Oct. 18, 1955 W. B. SIHPOL 2,720,808

ORGAN STOP MECHANISM

Filed Aug. 13, 1952 3 Sheets-Sheet 1

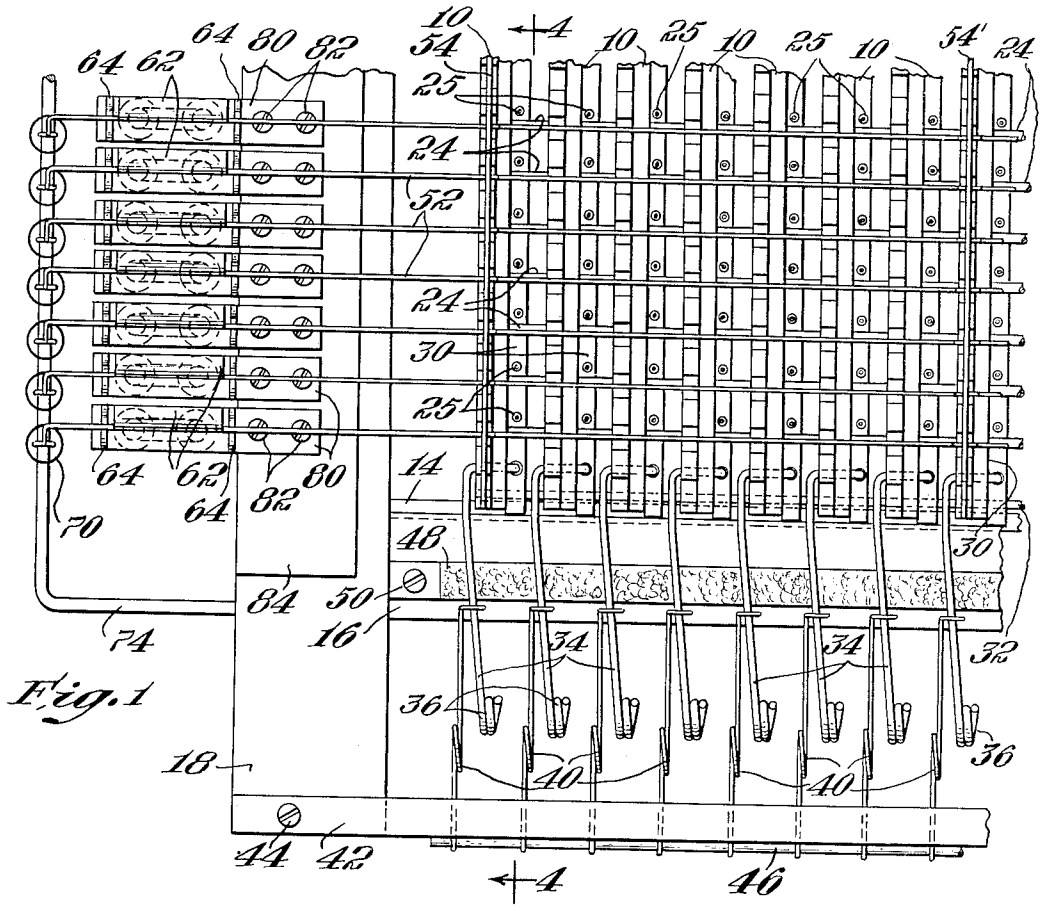


Fig. 1

