

No. 814,176.

PATENTED MAR. 6, 1906.

E. S. VOTEY.  
PNEUMATICALLY ACTUATED MUSICAL INSTRUMENT.

APPLICATION FILED JUNE 24, 1901.

4 SHEETS—SHEET 1.

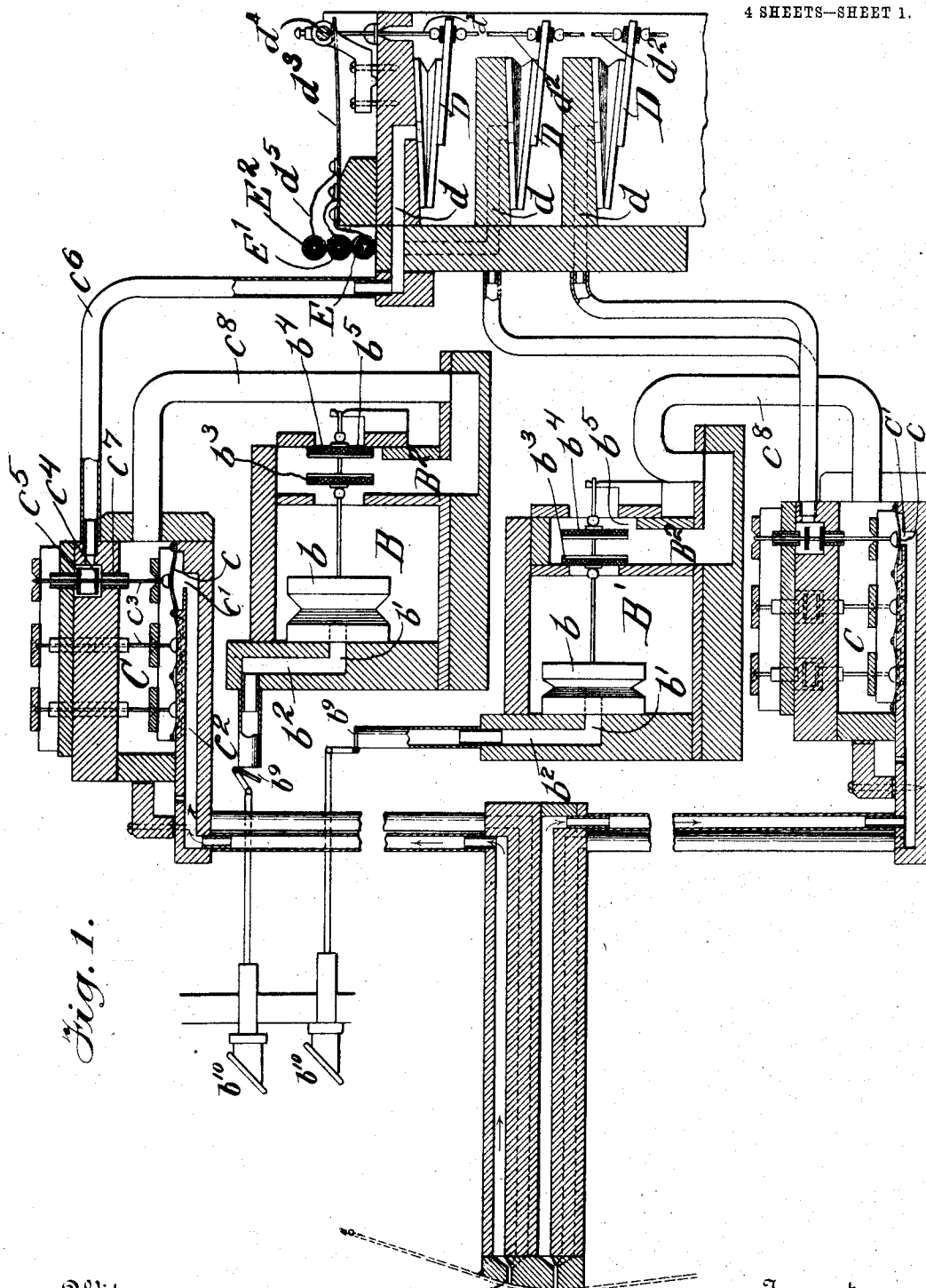


Fig. 1.

