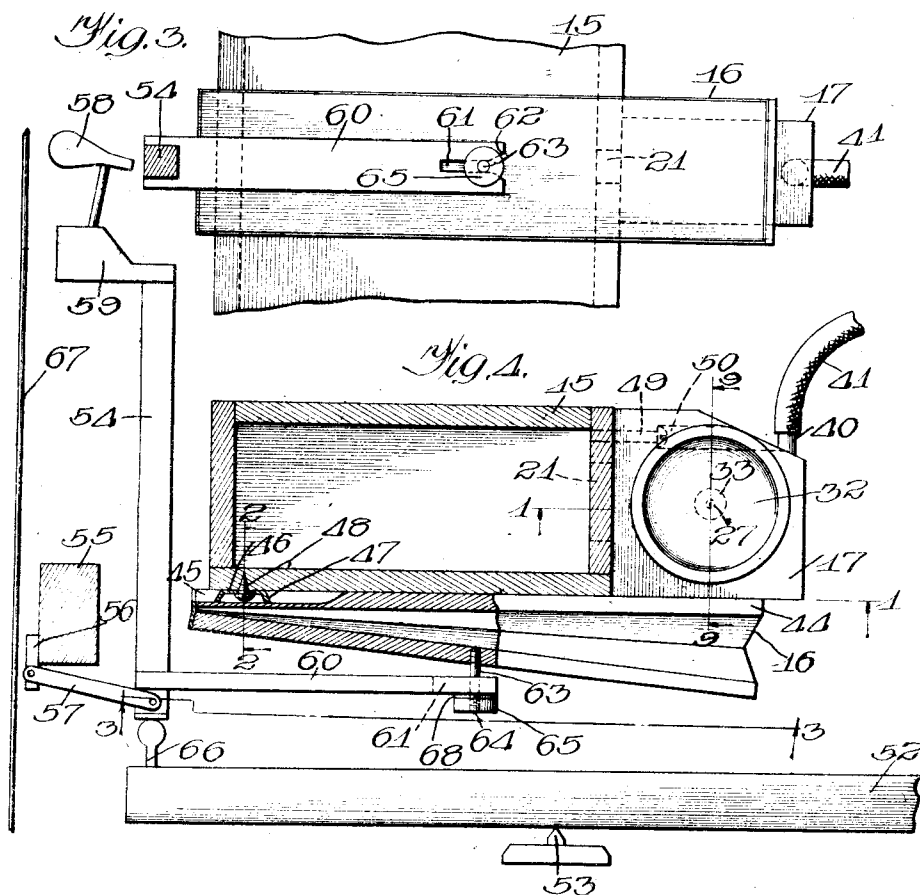
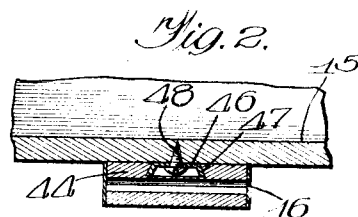
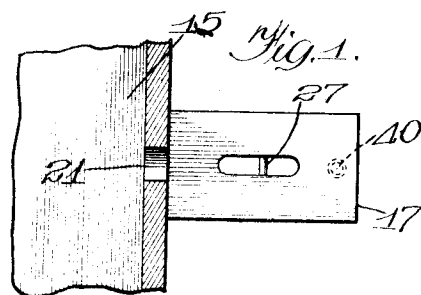


1,033,216.

2 SHEETS—SHEET 1

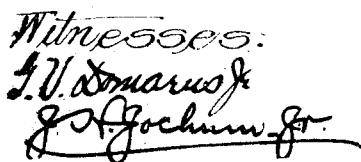


Witnesses:
G. V. Domarius Jr.
J. A. Jochem. Jr.

E. J. Y. Everetor:
E. J. Yurney
By Brown & Hoffmann
Attys

1,033,216.

2 SHEETS--SHEET 2.



Inventor:
E. J. Lumley,
By Brown & Hopkins *attys*

UNITED STATES PATENT OFFICE.