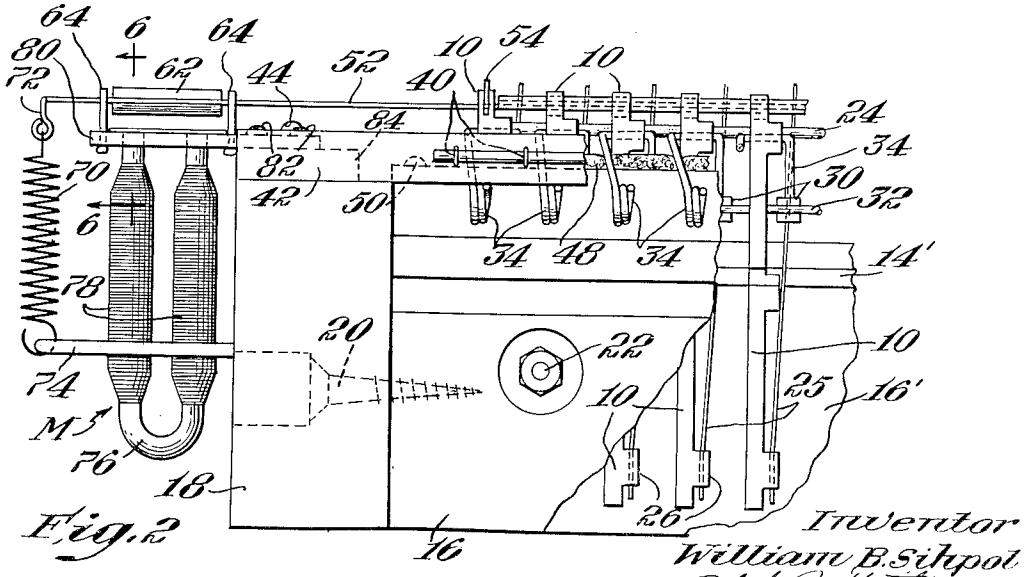


Fig. 2

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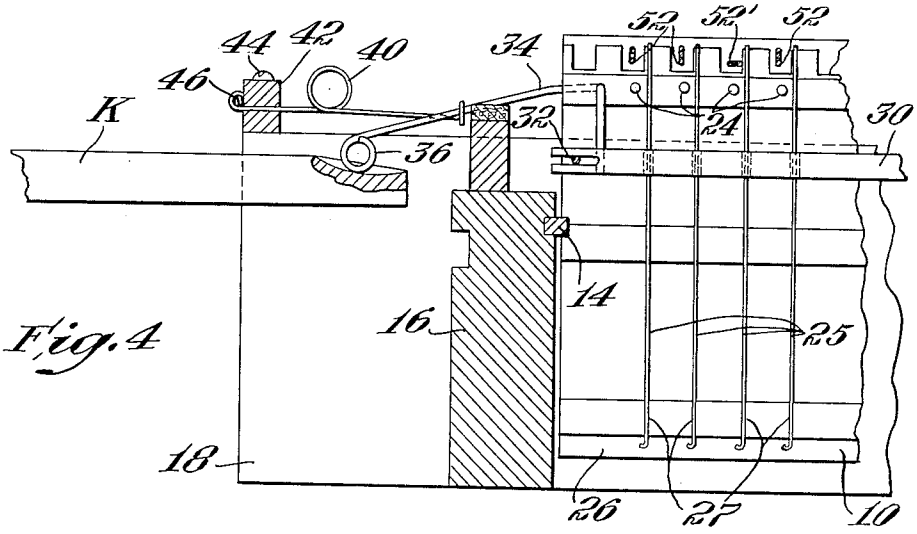


