Jan. 18, 1938. C. S. NORBURN ET AL 2,105,793

PIPE ORGAN

Filed June 29, 1936 2 Sheets-Sheet 1

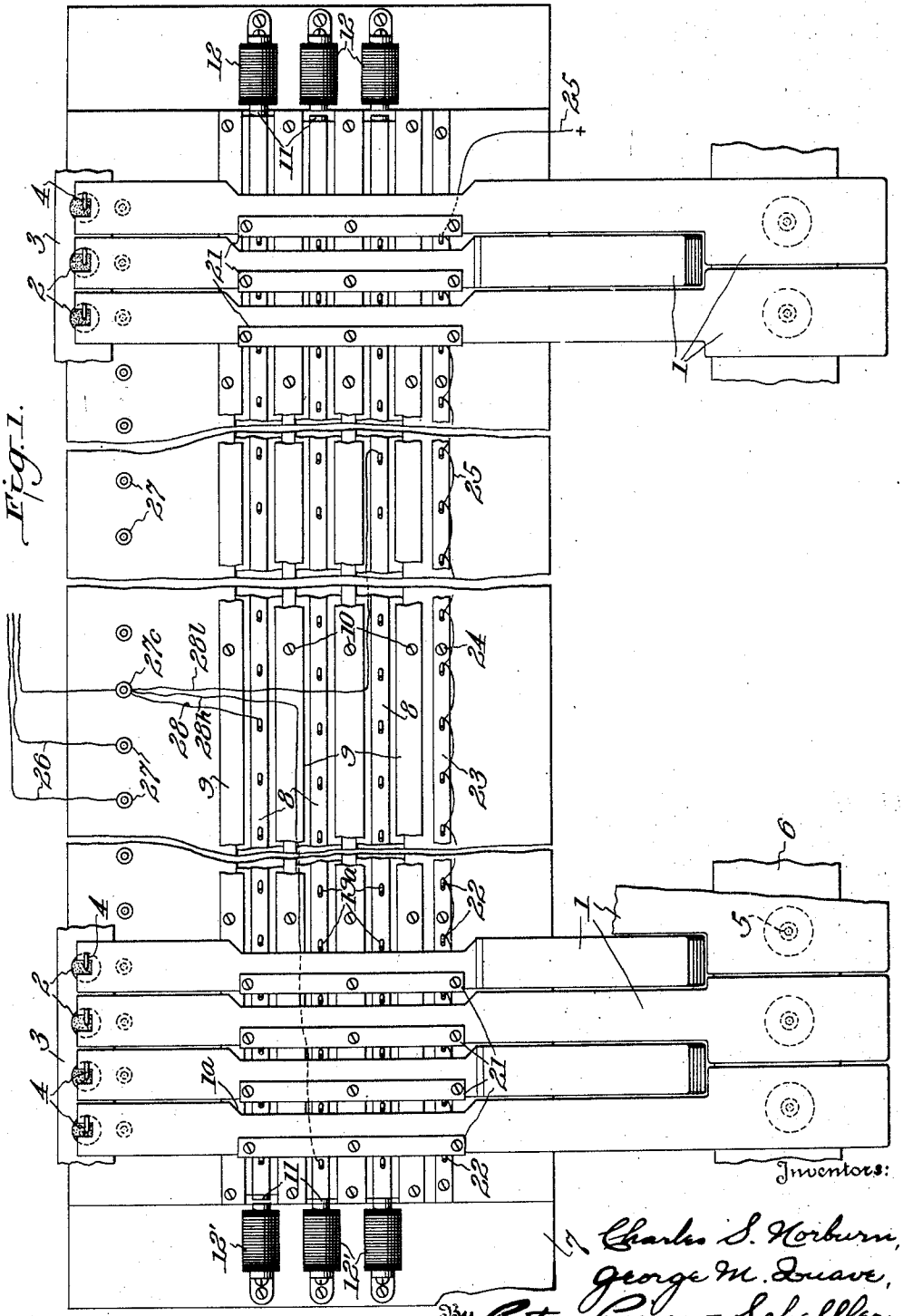


Fig. 1.

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Fig. 2.