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By his Attorneys  
*Dickerson, Brown & Paegle*

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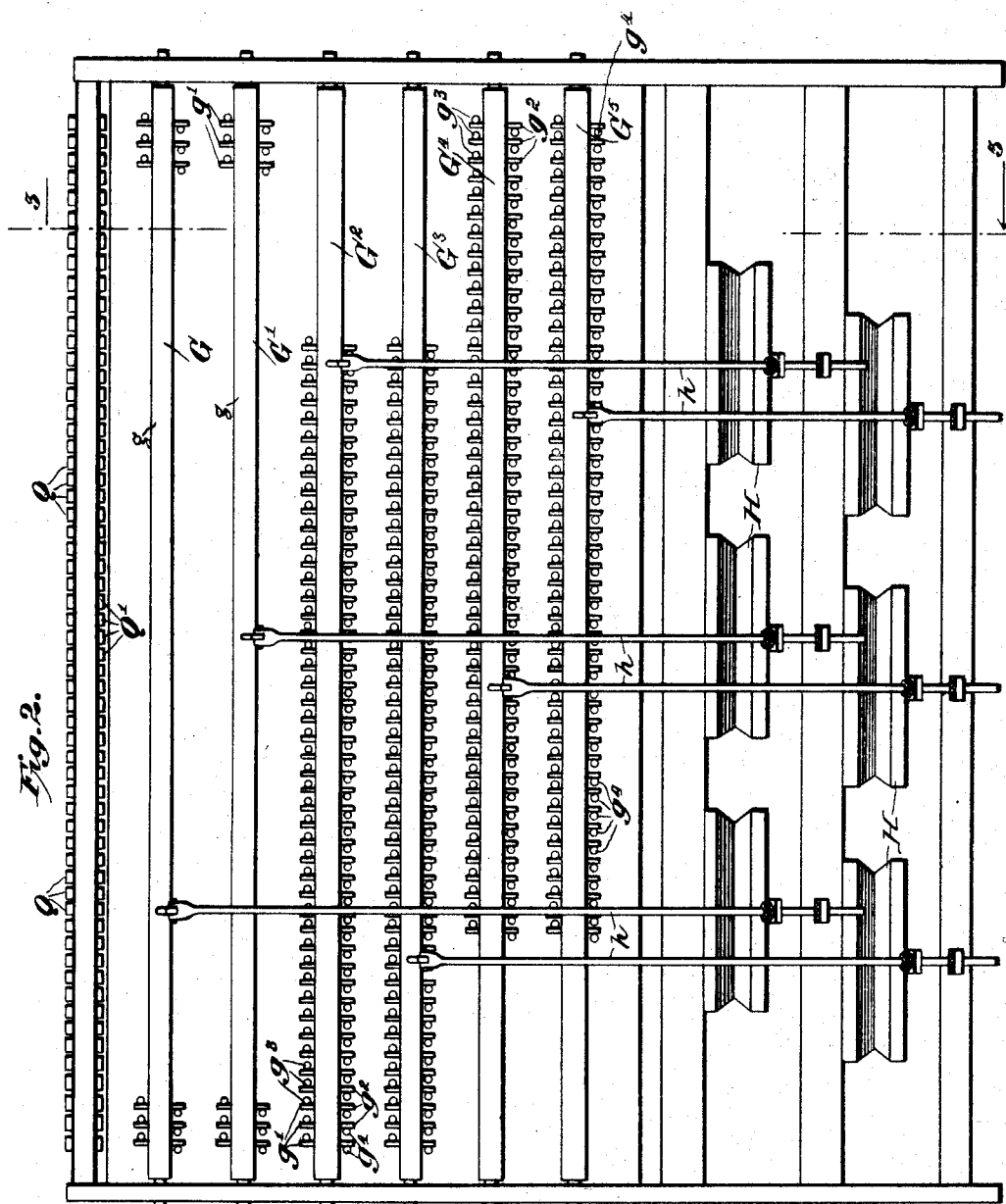
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4 SHEETS—SHEET 2.