Fig. 4

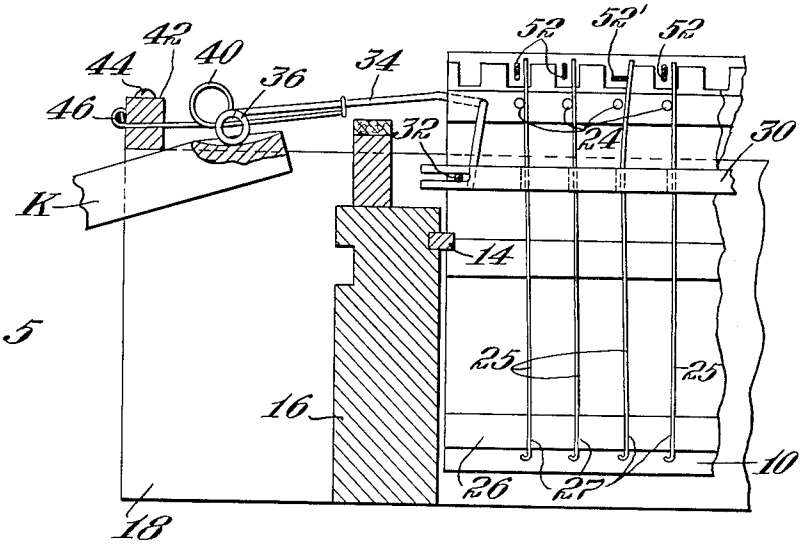


Fig. 5

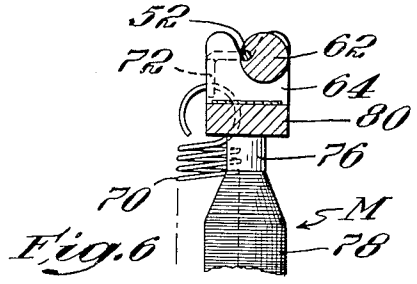


Fig. 6

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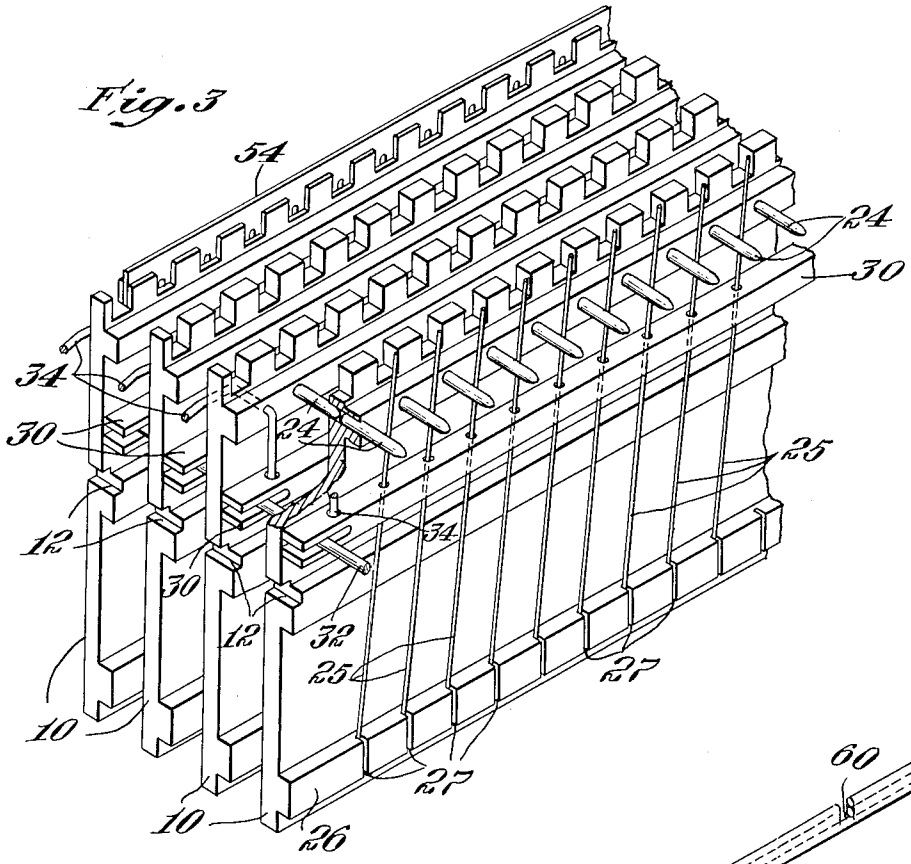
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Fig. 3