EUGENE T. TURNEY, OF ROCK ISLAND, ILLINOIS, ASSIGNOR TO ARTISTA PIANO
PLAYER COMPANY, OF MILAN, ILLINOIS, A CORPORATION OF ILLINOIS.

PNEUMATIC ACTION FOR MUSICAL INSTRUMENTS.

1,033,216.

Specification of Letters Patent. Patented July 23, 1912.

Application filed June 19, 1908. Serial No. 439,387.

To all whom it may concern:

Be it known that I, EUGENE T. TURNEY, a citizen of the United States, residing at Rock Island, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Pneumatic Actions for Musical Instruments, of which the following is a specification.

This invention relates to improvements in pneumatic actions particularly adapted for use with musical instruments in which the pneumatic action is controlled by a music sheet or record. Pneumatic actions of this character usually comprise what are known in the art as a main pneumatic and a controlling pneumatic. The main pneumatic is usually in the form of a bellows which has suitable connection by its movable member with the piano action, while the controlling pneumatic is provided with valves or similar devices for controlling the operation of the main pneumatic through the admission of air thereto, or exclusion of air therefrom, the controlling pneumatic being itself controlled by the music sheet, or record serving to admit air to or exclude air from the vent chamber for the controlling pneumatic.

Pneumatic piano actions must be designed with a view to meeting certain existing conditions; they must be designed with especial reference to the standard construction of piano case and piano action, as it is desirable that the pneumatic action be capable of insertion into the piano case of standard design and of ready application or attachment to the piano action of standard construction. The piano action requires for its proper operation that the main pneumatic possess a certain amount of power, and this power is of course dependent upon the action of the pumpers which exhaust the air from the controlling pneumatic, and through the controlling pneumatic from the main pneumatic, but there is a limit to the amount of power capable of being produced by foot actuated pumpers, and mechanical or motor operated pumpers are entirely out of the question, because with such the instrument becomes purely mechanical and the operator has no part whatever in the playing operation and cannot give expression to the music, as he can by the use of his feet for operating the pumpers. Moreover, a low degree of vacuum or low pressure is desirable in instruments of this character, since

high pressure increases the friction of all parts subjected to it, and not only results in serious wear, but in uncertainty of movement, the requirement for lubricant, etc. The difficulty in obtaining the requisite degree of pressure or vacuum by means of foot pumpers has heretofore made it necessary to employ objectionably large pneumatics of both the main and controlling species in order to compensate for the lack of pressure, and to produce the necessary power for working the piano action. But these large pneumatics are seriously objectionable in that they cannot be arranged entirely within the piano case of the usual dimensions and standard design, the space being restricted. In some instances it has been proposed to employ with a small main pneumatic a lever for multiplying its power upon the piano action, but it is found in practice that there is not room in the space available for the accommodation of this lever, which necessarily results in placing the pneumatic higher up in the piano case to make room below it for the lever. The pneumatic then interferes with the piano case. Neither can the width of the pneumatic be increased sufficiently to produce the requisite power, because that would add to the width of the entire attachment as much as the additional width of each pneumatic multiplied by the number of pneumatics, which would be very considerable, and would make the attachment several inches longer than the keyboard of the standard piano; and the length of the pneumatic is limited by the space between the upright bars, sometimes called stickers, of the piano action and the fall board of the piano case.

The invention, therefore, has for one of its important objects, to so construct and arrange a pneumatic piano action that the requisite number of such actions may be placed within a comparatively small space, and will yet be powerful enough to operate the piano action by direct connection therewith through pressure induced by foot power.

It is of course understood that in the operation of pneumatic piano players, the sounding of each note results in the admission of atmospheric air into the space wherein is created the partial vacuum depended upon for operating the main and controlling pneumatics, and consequently the more rap-

idly the instrument is played, or any note is sounded, the greater will be the reduction of the degree of vacuum and the greater will be the effort or work imposed upon the feet of the player to keep up the vacuum necessary for working the instrument. As before said, there is a limit to the degree of vacuum that can be feasibly produced by foot power, and for that reason, difficulty has heretofore been experienced with pneumatic automatic piano playing attachments in keeping up the requisite degree of vacuum when trilling or otherwise rapidly sounding one or more notes for operating the action as rapidly as the music requires, since the loss of vacuum results in sluggishness in the operation of the controlling pneumatic.

