

No. 889,165.

PATENTED MAY 26, 1908.

P. WELIN.

DIFFERENTIAL VALVE FOR PNEUMATICALLY CONTROLLED
MUSICAL INSTRUMENTS.

APPLICATION FILED JULY 18, 1907.

2 SHEETS—SHEET 1.

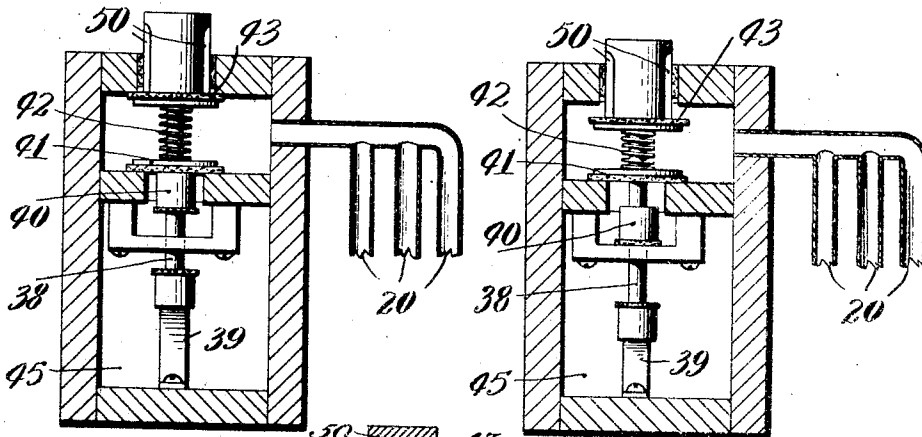
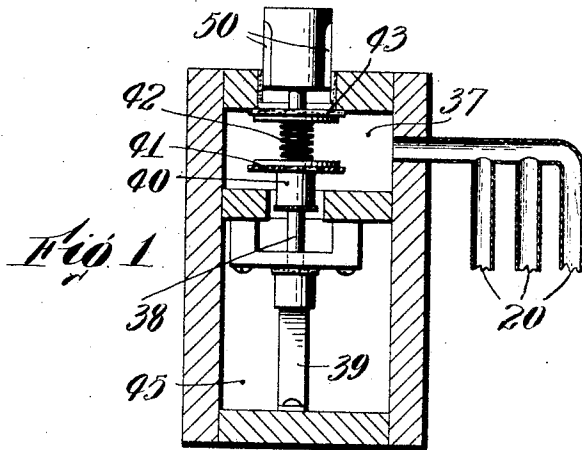


Fig. 2.

Fig. 3.

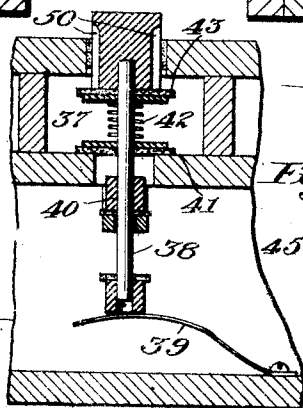


Fig. 3a.

Witnesses:

