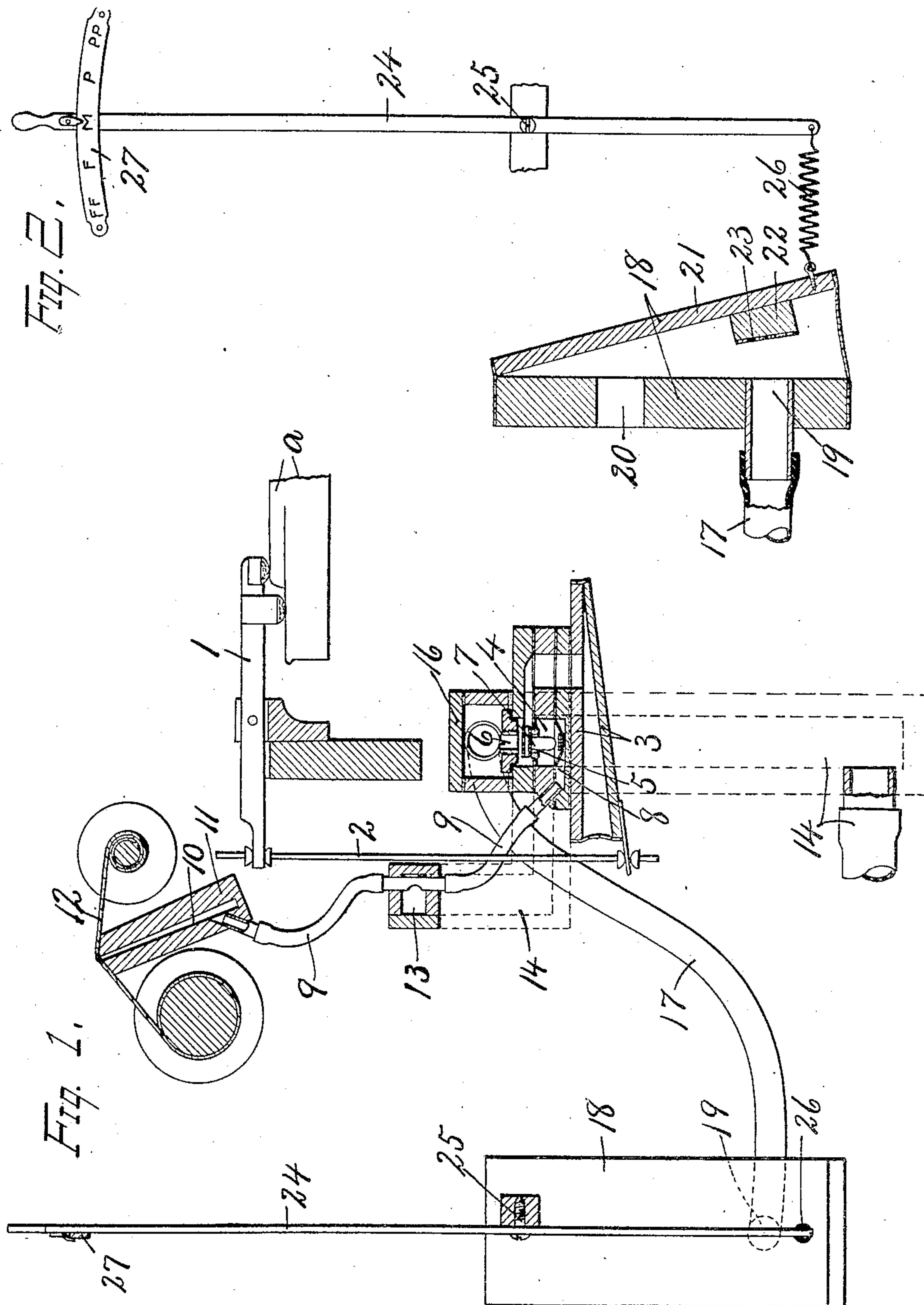


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PNEUMATIC SELF PLAYING MUSICAL INSTRUMENT.  
APPLICATION FILED OCT. 6, 1904.

912,366.

Patented Feb. 16, 1909.



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# UNITED STATES PATENT OFFICE.

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## PNEUMATIC SELF-PLAYING MUSICAL INSTRUMENT.

No. 912,366.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed October 6, 1904. Serial No. 227,470.

*To all whom it may concern:*

Be it known that I, LEWIS B. DOMAN, of Elbridge, in the county of Onondaga, in the State of New York, have invented new and  
5 useful Improvements in Pneumatic Self-Playing Musical Instruments, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

10 This invention relates to improvements in pneumatic self-playing musical instruments, but refers more particularly to an expression controlling mechanism by which the force of the key pneumatics may be graded step  
15 by step from one extreme to the other.

