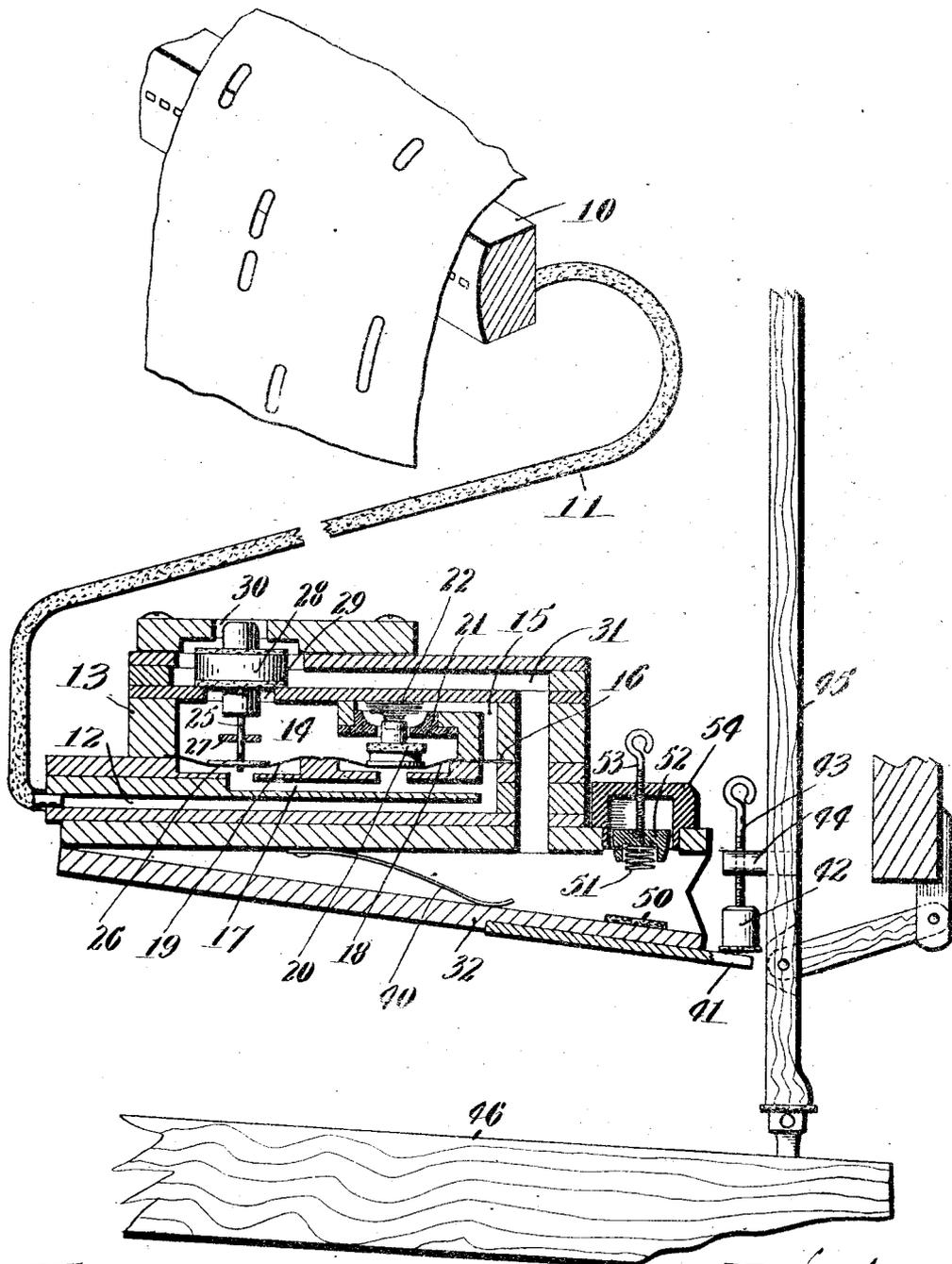


P. WELIN.
 PNEUMATIC ACTION FOR SINGLE SYSTEM MUSICAL INSTRUMENTS.
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Witnesses:
 C. F. Mason
 E. M. Allen.