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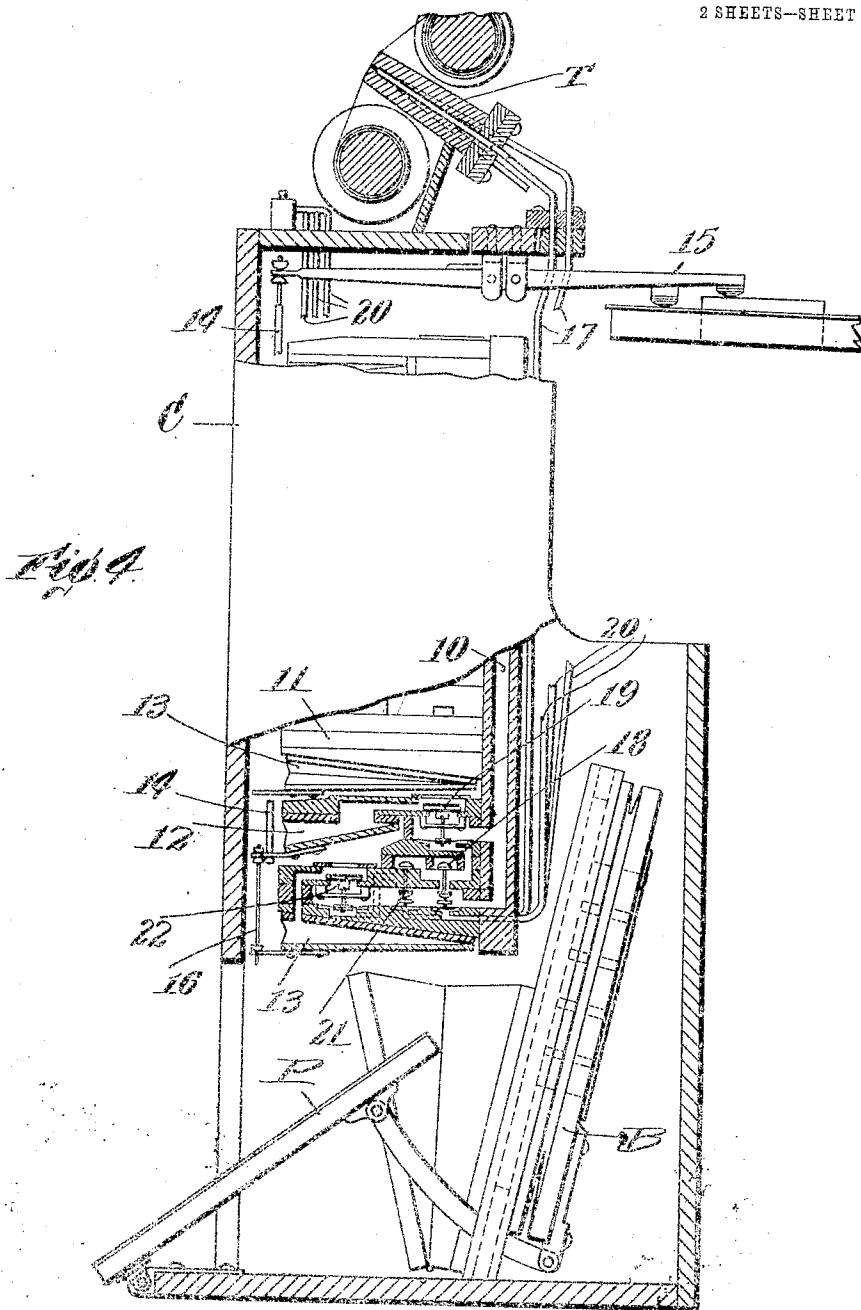
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2 SHEETS—SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

PETER WELIN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO ALBERT KRELL, OF NEWCASTLE, INDIANA.

DIFFERENTIAL VALVE FOR PNEUMATICALLY-CONTROLLED MUSICAL INSTRUMENTS.

No. 889,165.

Specification of Letters Patent.

Patented May 26, 1908.

Original application filed May 24, 1904, Serial No. 269,448. Divided and this application filed July 18, 1907.
Serial No. 384,361.

To all whom it may concern:

Be it known that I, PETER WELIN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Differential Valve for Pneumatically-Controlled Musical Instruments, of which the following is a specification.

This application is a division of my prior application for an automatic musical instrument filed May 24, 1904, Serial No. 209,449.

This invention relates to a valve for use with such a musical instrument as that set forth in the above identified application, or other forms of pneumatically controlled musical instruments, such as automatic pianos, piano players, and the like.

The principal objects of the invention are to provide means whereby a valve which normally connects a passage or chamber with the suction and is intended to disconnect the passage therefrom and connect it with the atmosphere will complete the former function first so that there will be no leakage between the suction chamber and the atmosphere. For this purpose the valve is made of a differential character, so that the suction passage can be first closed and the air passage opened thereafter.

While the invention is shown as applied to a form of differential valve designed to be operated by hand, and some of the claims are limited thereto, it is to be understood that the broader claims cover the device independently of the manner in which it is operated.

Reference is to be had to the accompanying drawings which show a preferred form of the invention, and in which

Figure 1 is a sectional view showing the parts in such position as to permit communication between the suction chamber and the passage. Fig. 2 is a similar view showing this communication cut off. Fig. 3 is a similar view showing the passage connected with the outer air. Fig. 3^a is a sectional detail view at right-angles to Fig. 3, and Fig. 4 is a vertical sectional view of sufficient parts of a playing attachment for musical instruments to illustrate the application of this invention thereto.