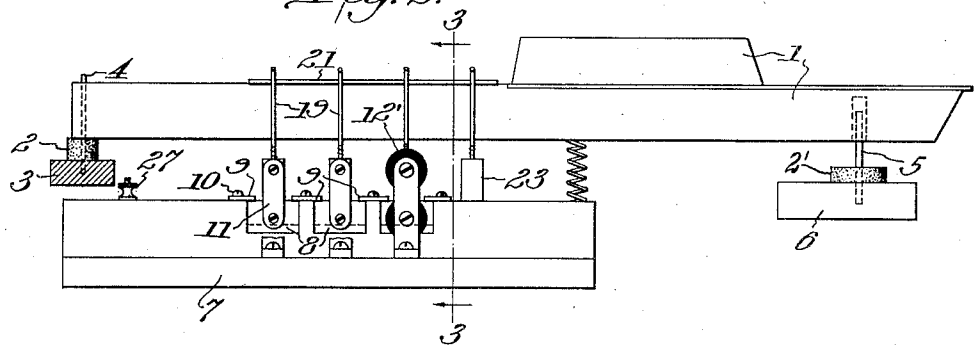


Fig. 3.

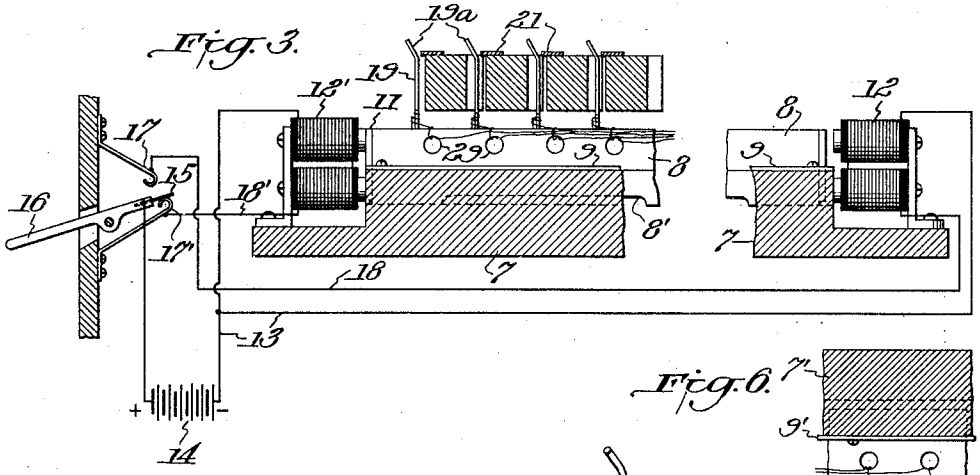


Fig. 6.

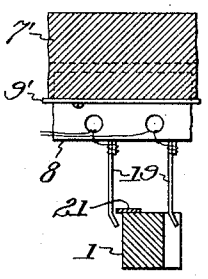
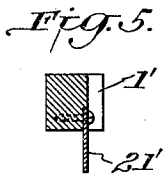


Fig. 5.



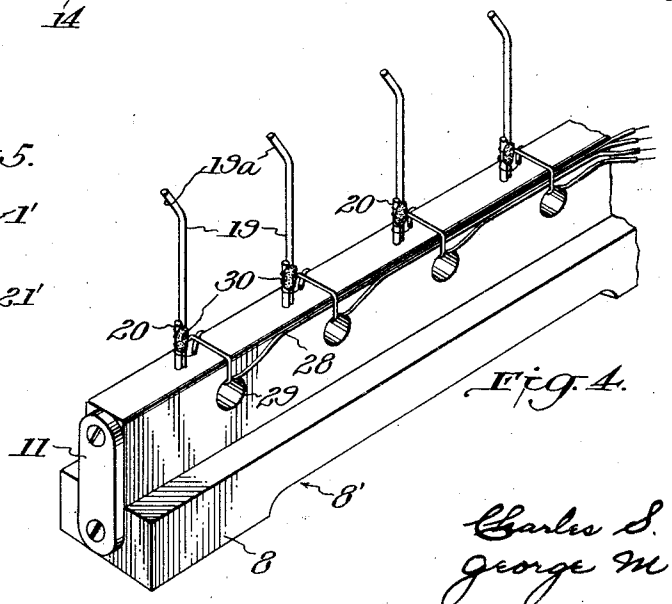


Fig. 4.