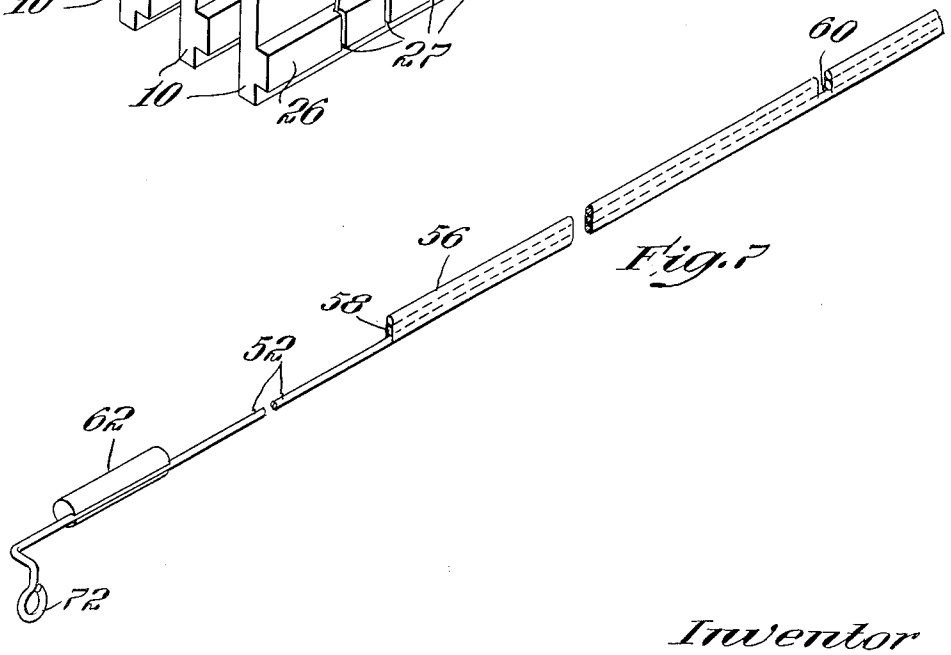


Fig. 7

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ORGAN STOP MECHANISM

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Application August 13, 1952, Serial No. 304,133

9 Claims. (Cl. 84—341)

This invention relates to electrical control systems and more particularly to key operated control systems such as are used to energize the electromagnets associated with the valves of an organ chest action.

As constructed heretofore the mechanical elements and components of analogous systems have been hand fitted, and the separate action for each key and stop has been individually adjusted so that both the time and cost of manufacture have been great.

It is, accordingly, the objects of this invention to provide an improved electrical control system which can be fabricated of preformed components, which requires a minimum of hand fitting and adjusting, which is economical to manufacture, which is readily assembled, which is positive in operation, and which advances the art generally.

The invention contemplates an electric control system such as used in an organ action comprising a plurality of plates of an electrically insulating material such as a suitable plastic. The plates are preferably supported by two rails which engage respective notches located upon opposite sides of each plate so that the plates can be stacked between the rails to facilitate assembly. The plates are maintained in spaced relationship by means of spacers which are preferably in the form of pins which extend outwardly from one side of each plate near the top edge thereof so as to engage the opposite side of the adjacent plate. The means operated by the organ keys or pedals includes a plurality of resilient conductors such as stiff wires arranged in sets or groups, the wires in each group corresponding in number to the number of stops of the organ. Each of the wires is attached at one end to the edge or side or an adjacent plate opposite the edge carrying the spacer pins to act as a cantilever whose free end lies adjacent one of the pins. The wires of each group are engaged by a respective movable member, for example threaded through apertures in a slidable member whose ends are preferably slotted to engage two elongated pins which extend transversely of the plates to act as supports for the members to slide upon. Each member is interconnected with a respective key, for example by a bell crank, whereby the depressing of a key slides the associated member forwardly to bring the free ends of the corresponding group of wires into engagement with the adjacent spacer pins. Stop operated means are provided and include a plurality of conductors corresponding in number to the number of organ stops. Each conductor is arranged transversely of the plates so as to be adjacent one wire of each group. The width of each conductor is greater than its thickness so that as the conductor is turned or rotated about its longitudinal axis, for example by an electromagnet energized by the operation of a corresponding stop, the conductor is moved into a position to be in electrical contact with the ends of such adjacent wires of a group as are in engagement with the pins due to the depressing of the corresponding keys.

These and other objects and aspects of my invention will be apparent from the following description of a specific embodiment referring to drawings, wherein:

Fig. 1 is a plan view with portions broken away;

Fig. 2 is a side elevation view with portions broken away;

Fig. 3 is an isometric view with portions broken away;

Fig. 4 is a sectional view on line 4—4 of Fig. 1 showing the contact wires in their normal position;

Fig. 5 is a sectional view on line 4—4 of Fig. 1 showing the position of the contact wires when a key is depressed;

Fig. 6 is an enlarged fragmentary sectional view on line 6—6 of Fig. 1; and

Fig. 7 is an isometric view of one of the transverse conductors.