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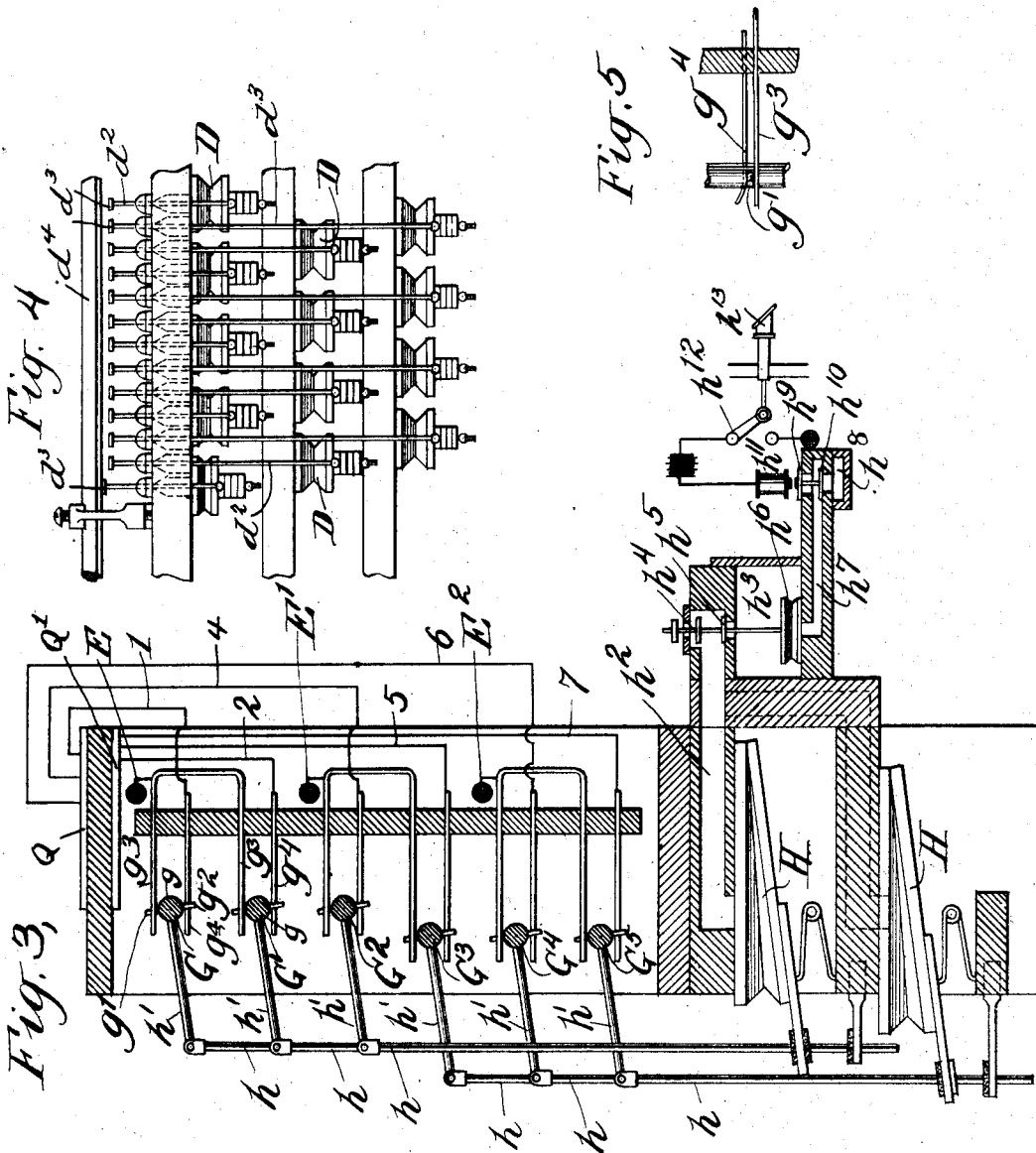