My object is to effect this gradation of expression by manually regulating the inflow of atmospheric air into the key-operating pneumatic from which the air has been  
20 previously exhausted. In other words, I have sought to grade the expression by rendering the action of the key-operating pneumatic more or less sluggish in its recovery or distention, and although this mechanism  
25 is particularly adapted for controlling the expression during the rendition of a musical selection, it will be obvious that the principle involved therein may be applied to other uses for regulating the action of any  
30 other bellows or pneumatic other than a key-operating pneumatic, such for instance, as a pneumatic motor for operating the music-sheet winding and rewinding mechanism.

35 Figure 1 is a vertical sectional view partly in elevation of a portion of a pneumatic self-playing piano showing my improved means for controlling the force of action of the striker-fingers to grade the expression.  
40 Fig. 2 is a vertical section of the expression governing pneumatic and its controlling lever and spring.

The mechanism for operating the keys, as  
45 —a— of a musical instrument, may be briefly described as consisting of key-striking fingers —1— which are connected by links —2— to suitable key-operating pneumatics —3—, Fig. 1. These key-operating pneumatics are grouped together upon a suitable  
50 shelf and each is placed in communication with an exhaust chamber —4— through a suitable port —5—, and is also connected to atmosphere through a second port —6—. Movable between these ports —5— and  
55 —6— is a valve —7— which is operated by

a primary pneumatic —8— for opening the port —5— and closing the port —6—, thereby connecting the exhaust passage —4— with the interior of the pneumatic —3—, and at the same time cutting off communica- 60 tion between the said pneumatic and the atmosphere. This primary pneumatic —8— is connected by a conduit —9— to its duct —10— of a tracker-board —11— over which travels a perforated music-sheet —12—. 65 The conduits —9— are connected to and communicate with a second exhaust chamber —13— and these exhaust chambers —4— and —13— are both connected by a conduit —14— to any suitable air exhaust- 70 ing device, not necessary to herein illustrate or describe, as any suction device capable of maintaining a partial vacuum in the chambers —4— and 13— will serve the desired purpose. 75

The mechanism thus far described is similar to what is shown in my former application Serial No. 221,996, filed August 24, 1904, and therefore, it is unnecessary to further illustrate or describe the construc- 80 tion and operation of these parts.

The essential change which has been made in the application above referred to consists in inclosing the several atmosphere ports —6— in a suitable chamber —16— which 85 has no connection with the exhaust chambers, but is connected by a conduit —17— to an additional pneumatic or bellows —18—. This pneumatic —18— is shown as provided with two ports —19— and —20—, the port 90 —19— receiving the conduit —17— while the port —20— opens to atmosphere, Fig. 2. The movable wall, as —21—, of the pneumatic —18— is provided on its inner face with a valve —22— having a felt or equiva- 95 lent porous face —23— which is movable into and out of engagement with the inner end of the port —19—.

A lever —24— is fulcrumed at —25— and has its lower end connected by a spring 100 —26— to the movable wall —21— of the pneumatic —18— while the upper end of said lever is adapted to be engaged by the hand of the operator, whereby the lever may be rocked upon its fulcrum along a 105 suitable scale —27— upon which are marked *ff*, *f*, *m*, *p*, and *pp* for indicating various degrees of expression from one extreme to the other. See Fig. 2.

It is now evident that the only communi- 110



cation between the pneumatics —3— and atmosphere is through the port —6—, chamber —16—, conduit —17—, and pneumatic —18— having the opening. —20— which  
 5 opens to atmosphere and that communication between the port —20— and key operating pneumatic —3— is controlled entirely by the valve —22—, Fig. 2. Now, if the  
 10 port —19—, as for instance, by rocking the lever —24— to the right until registered with the character *pp*— then it is evident that communication with the atmosphere is partially shut off except what gradually  
 15 leaks or oozes through the porous felt facing —23—, thus rendering the recovery or distention of the pneumatic —3— very slow and incomplete so that as it is again brought into communication with the vacuum chamber  
 20 before its reinflation is complete the action of the key-operating pneumatic is correspondingly weak and capable only of producing a light pianissimo tone. On the other hand, assuming that the lever —24—  
 25 is moved to the left into registration with the *ff*— character, then the spring —26— will be tensioned, and the valve —22— will be fully opened or drawn away from the port —19—, thus establishing full and complete  
 30 communication between the key striking pneumatic —3— and port —20—, and under such conditions the recovery or distention of the key-operating pneumatic is complete and instantaneous after each successive operation  
 35 of the keys. It is now clearly evident that by varying the degrees of proximity of the valve —22— to its seat —19—, a corresponding variation in the activity of the pneumatic —3— is produced, which in turn,  
 40 causes a similar variation in the expression or force of action of the keys, these intermediate expressions being indicated by the position of the lever upon the scale —27—.