As is best shown in Fig. 3 the control system is built up of a plurality of sections such as plates **10** which are preferably molded of an electrically nonconducting material such as a suitable plastic. The front edge of each plate **10** is provided with a respective notch **12** which engages a rail such as the key **14** (Fig. 4) carried by a front support member **16**. The back edge of each plate **10** is provided with a similar opposed notch which engages a similar key **14'** (Fig. 2) in a rear support member **16'** so that the plates **10** can be readily assembled by being stacked on the keys **14** and **14'** and compressed between two end members one of which is shown at **18**. The support members **16** are attached by screws **20** to the end members **18** which are built into the organ console (not shown). The support members **16** are also tied together by through bolts **22**. The spacing between the plates **10** is determined by a plurality of spacers, such as the pins **24**, which are arranged in a row near the top edge of one side of each plate so that the pins extend outwardly to engage mating recesses in the opposed side of the adjacent plate as is best shown in the broken away portion of Fig. 3.

The number of plates **10** required varies with the number of keys in the associated manual of the organ, there being one more plate required than there are keys to this forming a plurality of cavities or spaces corresponding in number to the number of keys. Each of the spaces accommodates a group of conductors such as the resilient wires **25** which are moved by a corresponding key as will be described in detail hereinafter. Each of the wires **25** is fixed as at **27** in a respective slot in an elongated boss **26** extending outwardly from the side near the bottom edge of each of the plates **10**, so that each wire acts as a cantilever whose free end extends up between two adjacent pins **24**. Each wire **25** of each group extends through an aperture in a respective slidable member **30** whose ends are slotted to engage elongated pins **32** which extend transversely through the plates **10**, as is shown in Fig. 3, so that the members can slide thereupon.

Such sliding movement is imparted to each member **30** by means of a respective bell crank **34** which is pivoted in the adjacent plate **10** so that the shorter crank arm engages an aperture in the forward end of the member. As is best shown in Figs. 4 and 5 the end of the longer arm of each crank is formed into a ring **36** which engages the slot of a respective organ key K that is conventional in design and operation so that it need not be described further. With the keys K in their normal position, illustrated in Fig. 4, each corresponding slidable member **30** is maintained in the normal position shown by means of a respective spring **40** one of whose ends is secured by passing through an aperture in a bridge piece **42** attached at its ends to the end members **18** by screws **44**. The ends of the springs **40** extending through the bridge piece **42** are secured by bending each end around a small rod **46** to which the end is soft soldered. The opposite end of each spring is hooked over the long arm of a correlated bell crank **34** to force the arm against a felt pad **48** cemented to the top of an elongated piece **50** which in turn

is screwed to the top of the front support member 16 so that the pad acts as a buffer which determines the location of the crank and therefore the normal position of the slidable member. As can best be seen in Fig. 4, in such normal position, the wires 25 extending through the slidable member 30 are positioned substantially vertically so that the free end of each thereof lies adjacent but spaced at a slight distance behind a respective spacer pin 24.

The top of each of the plates 10 is provided with a plurality of equally spaced rectangular recesses which are aligned with the corresponding recesses in the other plates upon stacking to form depressions or grooves wherein respectively are transversely disposed a plurality of conductors 52. As is best shown in Fig. 3, the top edge of the first or end plate 10 is slotted and a thin strip 54 is pressed therein. The strip 54 is provided with a number of recesses which extend upwardly from the bottom thereof wherein the respective transverse conductors 52 are journaled. Similar strips such as 54' (Fig. 1) are pressed, for example in every eighth plate, to provide further bearings for the conductors 52. As shown in Fig. 7, the conductor 52 has silver soldered or otherwise bonded thereto two other conductors 56 and 58 so that the effective width of the resulting assembly is considerably greater than its thickness for a purpose which will be discussed in detail hereinafter. The conductors 56 and 58 are cut away as at 60 to accommodate the bearing strips 54'.

The end of each of the conductors 52 extending beyond the bearing strip 54 has eccentrically secured thereto an armature 62 whose weight is supported by two brackets 64 of a nonconducting material, such as fiber, which have notches for engaging the portions of the conductor 52 located adjacent either side of the armature. The armature 62 is biased in the raised position shown in Fig. 6, which corresponds to the vertical or upright position of the conductors 52, 56, 58 shown in Fig. 4 by means of a spring 70 whose upper end is attached to an offset portion 72 of the conductor 52, the other end of the spring being secured to a U-shaped bracket 74 (Figs. 1 and 2) which extends outwardly from the side of the end member 18.

