism, it should be understood that the present invention can be used, irrespective of such combined or dual function. In this latter case the vertical sliding bars shown in Fig. 1, will merely carry the hook contact members alone, and in such modification these bars would be operative by electro-pneumatic means or could be located in the console and be mechanically operated from the stop tablets or knobs themselves. As a matter of fact the present invention could be utilized in a console in which slider bars 1a, 1b, 1c, of Fig. 1 are mechanically connected and moved by stop knobs or tilting tablets or their equivalent, and the combination slides 12a and 12b of Fig. 1, could be mechanically connected to the pistons and operated thereby.

Fig. 2 illustrates in greater detail the structural arrangement or location of parts of a combined stop and combination action, such as has been diagrammatically shown in Fig. 1. In this

embodiment a fixed rectangular frame is constructed of suitable size to be placed in the organ chamber, this frame comprising top and bottom members 30 and 31 and side members 32 and 33. An inner rectangular frame member 34 is mounted within the outer frame member by means of a hinge 35. This inner frame member carries the series of vertical sliding rod members 1a, 1b and 1c described in detail in connection with the diagrammatical Fig. 1, these rods carrying the movable contact members of the stop or coupler switches which cooperate with the fixed contacts 3 adjacent thereto when the slide bars are lifted or elevated by the pneumatic motors 4 carried on the lower member 30 of the fixed frame member and located directly under each slide bar. The inner frame 34 also carries the horizontal combination setting bars 12, 12a, 12b, et cetera, these being located at the top of the frame and having a sliding movement which is transverse to the movement of the stop slide bars. The combination setter-bars 12, 12a, 12b are operated by pneumatics 13 carried by the side member 32 of the outer fixed frame. It must be seen that when the inner frame is in the position shown in Fig. 2, both the horizontal and vertical movable slide bars are in operative relationship with the pneumatic motors which control them. By unloosening the fastening means 36, 36, which holds the inner frame in this position the same may be swung open on the hinge 35 so that convenient access may be had to the entire mechanism of the swinging frame as well as to other mechanism such as the control-chest for the pneumatic motors, relays, et cetera, that are mounted on the inside of the fixed frame and behind the movable frame, this arrangement of parts, therefore, making a simple, compact and accessible construction. The vertical slide members 1a, 1b, 1c, et cetera, carry at their upper-ends the hooked contact members which cooperate with the resilient contact members carried on the horizontal combination slider bars in the manner previously described in connection with Fig. 1.

Figs. 3, 4, 5, and 6 illustrate the invention as applied to a roller type of switch construction instead of the sliding bar type. In the front elevation of view Fig. 3, three rocking bars 40, 41 and 42 are shown operated by their respective pneumatic motors 43, 44 and 45. These rocking bars each carry the usual 61 movable contacts which cooperate with contact strips carried on a board 47 upon which the rocking bars are mounted. For simplification of the drawings but three sets of these contacts are illustrated as shown by the reference character 46. At the right hand end of the device shown in Fig. 3, the supporting board 47 is provided with three slots 48, 49 and 50. Each of the rocker bars 40, 41 and 42 has projecting from its rear resilient contact members 51a, 51b and 51c which pass through the slots as shown in the sectional illustration Fig. 5 which is taken on the section line 5-5 of Fig. 3. Each of these flexible contact elements cooperate with a pair of longitudinal members 52a and 52b mounted on the rear of the supporting board 47 a portion of which is shown in Fig. 4. Referring to Fig. 5, it will be noted that with the rocker members in off position the resilient contact members will be biased so as to make contact with the upper horizontal rear contact strips such as 52a. When any of the rocker bars 40, 41 or 42 however are actuated by their respective pneumatic motors

to close the stop contacts, which actuation would result in a counter-clockwise rotation of these bars, as shown in Fig. 5, the resilient contact members will be biased and tend to contact with the lower horizontal contact wires on the rear of the supporting board 47; these resilient contact members 51a, 51b, 51c are however normally prevented from yielding to such bias by virtue of a series of rollers 53a, 53b, 53c which hold the resilient contact members in contactual relationship with the horizontal contact bars. These series of rollers are mounted on a vertical or rotative member 54, a similar rotative member being provided to the rear of and adjacent each of the slots 48, 49, and 50 as shown in Fig. 6. These vertical rollers are operated by pneumatic motors such as 55 shown in Fig. 4, which are connected to rotate them through a rather large angle to the position shown in dotted lines in Fig. 6. By reference to Fig. 6, it will be noted that when the rocking roller 53a is rotated to the dotted line position the resilient contact member 51b will then be free and capable of assuming contact relationship with either the upper or lower rear contact wire dependent upon which way it is at that time biased by the position of the rocking switch member 40. It will therefore be evident that a momentary actuation of one of the vertical rotatable members 54 will act to release all of the resilient contact members which project through a slot adjacent that particular roller permitting them to assume the positions to which they are biased at that time and then subsequently capturing them in this position when the rollers 53a, 53b and 53c are returned to their normal locking position. As shown in Fig. 4, each set of horizontal rear contact wires or bars are connected to the on-and-off-magnets of the particular stop control device, which controls the stop control member located in front of the horizontal contact wires.