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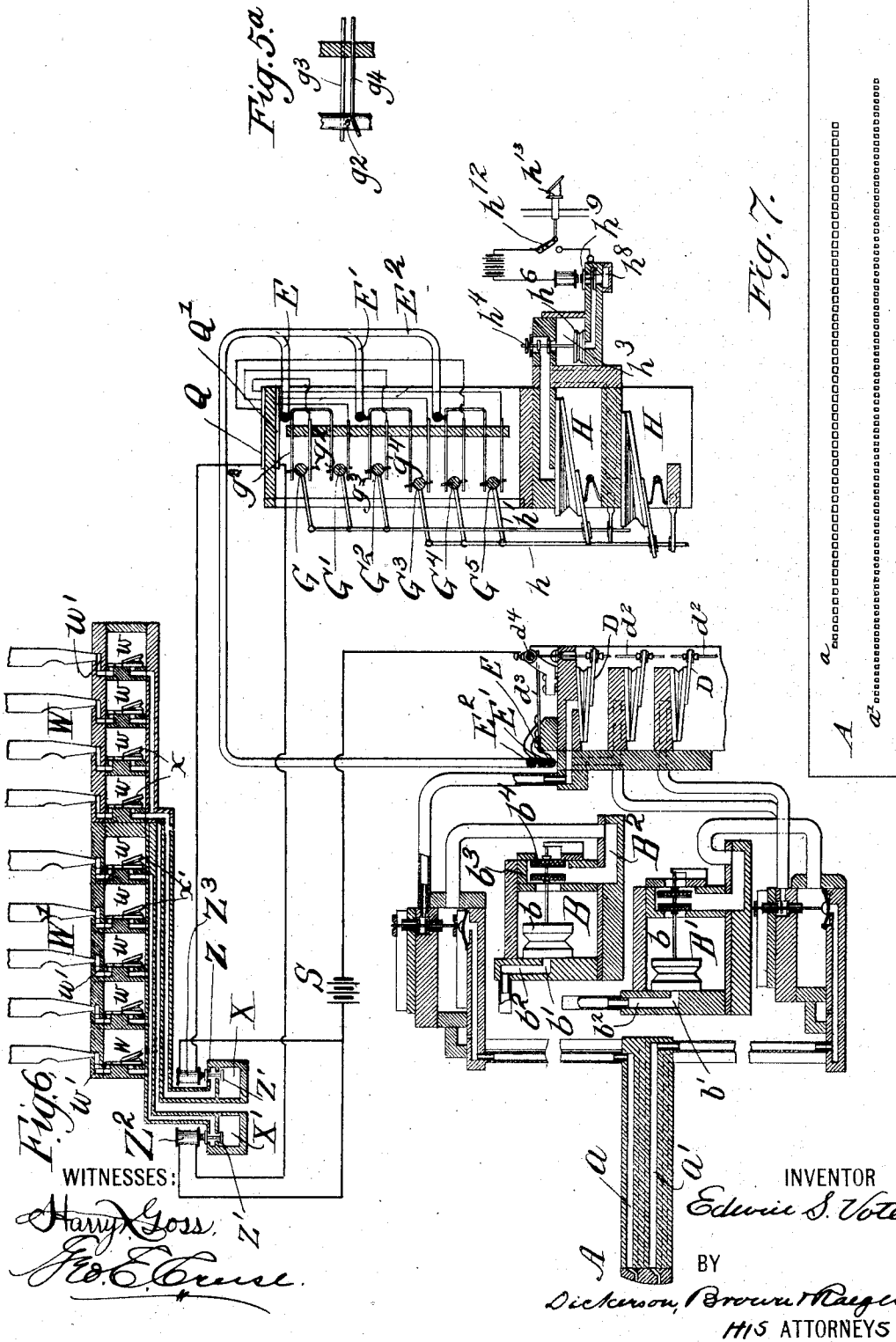
4 SHEETS--SHEET 3.