Each armature 62 has associated therewith an electromagnet M consisting of a U-shaped member 76 of a low reluctance material such as soft iron upon either leg of which members is wound a respective coil 78. Each of the electromagnets M is supported by means of a strip 80 of a nonmagnetic material having two spaced apertures wherein are pressed the ends of the arms of the U-shaped member 76. The strips 80, which also carry the brackets 64, are fixed by screws 82 to a spacer 84 that rests upon the top of the end member 18.

Each of the electromagnets M is connected respectively with a conventional power source (not shown) by means of a circuit including the electrical contacts (not shown) of the correlated organ stop whereby operation of the stop completes a circuit energizing the electromagnet. The resulting magnetic flux attracts the associated armature 62 so that the conductor 52 attached thereto is rotated against the biasing force of the spring 70 to the position designated 52' in Fig. 5. Each of the electrically operated valves of the organ chest (not shown) corresponding to a particular organ stop is electrically connected to the transversely arranged conductor 52 controlled by such stop. Each of such valves is also connected to the bottom of the wire 25 of the group operated by the key corresponding in pitch to the respective pipe controlled by the valve to complete an electrical circuit to open the valve when the wire is in contact with the transverse conductor.

It will be apparent from an inspection of Fig. 4 that with a key not depressed and in its normal position, no such contact is made between the transversely arranged conductors 52 and the wires 25 irrespective of the position of the conductors. When a key K is depressed as is shown in Fig. 5, the wires 25 are bent forwardly by the slidable member 30 such bending movement being restrained by the spacer pins 24 before the wires come into contact with the conductors 52 which are vertically disposed (due to the nonenergization of the corresponding electromagnets M) so that no circuit is completed to the corresponding electrically operated chest valves. If, however, one (or more) of the stops is operated to rotate a corresponding conductor 52 to the horizontal position 52, as has been described in detail heretofore, the width of the conductor causes the adjacent wire 25 to make contact with the conductor as it is bent forward by the depressing of the key K before the wire engages the spacer pin 24 so that an electrical contact which energizes the corresponding electrically operated chest valve is made between the conductor and wire.

While I have shown and described one desirable embodiment of the invention, it is to be understood that this disclosure is for the purpose of illustration and that various changes and modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. An electric control system for an organ action comprising a plurality of parallel plates of an electrically insulating material, a plurality of pins extending outwardly from one side of each of the plates near the edge thereof into mating recesses in the opposite side of the adjacent plate thereby to act as spacers for maintaining the plates in spaced relationship; key operated means including a group of resilient wires of a conducting material interposed respectively in each of the spaces between two adjacent plates, the wires of each group corresponding in number to the number of stops of the organ, each of said wires being a cantilever with its fixed end attached to the end of one of said adjacent plates opposite said pins so that the free end thereof lies adjacent one of the pins, a slidable member interposed between the ends of each group of wires, said slidable member having a plurality of apertures through which the wires of a respective group extend, means interconnecting each of the slidable members with a respective organ key whereby depressing of any key moves the associated slidable member to bring the ends of the corresponding group of wires into engagement with the adjacent pins; stop operated means including a plurality of conductors arranged transversely of said plates with each conductor adjacent the free end of one resilient wire of each key operated group, and means interconnecting each traversely arranged conductor with a respective stop to move the associated conductor into a position to be in electrical contact with the ends of such adjacent resilient wires as are in engagement with the pins due to the depressing of the corresponding keys.

2. An electrical control system according to claim 1, wherein the width of each of the transversely arranged conductors is greater than its thickness whereby rotating of the conductor brings it into electrical contact with the ends of such adjacent resilient wires as are in engagement with the spacer pins due to the depressing of the corresponding keys.

3. An electrical control system according to claim 2, whereineach conductor consists of a plurality of parallelly disposed wires which are bonded to one another.

4. An electrical control system according to claim 2, wherein electromagnetic means controlled by the organ stops is provided to respective conductors.