The invention therefore has for its further object to so construct and arrange the parts of the controlling pneumatic that the bleed-hole or passage commonly employed for placing the diaphragm chamber of the controlling pneumatic in communication with the pumpers will be so small that the loss of vacuum due to the opening of a large number of these bleed-holes at one time or in rapid succession, or the prolonged opening of any one of them, will not be sufficient to materially affect the operation of the valve mechanism of the controlling pneumatic. This last named object involves certain subsidiary objects, and essential requirements, which will be hereinafter pointed out.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating an embodiment of the invention, and in which—

Figure 1 is a detail view partly in section, taken on line 1—1 of Fig. 4. Fig. 2 is a detail sectional view on line 2—2 of Fig. 4. Fig. 3 is a detail bottom plan view partly in section, taken on line 3—3 of Fig. 4. Fig. 4 is a detail sectional view partly in elevation of an improved action of this character constructed in accordance with the principles of this invention and showing a portion of the mechanism to which it is attached. Fig. 5 is a detail elevation of one end of the valve box showing the transparent member by means of which the vent holes may be inspected. Fig. 6 is a detail sectional view taken on line 6—6 of Fig. 8. Fig. 7 is a detail sectional view taken on line 7—7 of Fig. 9. Fig. 8 is a detail sectional view taken on line 8—8 of Fig. 9. Fig. 9 is an enlarged detail sectional view taken on line 9—9 of Fig. 4.

In this exemplification of the invention, the reference character 15 designates a suction chamber, or what is sometimes called

a wind chest or trunk, which is located within the casing of the piano and to which the pneumatic piano actions are detachably secured, so as to have communication therewith, whereby the suction or partial vacuum induced in the wind chest will operate the pneumatics. As before said, each of the pneumatic actions comprises a main pneumatic and a controlling pneumatic. The main pneumatic consists merely of a bellows or other like instrument 16, having a movable bottom member connected to its top member by the usual flexible sides. The controlling pneumatic usually comprises a suitable fluid pressure abutment and suitable housing therein illustrated as a valve box or block 17, containing the necessary passages, valves, etc., for controlling the passages between the wind chest 15 and the main pneumatic 16, and between the said pneumatic 16 and the external atmosphere. Referring to this valve housing in detail, it is provided with a valve chamber 18 having a valve seat 19 therein. The valve chamber 18 opens through one end of the valve box 17, as at 20, and communicates with the wind chest or channel 15 through a passage 21 (see Fig. 8) the valve block or box 17 being secured against the wall of the chest 15. The valve box is also provided with a chamber 22 and means for admitting air to the pneumatic 16 and controlling such admission. In accomplishing this the chamber 22 is given communication with the outside air through one side of the box, as at 23, and a valve seat 24 is arranged within the chamber 22 upon which is adapted to be seated a valve 25. A valve 26 is arranged within the chamber 18 and is adapted to be seated upon the seat 19, and the valves 25 and 26 are connected by a suitable stem 27, a portion of which adjacent the valve 25 is adapted to pass through a suitable guide 28 adjacent the valve seat 24, and the extremity of the stem beyond the valve 26 is adapted to pass through a suitable guide 29 which extends across an opening 30 in one of the walls of the chamber 18 and constitutes a closure therefor. In this way the means for controlling the admission of air to the collapsible fluid chamber 16 is given operative connection with valve 26.

The valve stem 27 is preferably located in a horizontal plane and extends across the valve box through the various chambers. An open chamber 31 is arranged within one of the walls of the valve box and a suitable diaphragm 32 extends across the open side of the chamber to form a closure therefor, and said diaphragm is adapted to extend into the chamber when the air is exhausted therefrom. The extremity of the valve stem 27 is adapted to project beyond the guide 29 and into the chamber 31 on one side of the diaphragm 32 so as to be engaged by the

diaphragm to seat the valve 26 and to unseat the valve 25. If desired, a suitable projecting member 33 may be supported by the diaphragm at the point which engages the