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UNITED STATES PATENT OFFICE

2,105,793

PIPE ORGAN

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17 Claims. (Cl. 84—341)

This invention relates to pipe organs and more particularly to organ switches or couplers.

It has been the common practice to locate the organ switch or coupler mechanism at some distance from the keys, and to operate the key-controlled contacts of the coupler through some form of electromagnetic action or a mechanical linkage. These key-controlled contacts have, in the customary forms of coupler switches, engaged with that selected set of coupler contacts which was flexed out of normal position and into the path of movement of the key-controlled contacts.

An object of the present invention is to provide simple and compact organ switches that may be positioned at, and preferably either above or below the rear ends of, the organ keys. An object is to provide an organ switch or coupler in which the key-controlled portions of the coupler switches are carried by the keys. A further object is to provide an organ switch including pin contacts that are mounted on slides, the contacts being connected into appropriate control circuits by highly flexible leads and being bodily displaceable into and out of the range of movement of the key-controlled contacts. More particularly, an object is to provide an organ in which the coupler slides are located below the rear ends of the keys and carry contact pins that extend into spaces between adjacent keys for engagement with contact plates mounted upon the keys.

These and other objects and advantages of the invention will be apparent from the following specification when taken with the accompanying drawings, in which:

Fig. 1 is a fragmentary plan view of an embodiment of the invention in which the slides of the organ switch are located below the rear ends of the keys;

Fig. 2 is a side elevation of the manual and the organ switch;

Fig. 3 is a fragmentary sectional view on line 3—3 of Fig. 2, the circuit for actuating a coupler slide being shown diagrammatically;

Fig. 4 is a fragmentary perspective view of a coupler slide;

Fig. 5 is a section through a key provided with a modified form of contact plate; and

Fig. 6 is a fragmentary section showing a modification in which the switch is located above the keys.

In the drawings, the reference numerals 1 identify the keys of one manual of the organ, the rear ends of the keys resting on felt washers 2 and being pivotally connected to the rear key rail 3 by hooks 4 while the front ends of the keys are guided by pins 5 mounted on the other key rail 6. Felt cushioning washers 2' may be placed about the guide pins 5. The described construction constitutes a known mounting for the keys but other mountings may be used as the exact construction is not a feature of this invention.

Adjacent the rear ends of the several keys, and preferably in vertical alinement with them, is a support or base board 7 upon which a plurality of coupler slides 8 are mounted. The slides are preferably wooden strips of inverted T-shape which may be notched along their lower surfaces, as indicated at 8' to leave relatively small areas for sliding engagement with the board 7. The slides are mounted in guideways cut in the upper surface of the board 7 and are held in place by strips 9 which are fastened to the board by screws 10. Soft iron armatures 11 are fastened to the ends of the slides, and electromagnets 12, 12' are mounted upon the board 7 to move the slides. As shown in Fig. 3, the leads 13 connect the low terminals of both electromagnets to a current source 14, and the positive terminal of the current supply is connected to the movable contact 15 of the switch controlled by the coupler tablet 16. The "on" and "off" contacts 17, 17' of the switch are connected to the other terminals of the electromagnets 12, 12', respectively, by leads 18, 18'. As illustrated, the tablet 16 is in raised position, thus energizing electromagnet 12' and the slide is drawn to the left to render its associated switches inoperative.

Each slide has a contact 19 for each key of the manual, the contacts being small spring steel wire forced into minute holes in the slide and secured in place by small headless nails 20 that are driven into the slide beside the contacts. The contacts extend vertically upward through the spaces formed by notching out one side of each key, as indicated at 1a, and the upper ends 19a of the contacts are each bent away from the contact plate 21 of the associated key to provide a good wiping contact engagement. The interkey spaces are of such width as to permit movement of the slides 8 by about ⅛" to ¼" to bring the contacts 19 alternatively into or out of the path of movement of the contact plates 21 of the keys.