Inventor:
 Peter Welin
 by Attorneys
 Southgate & Southgate.

UNITED STATES PATENT OFFICE.

PETER WELIN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO KRELL AUTO-GRAND PIANO CO. OF AMERICA, OF CONNERSVILLE, INDIANA, A
CORPORATION OF INDIANA.

PNEUMATIC ACTION FOR SINGLE-SYSTEM MUSICAL INSTRUMENTS.

1,045,226.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed September 12, 1907. Serial No. 392,538.

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 Pneumatic Action for Single-System Musical Instruments, of which the following is a specification.

In theory there are two ways of operating pneumatic musical instruments, one consisting in controlling the striking pneumatics by means of a secondary valve which is in turn controlled by a primary valve, and the other consisting in controlling the striking pneumatics entirely by a single valve. The first is called the double system and the second the single system. The former is usually employed, although more complicated and expensive, because the single system requires large openings and passages to connect its pneumatic with the tracker in order to furnish enough air to open the valve. This makes the tracker too large and necessitates the use of more force in pumping the instrument than can be employed practically. This invention is equally applicable to both systems but it has the effect of rendering the simpler single system practicable.

One object of the present invention is to provide a construction whereby the single system may be employed with small tracker openings and channels and with a simple and convenient construction, this not only greatly lessening the cost of the instrument but also reducing the amount of pumping necessary for the operation of the same, and to provide a construction in which the loss of tension in both the single and double systems may be largely avoided.

Another object of the invention is to provide means located where dust from the outer air will not collect on it whereby the so-called "tubby" effects of the blow delivered by a striking pneumatic acting directly on the abstract is cushioned so as to get an effect approximating that of the human touch; and to provide certain adjustments for the same so located as to permit adjustment while testing and for the connection between the striking pneumatic and the abstract, these features being of such construction as to be especially applicable to instruments which can be operated either manu-

ally or automatically without disconnecting the abstracts.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying sheet of drawings which illustrates in cross section and partly in perspective, a pneumatic action embodying the features of this invention.

The invention is illustrated as applied to that type of automatic combination piano in which a tracker 10 is connected by tubes 11 with channels 12 for controlling the operation. It is to be understood, however, that the invention is to be applied to any type of pneumatic instrument or player. Each channel 12 in the present instance, is shown as located in a valve box 13 which has a suction chamber 14. The channel is connected with the suction chamber through a passage 15 which has a disk 16 provided with a small opening constituting a restricted passage for the air. It will be seen that when the passage 15 is opened to the suction chamber 14 and the channels of the tracker-bar are covered, there will be communication between each suction chamber and its channel.

The channel 12 is connected with a channel 17 which communicates with chambers under two pneumatics 18 and 19. The pneumatic 18 is located in such position that air coming from the tracker through the channel 12 will fill the chamber under it before it fills the chamber under the pneumatic 19. The pneumatic 18 is provided with a valve 20 adapted to engage a seat so as to close the communication between the passage 15 and the chamber 14. A light spring 22 normally operates to hold the valve away from its seat. The construction of this part of the device is similar to a construction shown and claimed in my co-pending applications for patent; to wit, automatic modulating mechanism for musical instruments, filed January 7, 1907, Serial No. 351,086 and automatic player for musical instruments, filed January 7, 1907, Serial No. 351,088, but it is used here in a different way and constitutes a part of a different combination.