5 extremity of the valve stem 27.
The valve box or block 17 is provided with a vent chamber 34 having communication with the chamber 31 at the suction side of the diaphragm 32 by means of a passage
10 35, and with the valve chamber 18 by means of a bleed-hole 38, which being essentially small, may be best formed in a thin wafer 37 secured against one of the walls of chamber 34 in any suitable way, with the bleed-
15 hole in register with chamber 18 through a passage 36 formed in the valve block between chamber 34 and chamber 18. The suction being always toward the chamber 18, the wafer 37 will of course be retained there-
20 by snugly against the wall of the chamber 34. The vent chamber 34 has connection with the respective apertures in the ordinary tracker board in any desired or suitable manner, preferably by means of a tubular
25 member 40 which is supported by the valve box and has connection with the chamber and to the projecting extremity of which is secured one end of a flexible tubular member 41, the other extremity of which
30 latter is secured to the tracker board.

The bleed-hole 38 being necessarily very small, as before stated, so as to avoid reducing in a material degree the vacuum in the valve chamber 18 when the admission of
35 air to the chamber 34 results from the sounding of one or more notes in rapid succession, such bleed-hole is liable to become clogged with dust, lint, and other small particles that are continually being drawn into the
40 instrument by the suction, and this makes it quite essential to place the bleed-hole in such a position that its condition can be readily observed from time to time. For that reason the chamber 34 is formed in the
45 front side of the controlling pneumatic housing and its outer wall is constituted by a transparent closure 39, through which the bleed-hole 38 is constantly in view.

The chamber 22 in the valve box is provided with an opening 42 which is located preferably between the valve seats 19 and
50 24, and has communication with the main pneumatic 16 by means of an aperture or opening 43 in the member of the pneumatic to which the valve box is secured, and with
55 which aperture the opening 42 registers, so that the air may be exhausted from the pneumatic 16 through the openings 43, 42, and valve chamber 18 to collapse the pneu-
60 matic.

The pneumatic action may be secured to the exhaust chamber or channel 15 in any desired or suitable manner, but a simple and
65 efficient securing means will now be described.

The stationary member 44 of the pneumatic 16 is preferably provided with a dovetail groove 45 adjacent the free end thereof and secured to the bottom of the chamber or
70 channel 15 is a washer 46, the edge 47 of which is flanged away from the body portion as shown, and the washer may be held in position by a suitable fastening screw or bolt 48 which passes through the washer
75 and into the bottom of the chamber or channel 15. The greatest diameter of the flanged washer 46 is slightly less than the dovetailed portion 45, which latter has an opening at the end of the member 44, so that the dove-
80 tailed portion 45 may be readily slipped over the washer to cause one edge of the valve box 17 to stand adjacent the front wall of the chamber or channel 15 in such a position that the opening 20 in the valve cham-
85 ber 18 will register with the opening 21 in the wall of the chamber or channel 15, and a suitable fastening screw or bolt 49 may be provided, which is seated in a suitable recess 50 in the wall of the valve box, and
90 which passes through a portion of the wall and into the wall of the chamber or channel 15 so that the entire action, including the pneumatic 16 and the valve box 17 may be readily detached from the front of the in-
95 strument by first detaching the fastening screw 49 from the wall of the chamber or channel 15, after which the other extremity of the pneumatic may be detached by slipping the dovetail groove 45 out of engage-
100 ment with the washer 46.

This pneumatic action is controlled in a manner well known in the art by a perforated record sheet which passes over a
105 tracker board, there being provided one of these pneumatic actions for each of the piano actions. When an imperforate portion of the record passes over the aperture in the tracker board to close the aperture, the vent chamber 34 will be closed against
110 the entrance of air, and when thus closed, the suction in the chamber or channel 15 will exhaust the air from the chamber 31 at the inner side of the diaphragm 32, as well as from the valve chamber 18, and will cause the diaphragm 32 to engage the end of the
115 valve stem 27 to force the valve 26 against its seat 19, and at the same time will move the valve 25 from its seat 24 to permit the outside air to enter the pneumatic 16 through the chamber 22, opening or passage
120 42, and aperture 43 to permit the pneumatic 16 to expand by the falling of the movable member of the pneumatic. When a perforation or aperture in the record sheet passes over one of the apertures in the tracker
125 board, it will establish communication between the vent chamber 34 and the outside air through the tube 41 and tubular member 40, which will flood the vent chamber. The air which has entered the vent chamber 34
130