It will be noted that the slides 8 displace the contacts 19 laterally, thus avoiding the bending which has been the usual characteristic of prior organ switches. A "firing" contact 22 for each contact plate 21 is supported by a rail 23 that is fixed to the support 7 by means such as the screws

24. The fixed or firing contacts are connected to each other and to a terminal of the current source (indicated by the symbol "+" in Fig. 1) by a lead 25, and the contacts 19 of the coupler slides are selectively connected to the electromagnets, not shown, of the associated pipes. The positive terminal leads 26 of the electromagnets of the several pipes are connected to terminals 27 that are mounted on the supporting board 7, and the connections from the fixed terminals 27 to the coupler slide contacts 19 are made with Litzendraht (Litz) wire, i. e. a multistrand insulated wire or cable of extremely high flexibility. The connections to only one fixed terminal are shown in Fig. 1; this terminal being assumed to be the terminal for the C-pipe of the second octave of keys. When the upper slide 8, Fig. 1, is the unison or 8-foot slide, the Litz wire leads 28 from the terminals 27 extend to the contacts 19 adjacent the key for the corresponding pipe. When the upper slide is drawn, as is illustrated in Fig. 1, the contact plates 20 of the several keys connect the firing contacts 22 with the contacts 19 and the circuits for sounding the pipes corresponding to the depressed keys are thus closed. Assuming the second slide 8 to be the 4-foot coupler slide, the Litz wire leads 28*h* are so connected between the terminals 27 and the contacts 19 of the second slide that the pressing down of any key sounds the pipe one octave higher. Starting with that contact 19 of this slide which is adjacent the lowest key, the Litz wire lead 28*h* extends to the terminal 27c of the C-pipe of the next higher octave. In similar manner, the contacts 19 of the third or 16-foot coupler are connected by Litz wire leads 28*l* to the terminals 27 corresponding to the pipes one octave lower than the keys adjacent the several contacts 19.

The 4-foot and 16-foot coupler slides are illustrated in Fig. 1 as having a contact 19 for each key of the manual. As these contacts control the sounding of pipes one octave above and one octave below the key which is pressed, it will be apparent that the contacts for the highest octave of the 4-foot coupler and for the lowest octave of the 16-foot coupler may be omitted unless, as is often the case, an extra octave of pipes is provided above and/or below the normal range of the keys of the manual.

As shown in Fig. 4, the wire 28 to the end contact 19 is extended along the slide, looped through and tied in a hole 29 adjacent the contact, and its end scraped and wrapped about both the contact 19 and pin 29 to which it is secured by solder 30. The tie of each wire for a succeeding contact is looped around the wires already in place, and the several wires are thus formed into a self-supporting cable that is securely held to the slide bar. The bars move only a short distance and the Litz wire is so flexible that it offers but little resistance to the sliding movement. The surfaces of the slide which engage the guideway on the board 7 may be lubricated by the usual methods, preferably with graphite, to reduce the frictional resistance to movement.

The location of the contact plates on the keys may be varied to some extent and the modified construction, as shown in Fig. 5, in which a vertically arranged plate 21' is mounted flush with the side of the key 1' has the advantage that it is not necessary to notch the keys to provide space for the contacts 19 of the coupler bars. In some cases where space is available above the rear ends of the keys, it may be convenient to use the inverted arrangement, Fig. 6, with slides 8, keys 1 and their contacts constructed substantially as described, but with the slides movable in overhead guideways provided by a grooved supporting board 7' and rails 9'.

The construction of an electropneumatic organ is materially simplified by the invention since the usual electrical and/or mechanical connections between the keys and the organ switch are eliminated. It is to be understood that the invention is not limited to the particular embodiments herein illustrated and described, as many changes may be made in the parts, and in their relative size, shape and location without departing from the spirit of our invention as set forth in the following claims.

We claim:

1. In an organ, the combination with the keys of a manual, of an organ switch including slides adjacent said keys and each carrying contacts corresponding to the several keys, and contact plates mounted on said keys for cooperation with said slide-carried contacts to form an organ switch.