The pneumatic 19 supports a valve rod which is adjustably connected with a disk 26 resting on or secured to the pneumatic

and guided in a guide 27. This valve rod supports a valve 28 adapted to control a pair of ports 29 and 30 communicating with a channel 31 which extends to a striking pneumatic 32. The valve 28, therefore, controls the connection of the striking pneumatic to the suction 14 and to the outer air, and it is obviously made heavier than the valve 20 and is not so easily operated by its pneumatic. The valve 28 opens against the pressure of the atmosphere, while the valve 20 closes only against the pressure of the spring 22, as the passage 15 is in communication with the suction chamber until the valve closes it. Consequently, in addition to the location of the pneumatics as described, it is obvious that there are two reasons why an air impulse through the channel 12 will first lift the valve 20 and thereafter lift the valve 28. This has the effect first to cut off the channel 15 from communication with the suction chamber so that the air admitted to the channel 12 will not at this time act to reduce the tension in the chamber 14. The next effect is that well understood in the art, namely the cutting off of the striking pneumatic 32 from the outer air and connecting it with the chamber 14 so as to collapse the pneumatic and operate it in a well-known manner. After this is accomplished, the air in the channel 12 gradually leaks through the restricted opening in the disk 16 and the spring 22 opens the valve 20 which connects the channel 12 with the chamber 14 and permits the pneumatic 19 to drop back. This admits air to the pneumatic 32. It will be seen that this use of the auxiliary valve 20 for controlling the bleeding of the channel into the suction chamber obviates the necessity of using large tracker passages and has the additional advantage of reducing the amount of pumping to operate the several striking pneumatics. It is understood, of course, that each of the striking pneumatics is similarly constructed.

The movable leaf of the pneumatic 32 is controlled by a spring 40 as is ordinarily the case, the preferred form shown being a flat spring inside the pneumatic fixed to one leaf thereof and bearing on the other leaf. The movable leaf is also provided with a projection 41 which engages a disk 42 mounted on a screw-threaded rod 43 which is adjustably supported in a projection 44 on the abstract 45. The bottom of the abstract rests on the rear of the key 46 and it is understood to be connected in any of the usual ways for operating the striking devices. By the use of the adjustable disk 42 it will be seen that the operation of the various elements can be regulated at any time, as for example, when the piano is tuned, and each note can be regulated independently of the others.

Another object of this invention is to provide means for overcoming the so-called "tubby" action of the mechanical players which is due to the fact that they give a distinct non-yielding blow to the abstract in their operation. In order to accomplish this result, the movable leaf of the pneumatic is provided with a pad 50 and the stationary leaf with a spring 51 which the pad encounters near the end of its stroke to slightly retard it and cushion the action of the pneumatic. This spring is preferably adjustable, and for that purpose is mounted in a cup 52 which is supported by a screw 53 projecting through a cap 54 secured to the pneumatic. It will be seen, therefore, that not only the strength of the blow but the cushioning effect of the spring can be regulated by a simple adjustment so that both of these factors which contribute to the successful operation of the device are within easy control. It will, of course, be understood that while the pad has been described as being on the stationary leaf of the pneumatic and the spring on the movable one, this arrangement might be reversed with similar results.

While I have illustrated and described a preferred form of the invention, I am aware that many modifications may be made therein by persons skilled in the art, and that the invention may be applied to other types of pneumatically controlled instruments than that illustrated in the drawings, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the construction shown, but

What I claim is:—

1. A pneumatic action for a music playing device comprising striking pneumatics, air conducting channels, a single pneumatic and valve for controlling the action of each striking pneumatic, a suction chamber, means for connecting the channel with the suction chamber, and means for cutting off said connecting means when an air impulse passes along the air channel to said single pneumatic and before the single pneumatic is operated.

2. The combination of a striking pneumatic, a suction chamber, an air channel normally connected with the suction chamber, pneumatic means controlled from said air channel for connecting said striking pneumatic with the suction chamber, and means independently controlled from said air channel for automatically disconnecting the air channel from the suction chamber before said pneumatic means is put into operation.