will pass into the chamber 31 on one side of the diaphragm 32 through the port or passage 35 and also into the valve chamber 18 through the bleed opening 38 and port or passage 36. The port or passage 35 being of a larger diameter than the bleed opening 38, the air will pass more rapidly into the chamber 31 to overcome the suction upon the diaphragm to render the diaphragm inactive, so that the suction in the chamber 18 will unseat the valve 26 and at the same time seat the valve 25 to shut off the communication of the chamber 22 with the outside air so that the suction created in the valve chamber 18 by the suction in the chamber or channel 15 will exhaust the air from the pneumatic 16 through the opening 43, port or passage 42, chamber 22 and valve chamber 18 to collapse the pneumatic 16, causing the movable member thereof to be raised. As soon as the perforation in the record has passed out of register with the aperture in the tracker board, the chamber 31 on one side of the diaphragm 32 will be exhausted of the air which has been supplied thereto, so that the suction will act upon the diaphragm 32 to cause the latter to engage the extremity of the valve stem 27 to force the valve 26 against its seat 19, and the valve 25 off of its seat 24 to establish communication of the pneumatic 16 with the outside air, to permit the movable member to fall to expand the pneumatic.

If desired, suitable packing material, such as leather washers 51 may be provided and secured to the valves so as to produce a tight joint when the valves engage their seats.

The chamber or channel 15 is located within the casing of the instrument in any desired or suitable position, and may be secured therein in any suitable manner, but is preferably spaced a short distance above the keys 52 so as to permit ready access to the keys when the actions are secured in position, and when the operator desires to manipulate the piano by means of the keys. The chamber or channel 15 is spaced above the keys a sufficient distance to permit the pneumatic 16 to be located between the bottom of the chamber 15 and the keys, the actions being secured to the front of the chamber or channel 15 may be readily accessible from the front of the instrument, and by being so located, the transparent closures 39 for the vent chambers 34 will be to the front of the instrument, and in such a position that the vent chambers of each of the actions may be readily observable, thereby rendering it possible to quickly ascertain whether or not the respective valves are performing their proper functions, and also which one of the valves is not properly operating, without necessitating the dismantling or dismembering of any of the parts of the mechanism. The keys 52 are sup-

ported by the ordinary key rail 53 and the sticker 54 of the piano action is supported from the back flange rail 55 by means of the back flange 56 and the rod or link 57 in the ordinary and usual manner, and the hammer 58 is supported in the ordinary and usual manner by means of the hammer butt 59 which is supported by the end of the sticker.

Secured to the sticker 54 and projecting forwardly therefrom, is an arm 60 which extends for some distance beyond the sticker and at a point substantially at the longitudinal center of the movable member of the main pneumatic 16 and the forward extremity of the shoe is preferably bifurcated, as at 61, with the bifurcation opening outwardly toward the front of the instrument, the extremities of the adjacent walls of the bifurcations being rounded as shown more clearly at 62 in Fig. 3 of the drawings.

Secured to and depending from the movable member of the main pneumatic 16 is a screw or bolt 63 which is located at substantially the longitudinal center of the member, and this screw or bolt is provided with a threaded extremity 64 adapted to receive a nut or collar 65. The screw or bolt 63 is adapted to enter the bifurcation 61 of the shoe 60 when the pneumatic action is placed in position, and to readily pass out of the bifurcation to permit the action to be readily and quickly removed without interfering with any of the other portions of the mechanism, the rounded portions 62 of the walls of the bifurcation serving to direct the member 63 into the bifurcation. This bolt or member 63 is of a length to permit the piano action to be operated by the keys 52 through the medium of the capstan 66 in the usual manner, that is, so as to provide a sufficient space between the top of the shoe 60 and the movable member of the pneumatic to permit the shoe to move under the influence of the key 52 without moving the movable member of the pneumatic whereby the piano action may be operated either by the pneumatic action or the keys whenever desired, so that the hammer 58 will strike the strings 67 of the instrument to sound the notes. If desired, a suitable washer 68 may be provided between the nut or collar 65 and the adjacent portion of the shoe 60. With this improved construction of attachment to the piano action it will be apparent that the greatest possible leverage is obtained for operating the sticker 54 with the least possible power, due to the fact that the point of connection between the shoe 60 and the movable member of the pneumatic is located some distance beyond the fulcrum of the movable member of the pneumatic. It will also be noted that inasmuch as the maximum degree of vacuum capable of being induced in the wind chest 15 by foot power is so low