2. In an organ, the combination with the keys of a manual, and contact-making means individual to and actuated by the several keys, of a plurality of elongated slide bars each carrying contacts for engagement by the contact-making means of said keys, guide means mounting said slide bars in the space vertically alined with said keys, means manually controlled to move said slide bars individually to bring the contacts thereof into or out of the paths of movement of the contact-making means of the keys, and circuits for controlling the playing of the pipes, said circuits including flexible leads connecting the contacts of said slide bars to stationary terminals.

3. An organ as claimed in claim 2, wherein said circuits include a series of firing contacts mounted in fixed positions to engage the contact-making means of the respective keys.

4. In an organ, the combination of a plurality of keys, a plurality of sets of contacts corresponding to the respective keys, a coupler slide for each set of contacts, means supporting said slides adjacent said keys for movement to bring the associated set of contacts into and out of operative positions, and a contact plate secured to each key for engagement with the corresponding contact of the selected set which is brought into operative position by its slide.

5. An organ as claimed in claim 4, wherein a side edge of each key is notched to provide a space between adjacent keys, and the said contacts extend into the spaces between the keys, the contact plates being horizontally arranged on said keys to project into said spaces.

6. An organ as claimed in claim 4, wherein a side edge of each key is notched to provide a space between adjacent keys, and the said contacts extend upwardly through the spaces between the keys to project above the same, the contact plates being horizontally arranged on said keys to project into said spaces.

7. An organ as claimed in claim 4, wherein a side edge of each key is notched to provide a space between adjacent keys, and the said contacts extend downwardly into the spaces between the keys, the contact plates being horizontally arranged on said keys to project into said spaces.

8. An organ as claimed in claim 4, wherein said contact plates are vertically arranged and extend below the keys.

9. In an organ, an organ switch including a

plurality of slide bars carrying contacts, and means actuated by the keys for engaging said contacts; each slide bar comprising a T-shaped member, the contacts being pins secured in and extending vertically from the base of the leg of the T-shaped member, the leg of the T-shaped member having a hole therethrough adjacent each contact, and flexible leads extending along said member with an end of each tied to the member at a hole and electrically connected to the adjacent contact.

10. An organ as claimed in claim 9, wherein each lead is looped through the hole adjacent the contact to which it is connected, the loop of each lead passing around all leads which extend beyond that hole in the member.

11. In an organ, the combination with a manual comprising key rails and a plurality of keys carried thereby, of an organ switch comprising a support below said keys, a plurality of coupler bars and means mounting the same on said support for movement relative to said keys, contacts secured to each coupler bar, a contact member actuated by each of said keys, and manually-controlled means for moving each coupler bar to carry the contacts thereof into and out of the range of movement of the associated key-actuated contact member.

12. An organ as claimed in claim 11, wherein said mounting means comprises guideways supporting said coupler bars for reciprocating movement substantially parallel to the plane of the key rails.

13. An organ as claimed in claim 11, wherein a plurality of stationary pipe circuit terminals are mounted on said support, and flexible leads of Litz wire extend from said terminals to the contacts of the several coupler bars.

14. An organ as claimed in claim 11, wherein said contact members comprise plates secured to the respective keys.

15. In an organ, a plurality of keys, a plurality of sets of contacts positioned in a space vertically alined with said keys, each set of contacts including one for and adjacent each key, a series of firing contacts connected to a source of current, means actuated by the depressing of a key to complete a circuit including a firing contact and the corresponding key contact of one of said sets, and manually-controlled means for effecting relative movement of said sets of contacts and said series of firing contacts, thereby to determine the set of contacts to which circuits may be completed by depressing the keys.

16. An organ as claimed in claim 15, wherein said sets of contacts are movable relative to each other and to said series of firing contacts, and said manually-controlled means displaces the said sets of contacts selectively into and out of the range of movement of said key-actuated means.

17. An organ as claimed in claim 15, wherein said firing contacts are stationary and said key-actuated means comprises contact plates mounted on the several keys and adapted upon depressing of the keys to engage the corresponding firing contacts, and said sets of contacts are selectively displaceable into the paths of movement of said contact plates.

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