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4 SHEETS—SHEET 4.



# UNITED STATES PATENT OFFICE.

EDWIN S. VOTEY, OF SUMMIT, NEW JERSEY, ASSIGNOR TO THE AEOLIAN CO., OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

## PNEUMATICALLY-ACTUATED MUSICAL INSTRUMENT.

No. 814,178.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed June 24, 1901. Serial No. 65,783.

*To all whom it may concern:*

Be it known that I, EDWIN S. VOTEY, a citizen of the United States, residing at Summit, Union county, State of New Jersey, have invented certain new and useful Improvements in Pneumatically-Actuated Musical Instruments, of which the following is a specification.

My invention relates to mechanically-played musical instruments.

My invention is particularly adapted to organs comprising a plurality of sets of manual-keys, by means of which different sets of pipes comprised therein—as, for example, swell-organ, great organ, &c.—may be played; and the object of my invention is to provide mechanisms for such organs under the control of a perforated music-sheet, whereby such an organ may be played to obtain any and all effects obtained by its operation through the manual-keys thereof.

I will describe a mechanical musical instrument embodying my invention and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of a portion of a mechanical musical instrument embodying my invention. Fig. 2 is a detail rear elevational view of a switch device and its operating mechanism comprised in the invention. Fig. 3 is a detail vertical transverse sectional view of the switch device on the plane 3-3, Fig. 2. Fig. 4 is a detail elevational view of a part comprised in the instrument. Fig. 5 is a detail view. Fig. 5<sup>a</sup> is a detail of the same part in inverted plan view. Fig. 6 is a sectional view of an organ conventionally shown having an attachment embodying my invention for playing the same, the latter being diagrammatically illustrated. Fig. 7 is a front elevation of the tracker-board.

Similar characters of reference designate corresponding parts in all the figures.

Referring now to Fig. 6, in which is illustrated an organ comprising two sets of sound-producing devices *W* and *W'*, the former being the swell-organ and the latter the great organ, and the usual manual-keys for causing the speaking of sound-producing devices being omitted, *w* represents longitudinal wind-chambers, and *w'* the ducts leading from such chambers to the pipes *W* and *W'*. *x* *x'* are the pallets, both in communication

with a wind-supply; *X* *X'*, wind-ducts communicating with the pallets, and *Z* *Z'* valves for controlling the ducts *X* *X'*. The valves *Z* *Z'* are moved by electromagnets *Z*<sup>2</sup> *Z*<sup>3</sup>, as will be hereinafter described. The form of pipe-organ will be readily understood by those skilled in the art, and hence I will not describe it more in detail. The organ is shown as provided with the usual banks or sets of pipes for giving different tone effects—such, for example, as oboe tones, viola tones, &c.—which banks or sets are controlled by the usual stops. These stops and the banks or sets of pipes are not here shown. The circuits of the magnets *Z*<sup>2</sup> *Z*<sup>3</sup> are brought into junction-plates *Q* *Q'*, the circuits from the magnets of the swell-organ pipes being brought into the junction-plates *Q* and the circuits from the magnet of the great-organ pipes into the junction-plates *Q'*. In addition I provide the following-described pneumatic and electromagnetic means for causing the pipes of the swell and great organs to speak, which means are controlled by a traveling perforated music-sheet. In the mechanical operation of an organ having a plurality of sets of pipes—as, for example, a swell-organ, great organ, &c.—a tracker-board having a plurality of sets of ducts or passages, one set of ducts or openings for each set of pipes or sound-producing devices, is preferably employed. In the present instance a tracker-board having two sets of ducts or passages—in short, a double tracker-board—is shown as being employed to operate the two sets of sound-producing devices herein referred to as the “swell” and “great” organs. A represents the tracker-board having the two sets of ducts or passages *a* *a'*. The ducts or passages are staggered, as shown in Fig. 1, for convenience in manufacture. The two sets of ducts or passages may be considered as separate tracker-boards. The upper tracker-board is provided with fifty-eight ducts or passages and is adapted to control the speaking of fifty-eight pipes, while the lower tracker-board is provided with ninety-two ducts or passages and controls the speaking of ninety-two pipes. The number of ducts or passages in each tracker-board may be increased or diminished. The upper tracker-board when in use controls, by means of suitable coupling devices, the speaking of the