The electrical operation is the same as that which is shown in detail in Fig. 1, all the flexible contact elements which project through any given slot being connected for simultaneous energization by means of a relay and associated combination piston. When such combination piston is pressed and the associated group of flexible contact elements energized, current will be fed to the on-and-off-magnets of the stop control devices dependent upon the positions in which the flexible contact elements have been captured by the capture rollers. As this, of course, is dependent upon the position to which the resilient contact elements were biased previous to their capture, this structure thereby permits the organist to select a desired group of stops, capture them or set them as a combination by means of pneumatics such as 55 which are controlled by combination-setting pistons, and subsequently produce the tonal combination called for by this group of stops by pressing the corresponding combination piston.

It is to be understood that the present invention contemplates other modifications and embodiments than those selected for the purpose of disclosure.

What I claim is:—

1. A combination action for pipe-organs including in combination a plurality of stop-control devices each capable of either direct manual or electrically actuated movement to on or off positions, a plurality of switch bar elements operatively associated with and corresponding in number to said stop-control devices, each mov-

able under control of its associated stop-control device to an on-position or an off-position, a two-way switch operatively associated with each of said switch bar elements and comprising a resilient contact adapted for cooperation with an "off" contact or an "on" contact, dependent upon the position of the switch bar, locking means for holding said resilient contact in electrical relationship with either said "off" or "on" contact notwithstanding any bias that it may have toward the other contact, manually operated means for temporarily releasing said locking means, electrical circuits connecting said "off" and "on" contacts to a pair of electro-magnets for electrically actuating the stop-control device, associated with the particular switch bar element having said contacts associated therewith and manually operated means for electrically energizing said resilient contact to actuate said stop-control device to the "on" or "off" position dependent upon which contact is engaged by said resilient contact.

2. A combination action for pipe-organs including in combination a plurality of stop-control devices each capable of either direct manual or electrically actuated movement to on or off positions, a plurality of switch bar elements operatively associated with and corresponding in number to said stop-control devices, each movable under control of its associated stop-control device to an on-position or an off-position, a plurality of movable switch contacts mounted thereon and cooperating with a set of fixed contacts to control a set of pipes or coupler circuits, a two-way switch also associated with each of said switch bar elements and comprising a resilient contact adapted for cooperation with an "off" contact or an "on" contact, dependent upon the position of the switch bar, locking means for holding said resilient contact in electrical relationship with either said "off" or "on" contact notwithstanding any bias that it may have toward the other contact, manually operated means for temporarily releasing said locking means, a pair of electrical circuits connecting said "off" and "on" contacts to a pair of electro-magnets for electrically actuating the stop-control device, associated with the particular switch bar element having said contacts associated therewith and manually operated means for electrically energizing said resilient contact to actuate said stop-control device to the "on" or "off" position dependent upon which contact is engaged by said resilient contact.

3. A combination action for pipe-organs including in combination a plurality of stop-control devices each capable of either direct manual or electrically actuated movement to on or off positions, a plurality of parallel mounted switch bar elements operatively associated with and corresponding in number to said stop-control devices, each axially movable under control of its associated stop-control device to an on-position or an off-position, a two-way switch associated with each of said switch bar elements and comprising a resilient contact mounted on a bar transversely movable with respect to said switch bar elements and adapted for a biasing cooperation with an "off" contact or an "on" contact, carried upon and dependent upon the position of the switch bar, locking means for holding said resilient contact in electrical relationship with either said "off" or "on" contact notwithstanding any bias that it may have toward the other contact, manually operated means for temporarily

actuating said bar to release said locking means, a pair of electrical circuits connecting said "off" and "on" contacts to a pair of electro-magnets for electrically actuating the stop-control device, associated with the switch bar element having said contacts associated therewith and manually operated means for electrically energizing said resilient contact to actuate said stop-control device to the "on" or "off" position dependent upon which contact is engaged by said resilient contact.