The invention is illustrated as applied to an automatic musical instrument player in which the operative parts are mounted in a casing or housing C.

In the bottom part of the casing C are the usual bellows B which are worked from the treadles P preferably for producing a low air tension.

The bellows B are connected by the usual passages (not shown) to exhaust the air from a vertical wind-trunk 10.

Mounted on the face of the vertical wind trunk 10 are independently detachable units 11, each one of which contains the operative connections for operating one of the key striking levers. Each of the units 11 comprises an upper small service pneumatic 12 which is connected by a rod 14 to a key lever 15, and a larger accenting pneumatic 13 which is connected, for example, as shown at the bottom unit, by a rod 16 to supplement the service pneumatic 12.

In addition to a service pneumatic 12 and an accenting or supplemental pneumatic 13, each one of the detachable elements contains the pneumatics and valves for controlling the striking pneumatics, and included in each set of operating connections is a primary valve 18 which is operated by a primary pneumatic to admit atmospheric pressure to a pneumatic which operates a valve 19 controlling the striking or service pneumatic 12.

Mounted on top of the casing is the usual tracker-board T cooperating with the usual paper wiping rolls, and extending down from the tracker-board are the service pipes 17. Each service pipe 17 is connected to operate a primary pneumatic to raise a valve 18, admitting air pressure to the operating pneumatic which raises the valve 19 to connect the service pneumatic 12 with the suction.

The operative connections so far referred to are substantially the same as employed in the ordinary instruments of this class, and it will also be seen that in the specific construction herein illustrated I have followed the same general plan as shown in my prior United States Letters Patent No. 727,725 granted to me May 12, 1903. That is to say, the ordinary operating connections for each note are all located in an element or structure which is detachably secured in place so that the same may be removed without otherwise dismantling the construction. In addition to these ordinary operating connections each unit of an action is shown as comprising a switch valve 21 which is operated by a primary pneumatic to open the

connection between the passage controlled by the primary valve 18 and a passage which leads to an operating pneumatic controlling the valve 22 which connects the accenting or supplemental pneumatic 13 to the atmosphere or to the suction.

The primary pneumatic which operates the switch valve 21 has pressure admitted thereto through a pipe 20 which may be controlled from the tracker-bar or from manually operated valves as hereinafter explained. By means of this construction when the switch valve 21 is in its normal position the operation of the primary valve 18 may cause the operation of the service pneumatic 12 without affecting the accenting or supplemental pneumatic 13. When it happens, however, that the switch valve 21 is in its raised position the operation of the primary valve 18 will cause both of the striking pneumatics to operate. That is to say, the switch valve 21 acts simply as an intermediate controller, and the accenting or supplemental pneumatic is not brought into use, except when the primary valve 18 is opened. I regard this as a point of advantage, as it secures absolute simultaneous action, and also for the reason that the switch valve 21 does not provide a direct outlet to the atmosphere, the only outlet to the atmosphere of the operative connections being controlled by the primary valve 18. This is important, because in the use of automatic playing attachments for musical instruments the greatest loss of air arises from the imperfect seating of the primary valves, and for the reason that when a primary valve is shifted, but has not completed its travel, there is a momentary direct connection between the atmosphere and the vacuum chamber or wind-trunk.

The above description is given to show how this invention may be applied in practice but it is not claimed herein, as it forms part of my above identified application.

The present invention may be applied to instruments or instrument players in which the action is controlled from the tracker bar or from manually manipulated push buttons or keys. The former construction requires a specially perforated music sheet, and the invention is illustrated with particular reference to the other manner of controlling the device.

Figs. 1, 2 and 3 of the drawings illustrate a preferred form in which a number of the controlling pipes 20 are connected to be operated simultaneously. That is to say, a single manually operated push button or key may be made to control the accenting devices in a group of notes, three in number in the present case, and this can be done without confusing the playing, as three successive notes in a musical composition are never sounded in a perfect chord. Each of these groups of con-

trolling or accenting pipes 20 is shown as connected with a chamber or passage 37. Mounted in this chamber is a valve stem 38 which is normally lifted by a spring 39. Fastened on the valve stem 38 is a button 40 which carries a valve 41. Supported on the valve stem by a spring 42 is a normally closed valve 43, and on the upper end of the valve stem 38 is a finger piece or button having splines or channels in its sides.