pipes comprised in the swell and great organs either separately or in unison, and the lower tracker-board also controls the speaking of the pipes in the swell and great organs in unison or as solo and accompaniment, as the same may be coupled, as hereinafter explained. The ninety-two ducts of the lower tracker range are divided in two sets of forty-six each, one set being allotted to the accompaniment and the other to the solo. The accompaniment has connections for the lowest forty-six notes of the great and swell organs, and the solo is similarly connected for the upper forty-six notes of the great and swell organs, so that various combinations can be produced as required. While one set of ducts or passages in the tracker-board is being used in connection with a perforated music-sheet the other set of ducts or passages therein is rendered inoperative.

B B' represent a pair of exhaust-chests. Provided in each chest is a pneumatic  $b$ , which is placed over a vent  $b'$ , opening to the atmosphere through a conduit  $b^2$ . The spring of the pneumatic, as usual, tends to collapse, the leakage being sufficient to permit this when the atmosphere is not admitted to its interior. The end of this conduit is controlled by a damper or valve  $b^3$ , operated by a stop  $b^{10}$ , and when the damper or valve is over the conduit the pneumatic is collapsed.  $b^3$   $b^4$  represent pallets or valves moved by the pneumatic  $b$ .

Each chest B B' is provided with a branch or extension  $B^2$ , which is open to the atmosphere at  $b^5$ .

In the collapsed positions of the pneumatics  $b$  the valve-pallets  $b^3$  close the openings between the chest B B' and their extensions  $B^2$  and the pallets  $b^4$  open the extensions  $B^2$  to the atmosphere. When the pneumatics  $b$  are expanded, (and this is so when the valves or dampers of the conduits of the pallets  $b^3$   $b^4$  are as shown in the upper part of Fig. 1,) the extension  $B^2$  is then open to the exhaust-chest B or B', as the case may be. Consequently these connections furnish means for connecting and disconnecting the exhaust with the pneumatics controlled from either the upper or the lower set of tracker-holes and rendering either set inoperative at will by the cutting off of the exhaust from the corresponding passage  $B^2$ .

C represents a chest or chamber containing a plurality of diaphragms  $c$ . Each diaphragm  $c$  is directly over a vent  $c'$  of a passage  $c^2$ , which passage forms a continuation of a passage in the tracker-board. For each duct or opening in each tracker-board there is provided a vent and diaphragm  $c$ . The diaphragm in its movement operates a rod  $c^3$ , which carries a pair of pallets  $c^4$   $c^5$ . These pallets are located in a chamber which acts as a communication between a conduit  $c^6$  and the interior of the chest C through a vent