4. A combination action for pipe-organs including in combination a stop-control device capable of either direct manual or electrically actuated movement to on or off positions, a switch bar element axially movable to an on-position or an off-position under the control of the said stop-control device, a pair of contact members fixedly carried on said switch bar element and movable therewith, said contact members comprising an "off" contact member and an "on" contact member each electrically connected to electro-magnets for actuating the stop-control device respectively to its off and on positions, a second axially movable bar element mounted for transverse movement with respect to said first mentioned bar element, a resilient contact member carried thereby and free to make contact with either of said "off" or "on" contacts when said second mentioned bar element is in one position, locking means to hold said resilient contact member in fixed relationship with said off and on contacts when said second mentioned bar element is in a second position, manually operated means for controlling the position of said second mentioned bar element, and manually operated means for electrically energizing said resilient contact to actuate said stop control device to the "on" or "off" position dependent upon which contact is engaged by the resilient contact member.

5. A combination action for pipe-organs including in combination a stop-control device capable of either direct manual or electrically actuated movement to on or off positions, a switch bar element axially movable to an on-position or an off-position under the control of the said stop-control device, a pair of contact pins having locking hooks fixedly carried on said switch bar element and movable therewith, said contact pins comprising an "off" contact member and an "on" contact member each electrically connected to electro-magnets for actuating the stop-control device to its off and on positions, a second axially movable bar element mounted for transverse movement with respect to said first mentioned bar element, a selective contact member carried thereby and normally biased into engagement with one of said locking hooks when said second mentioned bar element is in one position, and released therefrom when said bar element is in a second position, manually operated means for controlling the position of said second mentioned bar element, and manually operated means for electrically energizing said selective contact to actuate said stop-control device to the "on" or "off" position dependent upon which contact is engaged by the selective contact member.

6. A combination action for pipe-organs including in combination a stop-control device capable of either direct manual or electrically actuated movement to on or off positions, a switch bar element axially movable to an on-position or an off-position under the control of the said stop-control device, a pair of contact pins having locking hooks fixedly carried on said switch bar ele-

ment and movable therewith, said contact pins comprising an "off" contact member and an "on" contact member each electrically connected to electro-magnets for actuating the stop-control device to its off and on positions, a second axially movable bar element mounted for transverse movement with respect to said first mentioned bar element, a resilient contact member carried thereby and normally biased into engagement with one of said locking hooks when said second mentioned bar element is in one position, and released therefrom when said bar element is in a second position, manually operated means for controlling the position of said second mentioned bar element, and manually operated means for electrically energizing said resilient contact to actuate said stop-control device to the "on" or "off" position dependent upon which contact is engaged by the resilient member.

7. An electrical switch mechanism for use in pipe-organ combination systems, comprising a switch bar mechanism axially movable to either of two predetermined positions, a pair of contacts having converging hook-shaped extremities carried thereby, a second switch bar positioned at right angles to said first mentioned switch bar mechanism and axially movable from a normal position to an abnormal position, a resilient contact member so positioned thereon that when said second switch bar is in normal position, said resilient contact member is biased into continuous engagement with the hook-shaped extremity of one of said pair of contacts, and when in abnormal position said resilient contact is unbiased and free for subsequent engagement with either of said pair of contacts dependent upon the predetermined position of said first mentioned switch bar mechanism.

8. A switch mechanism for a pipe-organ comprising a combination, a fixed rectangular frame, a second rectangular frame pivotally mounted within said fixed frame, a plurality of axially movable switch bars vertically mounted for axially movement in said pivotally mounted frame, a second set of axially movable switch bars mounted for transverse movement with respect to the first mentioned switch bar in the said pivotally mounted frame, operating means for moving both sets of switch bars mounted in said fixed frame in position to cooperate with the ends of switch bars carried by said pivotally mounted frame when the latter is in a closed position.

9. In a combination switch action for pipe-organs, a pair of "off" and "on" contacts rigidly fixed with respect to each other, and both relatively movable with respect to a third resilient contact to engage the same locking means carried by said "off" and "on" contacts to hold said third contact in engagement with either one of said contacts irrespective of said relative movement, and means to release said third contact from said locking means.

10. In a combination switch action for pipe-organs, a pair of "off" and "on" contacts each comprising a straight shank and a hooked end rigidly positioned with respect to each other, and jointly movable with respect to a third resilient contact member, means normally biasing said resilient contact into the hooked end of said "off" and "on" contacts and means for releasing said bias and moving said resilient contact into a position adjacent the shank portion of said contacts.

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