When the parts are in normal position as illustrated in Fig. 1, the chamber or passage 37 communicates with a trunk or vacuum chamber 45. When the finger piece is first depressed, as illustrated in Fig. 2, the valve 41 is immediately closed, and thereafter the valve 43 is opened to admit atmospheric pressure to the chamber 37 and the accenting pipes 20, three of such accenting pipes being shown in the present case as controlled from a single push button or finger piece. I consider this a desirable construction, because it enables me to shut off connection with the wind-chest before atmospheric pressure is admitted to the chamber 37, and for this reason a direct connection between the wind-chest and the atmosphere cannot be opened even when the finger key is left in an intermediate position.

The operation of the valves will be readily understood. Referring first to Fig. 1, it will be seen that the valve 43 is on its seat protecting the chamber 37 from the admission of air. The spring 39 acts to hold the parts in this position. When pressure is first applied to the finger button, the first action positively forces down the valve 41 on its seat as shown in Fig. 2. No action of the valve 43 takes place during this motion of the finger button, because the latter is capable of moving longitudinally with respect to the valve, but on the further downward motion of the finger button, its bottom directly engages the top of the valve, and forces it away from its seat, as shown in Fig. 3 without interfering with the position of the valve 41. The air is then admitted to the chamber 37 through the channels 50 in the sides of the finger button. When the accenting effects are controlled by the finger keys or push buttons it is desirable that the music sheet should have the proper characters printed thereon to indicate which ones of the push buttons should be operated. To accomplish this the push buttons are preferably numbered consecutively, and on the music sheet characters are printed signifying which ones of the push buttons should be operated. For example, when the push button No. 1 should be operated, the characters "No. 1" are printed immediately in front of the accented note. In a similar way, different numbers, for example, No. 2 and No. 4, may also be printed to indicate the proper button.

While I have illustrated and described a

preferred form of the invention, I am aware that many modifications may be made therein within the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to the particular form shown, but

What I do claim is:—

1. In a music playing device, the combination of a chamber having two ports, a valve stem, resilient means for forcing said valve stem in a certain direction, a valve fixedly mounted on said valve stem for closing one of said ports, a valve slidably mounted on the valve stem for closing the other port, and a spring for forcing the second valve away from the first.

2. In a music playing device, the combination of a chamber having two ports, a valve stem, resilient means for forcing said valve stem in a certain direction, a valve fixedly mounted on said valve stem for closing one of said ports, a valve slidably mounted on the valve stem for closing the other port, a spring for forcing the second valve away from the first, and a push button on the stem above the slidably mounted valve.

3. The combination with a chamber having ports, a valve stem, two valves on said stem both located in said chamber between the ports, one of said valves being fixed to the stem and the other slidable thereon, a spring for moving the valve stem in such direction as to tend to move the slidable valve toward its port, and a spring located between said valves.

4. The combination with a chamber hav-

ing two ports opposite each other, a vertical valve stem, a spring for forcing said valve stem upwardly, two valves on said stem, the lower one being fixed thereto, and the upper one slidable thereon, a spring between said valves for moving the slidable valve, and a push button mounted on the top of the stem and having channels in its walls for admitting air through the port in which it is located, said first named spring being adapted to force the valve stem to sufficient height to remove the fixed valve from its port and lift the push button out of contact with the sliding valve.

5. A valve box having a chamber, a suction chamber, a port of smaller cross-section than the chamber and connecting it with the suction chamber, an opening from the chamber to the open air, valves for said opening and port, and means for operating the valves when the valve for the opening is closed, for first closing the valve for the port and then opening the valve for the opening.

6. In a valve, the combination of a valve stem, means for operating said stem, a valve member rigidly mounted on the stem, a second valve member loosely mounted on the stem, and a spring located between said members.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

PETER WELIN.

Witnesses:

C. FORREST WESSON,
ALBERT E. FAY.