$c^7$ . When the pallet  $c^4$  is off the vent  $c'$ , the chest C is in communication with the conduit  $c^6$ . It may be well to state here that the chest C is in communication with the extension  $B^2$  through a conduit  $c^8$ . The end of each conduit  $c^6$  is connected with one end of a passage  $d$ , which passages  $d$  are provided in channel-boards, and at the other end of each passage is a pneumatic D. Normally the pneumatics D are expanded. When, however, a conduit  $c^6$  is opened to the exhaust-chests B or B', its pneumatic D is collapsed. (See the upper pneumatic D in Fig. 1.) Each pneumatic D is provided with a vertical rod  $d^2$ , and each vertical rod  $d^2$  is adapted to move a contact  $d^3$  into engagement with a bar  $d^4$ . The bar  $d^4$  is common to all the contacts  $d^3$  and is connected to one pole of a battery S. (See Fig. 6.) Each contact  $d^3$  has connected to it a conductor-wire  $d^5$ , and the several wires are arranged in sets and lead to a switch mechanism. (Shown in Figs. 2 and 3.) Each contact  $d^3$  in connection with the bar constitutes a make-and-break. For convenience the sets of wires are arranged in cables. All of the wires of the contacts  $d^3$ , operated by the upper row of pneumatics, (see Figs. 1 and 3,) are gathered in one cable E. These wires may include the magnets controlling the speaking-pipes comprised in the swell and great organs and are used only when the upper set of ducts or passages of the double tracker-board are in use. The contacts  $d^3$ , operated by the two lower rows of pneumatics, (see Fig. 4,) and which are operated from the lower set of openings in the double tracker-board, are divided into two parts—a solo part, comprising the upper forty-six notes of the great and swell organs, and an accompaniment part, comprising the lower forty-six notes of the great and swell organs. (See Fig. 2.) The wires  $d^5$  of these contacts are gathered in two cables E' E'', respectively.

The several cables E E' E'' are brought into proximity to the switch device, which is shown more particularly in Figs. 2 and 3. The switch device consists of a plurality of switches G, G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, and G<sup>5</sup>. Each switch, as here shown, comprises contact-fingers  $g^3$   $g^4$  and a bar or rod  $g$ , carrying diametrically opposite contact-points  $g'$   $g^2$ , with which the contact-fingers coact. Normally the contact-finger  $g^3$  is always in engagement with the contact-point  $g'$ . Upon the partial rotation of the rod  $g$  the other contact-point  $g^2$  is brought into engagement with the contact-finger  $g^4$ , thus completely closing a circuit through the two fingers and the contact-points. To insure a break in this circuit when the switch is in its normal position, the contact-finger  $g^4$  is slightly bent at its end. (See Fig. 5.) The partial rotation of each bar or rod  $g$  is accomplished through a pneumatic H, the movable member of which is

connected to the bar or rod through a rod  $h$  and an arm  $h'$ . Each pneumatic  $H$  is open to one end of a passage  $h^2$ , the other end of which is vented to the atmosphere and to an exhaust-chest  $h^3$ . Pallets  $h^4$   $h^5$ , operated by a pneumatic  $h^6$  in the chest  $h^3$ , control the vents of the passage  $h^2$ . The pneumatic  $h^6$  is vented to one end of a passage  $h^7$ , the other end of which passage is vented to the atmosphere and an exhaust  $h^8$ . Pallets  $h^9$   $h^{10}$ , operated by an electromagnet  $h^{11}$ , control these vents. The magnet  $h^{11}$  is included in a circuit comprising a battery and a switch  $h^{12}$ . A switch is provided for each magnet  $h^{11}$ , and a stop  $h^{13}$  is provided to move each switch.

For each wire in each cable there is provided a pair of contact-fingers  $g^3$   $g^4$  and a pair of contact-points  $g^1$   $g^2$ . The cable E, containing the wires for operating from the upper row of tracker-holes, is brought into proximity with the switches G and G', and each wire therein is connected to a contact-finger  $g^3$ . Each contact-finger  $g^4$  of the switch G is connected by a wire 1 with a junction-plate Q, so that when the rod  $g$  of this switch is rotated to make the circuit complete through the contact-fingers  $g^3$   $g^4$  and contact-points  $g^1$   $g^2$  a pipe in the swell-organ will be permitted to speak. Each contact-finger  $g^4$  of the switch G' is connected by a wire 2 with a junction-plate Q', so that upon the rotation of the rod  $g$  of this switch to complete a circuit a pipe in the great organ will be permitted to speak.