In operation, when the pneumatics —3—  
 45 are placed in connection with the exhaust chamber —4— they are instantly deflated with a force proportionate to the extent of their previous inflation or distention so that if the governing pneumatic —18— is held  
 50 wide open the pneumatics —3— are operated with full fortissimo effect while if the valve —23— covers the port —19— the recovery of the pneumatic is complete and the stroke light or pianissimo in its effect.  
 55 Now, by tensioning the spring —26— slightly the distance of the valve —23— from its seat is increased to allow the atmospheric air to flow more freely into the pneumatic —3—, thereby producing an increased  
 60 force of action, the degree of force being regulated by the amount of resistance which is introduced to oppose the closing of the pneumatic —18— as controlled by the lever —24— and spring —26—.

65 Having thus described my invention what

I claim and desire to secure by Letters Patent is—

1. In a self-playing musical instrument, a striker pneumatic and an expression controlling pneumatic in combination with a valve 70 chest having an exhaust chamber and a port communicating with the expression pneumatic, a valve controlling communication between the exhaust chamber and striker pneumatic and also between said port and striker 75 pneumatic, said expression pneumatic having a port opening to atmosphere, and also provided with a valve for controlling communication between the expression pneumatic and port in the valve chest, and a 80 manual for operating the movable side of the expression pneumatic to control the action of the valve therein.

2. In a self-playing musical instrument, a striker pneumatic an expression pneu- 85 matic having two ports, one opening to atmosphere and the other connected to the striker pneumatic and having a movable side provided with a valve for opening and partially closing the port which communi- 90 cates with the striker pneumatic, a manual for controlling the movable side of the expression pneumatic, a valve chest having an exhaust chamber also connected to the striker pneumatic, a valve in the valve chest 95 for controlling communication between the expression and striker pneumatic and a primary pneumatic within the valve chest for controlling the action of the valve therein.

3. In a self-playing musical instrument, a 100 striker pneumatic, and means controlling the action of said striker pneumatic including an air chamber communicating with the atmosphere and with the striker pneumatic, a valve controlling communication between the 105 striker pneumatic and said chamber, and manually controlled means for operating said valve.

4. In a self-playing musical instrument, an exhaust chamber, a striker pneumatic con- 110 nected to the exhaust chamber, means for opening and closing communication between the exhaust chamber and striker pneumatic, an expression governing pneumatic communicating with the first named pneumatic 115 and having a port opening to atmosphere, and manually operated means for expanding the expression pneumatic for varying the flow of atmospheric air through the expres- 120 sion pneumatic to the striker pneumatic.

5. In a self-playing musical instrument, in combination with a striker pneumatic and air chamber having two ports, one communicating with the atmosphere and the other communicating with the striker pneu- 125 matic, a valve coacting with the last named port to vary the flow of atmospheric air to the striker pneumatic, and manually operated means controlling the action of said valve.



6. In a pneumatic self-playing musical instrument, an exhaust chamber, a striker pneumatic connected to the exhaust chamber, a valve controlling communication between the exhaust chamber and striker pneumatic, a primary pneumatic for operating the valve, a tracker duct connected to the primary pneumatic, a perforated music sheet controlling the passage of air through the tracker duct to the primary pneumatic, an expression governing pneumatic connected to the striker pneumatic and having an opening to the atmosphere, said expression governing pneumatic being operable manually to retard the flow of atmospheric air therethrough to the striker pneumatic.

7. In a pneumatic self-playing musical instrument, an exhaust chamber, a striker pneumatic connected to the exhaust chamber, and a manually operated expression controlling pneumatic opening to the atmosphere and connected to the striker pneumatic for varying the flow of atmospheric air to the striker pneumatic.

8. In a pneumatic self-playing musical instrument, an exhaust chamber, a striker pneumatic connected to the exhaust chamber and to the atmosphere, a valve and operating means therefor controlling communication between the striker pneumatic, exhaust chamber and the atmosphere, and an expression controlling pneumatic having two ports, one of which is connected to the striker pneumatic and provided with a porous valve, the other port being open to atmosphere, said valve being operable manually to control the flow of atmospheric air to the striker pneumatic.

9. In a self-playing musical instrument, an exhaust chamber, a striker pneumatic connected to the exhaust chamber and with the atmosphere, a perforated music sheet, and means controlled thereby for making and breaking connection between the exhaust chamber and striker pneumatic, connections between the striker pneumatic and atmosphere including an expression controlling pneumatic opening to atmosphere and operable manually to control the passage of atmospheric air to the striker pneumatic and thereby regulate the power with which said pneumatic is operated.

10. In a pneumatic self-playing musical instrument, an exhaust chamber, a striker pneumatic, connections between the striker pneumatic and exhaust chamber, additional connections between the striker pneumatic and atmosphere including therein an expression controlling pneumatic opening to atmosphere, a perforated music sheet, and means controlled thereby for making and breaking connections between the striker pneumatic, exhaust chamber and the atmosphere, said expression pneumatic having its movable side provided with a porous valve to control the passage of air therethrough to the striker pneumatic, and manually operated means for operating the movable side of the expression controlling pneumatic.

In witness whereof I have hereunto set my hand this 30 day of September 1904.

LEWIS B. DOMAN.

Witnesses:

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