3. In a pneumatic action for musical instruments, the combination of an air channel, a suction chamber, a passage from the air channel to the suction chamber, a valve

for closing said passage, a striking pneumatic, a valve for controlling said striking pneumatic, a pneumatic for operating the last named valve controlled by the air in said channel, and a pneumatic also controlled by the air in said channel for operating the first named valve.

4. In a pneumatic action for musical instruments, the combination of an air channel, a suction chamber, a passage from the air channel to the suction chamber, a valve for closing said passage, a striking pneumatic, a valve for controlling said striking pneumatic, a pneumatic for operating the last named valve, controlled by the air in said channel, and a pneumatic also controlled by the air in said channel, and operating in advance of the first named pneumatic, for closing the first named valve.

5. In a pneumatic action for musical instruments, the combination of an air channel, a suction chamber, a restricted passage from the air channel to the suction chamber, a valve for closing said passage, a striking pneumatic, a valve adapted to connect the striking pneumatic with the suction chamber or with the outer air, means for operating the first named valve, and means for thereafter operating the second valve.

6. In a pneumatic action for musical instruments, the combination of a striking pneumatic, a suction chamber, a single valve for controlling the connection of the striking pneumatic with the suction chamber and with the outer air, means for operating said valve comprising a channel, means for bleeding the air in said channel into the suction chamber, and means for closing the connection between said channel and suction chamber before the operating means for said valve is operated.

7. In a pneumatic action for musical instruments, the combination of a striking pneumatic, a valve box having a passage connected with said pneumatic, a port from said passage to the outer air, a suction chamber, and a port between said passage and suction chamber with a double-faced valve adapted to close said ports, a pneumatic for operating said valve, said valve box having a channel connected with said suction chamber, a valve for closing said channel of a lighter weight than the first named valve, and a pneumatic for operating the second valve, said valve box also having a channel communicating with the two pneumatics and with said channel.

8. In a pneumatic action for musical instruments, the combination of a striking pneumatic, a suction chamber, a valve opening against the air pressure for cutting said striking pneumatic off from connection with the outer air and connecting it with said

suction chamber, a pneumatic for said valve, a channel for controlling the operation of said pneumatic, means for connecting said channel with the suction chamber, a valve for closing said connecting means adapted to close against the air tension in said channel, and a pneumatic for operating the second valve, both of said pneumatics being in communication with said channel.

9. A valve box for a pneumatically controlled musical instrument having a suction chamber therein, a port from said suction chamber, a passage from said port, a second port opposite the first named port, a double-faced valve for controlling both of said ports, a channel communicating with said suction chamber, a valve for closing said channel located in the suction chamber, a pneumatic on which said last named valve rests, and a second pneumatic for supporting the first named valve, both of said pneumatics being located in said suction chamber and having their opposite sides connected with said channel, the first named valve opening against the air pressure and the second valve closing freely.

10. In a striking pneumatic, the combination of a movable leaf, a fixed leaf, a spring cushion within said pneumatic located on the fixed leaf and extending toward the movable leaf for limiting the motions of the movable leaf, and means extending through the fixed leaf for adjusting said cushion.

11. The combination of a striking pneumatic, a pad located on one of the leaves thereof, a spring located on the other leaf and adapted to engage the pad to cushion the blow of the pneumatic toward the end of its stroke, and means for adjusting the position of said spring toward and from the pad, said spring and pad being located within said striking pneumatic.

12. The combination of a striking pneumatic, a pad located on one of the leaves thereof, and a spring located on the other leaf and adapted to engage the pad to cushion the blow of the pneumatic toward the end of its stroke.

13. A striking pneumatic comprising a stationary leaf, a movable leaf, a pad on the movable leaf, a cap secured to the stationary leaf, a screw threaded through said cap, a cup mounted on the inner end of the screw, and a spring located in said cup and adapted to be engaged by said pad.

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

PETER WELIN.

Witnesses:

C. FORREST WESSON,
ALBERT E. FAX.