35 The cable E', containing the wires for operating the magnets controlling the upper forty-six notes of the great and swell organs, is brought into proximity to the switches G<sup>2</sup> 3, so that the wires therein may be connected  
40 with the contact-fingers g<sup>3</sup> comprised in these switches. The contact-fingers g<sup>4</sup> of the switch G<sup>2</sup> are each connected by a wire 4 with the junction-plates Q, and the fingers g<sup>4</sup> of the switch G<sup>3</sup> are each connected by wires 5  
45 with the junction-plates Q'. The cable E<sup>2</sup>, containing the wires for operating the magnets controlling the lower forty-six notes of the great and swell organs, is brought into proximity to the switches G<sup>4</sup> and G<sup>5</sup>, and each  
50 wire in said cable is connected with the contact-fingers g<sup>3</sup> comprised in these switches. The contact-fingers g<sup>4</sup> of the switch G<sup>4</sup> are connected by a wire 6 with the junction-plates Q, and the contact-fingers g<sup>4</sup> of the  
55 switch G<sup>5</sup> are connected by wires 7 with the junction-plates Q'.

The organ shown in the drawings is provided with six stops <sup>h<sup>13</sup></sup> for the six switches G, G', &c., which are marked as follows: G, 50 "Swell Æolian;" G', "Great Æolian;" G<sup>2</sup>, "Swell solo;" G<sup>3</sup>, "Great solo;" G<sup>4</sup>, "Swell accompaniment;" G<sup>5</sup>, "Great accompaniment."

In the operation of the musical instrument, and assuming that the upper set of passages of the tracker-board are being used in connec-

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the tracker-board having two sets of tracker-holes, two or more sets of sound-producing devices, and connections for playing them from either of said sets of tracker-holes, one of the said sets of tracker-holes having solo and accompaniment sections and connections for connecting either section at will to either or both said sets of sound-producing devices, for substantially the purposes set forth.

2. In a musical instrument, a plurality of independent sets of sound-producing devices having different characters, a tracker having two sets of ducts, each set disposed in a separate longitudinal line, one of said sets of tracker-ducts being greater in number than the other and divided into two sections for controlling two sets of said sound-producing devices, and means for connecting said sets of ducts with said sets of sound-producing devices.

3. In a musical instrument, a plurality of independent sets of sound-producing devices having different characters, a tracker having two sets of ducts, each set disposed in a separate longitudinal line, one of said sets of

tracker-ducts being greater in number than the other and divided into two sections for controlling two sets of said sound-producing devices, means for connecting either of said  
5 sets of ducts with said sets of sound-producing devices, and means for rendering the other set of ducts inoperative.

4. In a musical instrument, a plurality of sound-producing devices, two sets of tracker-  
10 ducts, one of which is greater in number than the other and is divided into two sections each comprising a plurality of ducts, means for rendering the set of ducts of lesser number inoperative, and means for alternatively connect-  
15 ing either of the separate sections of the other set of ducts to either of two sets of sound-producing devices.

5. In a musical instrument, a plurality of independent sets of sound-producing devices,  
20 a tracker having two sets of ducts, each set disposed in a separate longitudinal line, one of said sets of tracker-ducts being greater in number than the sound-producing devices in one set thereof and divided into two sections,  
25 each comprising a plurality of ducts connected with one of said sets of sound-producing devices, and means for alternatively connect-

ing either of said independent sets of tracker-ducts with said sound-producing devices.

6. In a musical instrument, a plurality of  
30 independent sets of sound-producing devices having different characters, a tracker having two sets of ducts, each set disposed in a separate longitudinal line, one of said sets of  
35 tracker-ducts being equal in number to the sound-producing devices in one of said sets thereof and the second set of tracker-ducts being greater in number than the first-named set and divided into two sections each com-  
40 prising a plurality of ducts, means for rendering said first-named set of ducts inoperative, and means for connecting one section of the tracker-ducts in said last-named set with the  
45 upper portion of one set of sound-producing devices and the other section of said tracker-ducts with the lower portion of another set of sound-producing devices.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN S. VOTEY.

Witnesses:

F. R. WYCKOFF,  
GEO. E. CRUSE.