5. An electrical control system according to claim 4, wherein the electromagnetic means comprises a plurality of electromagnets energized respectively by the operation of an associated stop, the armature of each electromagnet being eccentrically attached to a corresponding conductor so that the energizing of the electromagnets rotates the corresponding conductors to bring the conductors into electrical contact with the ends of such adja-

cent resilient wires as are in engagement with the spacer pins due to the depressing of the corresponding keys.

6. An electric control system for an organ action comprising a plurality of parallel plates of an electrically insulating material, a plurality of pins extending outwardly from one side of each of the plates near the edge thereof into mating recesses in the opposite side of the adjacent plate thereby to act as spacers for maintaining the plates in spaced relationship; key operated means including a group of resilient wires of a conducting material interposed respectively in each of the spaces between two adjacent plates, the wires of each group corresponding in number to the number of stops of the organ, each of said wires being a cantilever with its fixed end attached to the end of one of said adjacent plates opposite said pins so that the free end thereof lies adjacent one of the pins, a slidable member interposed between the ends of each group of wires, said slidable member having a plurality of apertures through which the conductors of a respective group extend, means interconnecting each of the slidable members with a respective organ key, said means including a bell crank one arm of which is engaged by the key, the other bell crank arm being attached to said slidable member whereby depressing of any key moves the associated slidable member to bring the ends of the corresponding group of conductors into engagement with the adjacent pins; stop operated means including a plurality of conductors arranged transversely of said plates with each conductor adjacent the free end of one resilient conductor of each key operated group, and means interconnecting each traversely arranged conductor with a respective stop to move the associated conductor into a position to be in electrical contact with the ends of such adjacent resilient conductors as are in engagement with the pins due to the depressing of the corresponding keys.

7. An electrical control system according to claim 6, wherein the bell cranks are pivotally mounted upon the respective plates.

8. An electrical control system according to claim 6, wherein each of the slidable members is slotted in either end and two elongated pins are provided which extend transversely of said plates to engage respectively the slots in the ends of said members.

9. An electrical control system for an organ action comprising a plurality of parallel plates of an electrically insulating material, each of said plates having a notch in either side thereof, two spaced support members each of which has a rail for engaging a respective notch to facilitate stacking of the plates therebetween, a plurality of pins extending outwardly from one side of each of the plates near the edge thereof into mating recesses in

the opposite side of the adjacent plate thereby to act as spacers for maintaining the plates in spaced relationship; key operated means including a group of resilient wires of conducting material interposed respectively in each of the spaces between two adjacent plates, the wires of each group corresponding in number to the number of stops of the organ, each of said wires being a cantilever with its fixed end attached to the end of one of said adjacent plates opposite said pins so that the free end thereof lies adjacent one of the pins, a slidable member interposed between the ends of each group of wires, each slidable member having a plurality of apertures through which the wires of a respective group extend, each member having a slot in either end thereof, two elongated pins extending transversely of said plates to engage the respective slots in said slidable members thereby to act as a support therefor, means interconnecting each of the slidable members with a respective organ key, said means including a plurality of bell cranks pivotally supported upon the respective plates, one arm of each of which engages a correlated key, the other arm of each bell crank being attached to an associated slidable member whereby depressing of any key moves the associated slidable member to bring the ends of the corresponding group of wires into engagement with the adjacent spacer pins; stop operated means including a plurality of conductors arranged transversely of said plates with each conductor adjacent the free end of one resilient wire of each key operated group, the width of each conductor being greater than its thickness, and means interconnecting each transversely arranged conductor with a respective stop, said interconnecting means including a plurality of electromagnets each of which is energized by the operation of a respective stop, the armature of each electromagnet being eccentrically attached to a respective conductor to rotate the conductor upon the energization of the electromagnet into a position to be in electrical contact with the ends of such adjacent resilient wires as are in engagement with the pins due to the depressing of the corresponding keys.

References Cited in the file of this patent

UNITED STATES PATENTS

1,077,075	Hope-Jones	Oct. 28, 1913
1,788,963	Steinfeld	Jan. 13, 1931
1,930,613	Gordon	Oct. 17, 1933
2,115,748	Reisner	May 3, 1938
2,547,918	Zuck	Apr. 3, 1951

FOREIGN PATENTS

128,523	Austria	June 10, 1932