that a diaphragm 32 of very liberal dimensions is required for operating the valves, and the width or lateral thickness of the valve box or block measured lengthwise of the keyboard being restricted and not of sufficient area to accommodate a diaphragm of the requisite area for the described purpose, this diaphragm has been placed on the side of the valve box in each instance contiguous to the adjacent pneumatic where the area or dimensions of the block are not so restricted and the diaphragm of the proper dimensions may be accommodated. It will further be observed that the diaphragm 32 is exposed to direct atmospheric pressure on its outer side, and to the partial vacuum on its inner side only. Consequently, it is more sensitive in operation than those constructions in which it is necessary to bleed the air from both sides of the diaphragm, because with the construction embodying this invention, the partial vacuum at the inner side or suction side of the diaphragm is broken or relieved instantly upon the admission of air to the chamber 34 through the tracker board or action of the record sheet, allowing the valve 19 to open and cause the operation of the main pneumatic without having to bleed the air from the opposite side of the diaphragm. The same rapidity of action is the result when the air is bled from the suction side of the diaphragm through the bleed-hole 38, as it is not necessary to admit air to the opposite side, which is exposed to the atmosphere.

In order that the invention might be fully understood, the details of the foregoing embodiment thereof have been thus specifically described, but—

What I claim as new is:

1. In an automatic musical instrument, a pneumatic action including a collapsible fluid chamber, a valve chamber, a communication between the valve chamber and the fluid chamber, a valve in the chamber, a diaphragm chamber, a diaphragm forming a closure for the diaphragm chamber and adapted to project thereinto, said diaphragm being directly exposed to atmospheric pressure on one side, means operatively related to the valve and extending into the diaphragm chamber, means whereby the diaphragm chamber may be exhausted to cause the diaphragm to seat the valve, means whereby the suction in the diaphragm chamber may be overcome to cause the valve to unseat for allowing the said fluid chamber to be collapsed, and means operatively related to the valve for admitting air to the fluid chamber to permit the latter to expand, in combination with a piano action operatively connected with the main pneumatic.

2. In an automatic musical instrument, a pneumatic action including a collapsible fluid chamber, a valve chamber, a communi-

cation between the valve chamber and the fluid chamber, a valve in the valve chamber, a diaphragm chamber, a diaphragm forming a closure for the diaphragm chamber and adapted to project thereinto, said diaphragm being directly exposed to atmospheric pressure on one side, means operatively related to the valve and extending into the diaphragm chamber, means whereby the diaphragm chamber may be exhausted to cause the diaphragm to seat the valve, said means including a passage having an exposed transparent portion, means whereby the suction in the diaphragm chamber may be overcome to cause the suction in the valve chamber to unseat the valve to permit the fluid chamber to be collapsed, and means operatively related to the valve for admitting air to the fluid chamber to permit the latter to expand, in combination with a piano action operatively connected with the main pneumatic.

3. In an automatic musical instrument, a pneumatic action including a collapsible fluid chamber, a valve chamber, a communication between the valve chamber and the fluid chamber, a valve in the chamber, a diaphragm chamber, a diaphragm constituting one wall of the chamber and forming a closure for the chamber and adapted to project thereinto, said diaphragm being directly exposed on one side to atmospheric pressure, means operatively related to the valve and extending into the diaphragm chamber, means whereby the chamber may be exhausted to cause the diaphragm to seat the valve, said means including a chamber having a vent opening leading to the valve chamber, and said chamber having an exposed transparent closure individual to the action whereby the vent opening is always visible, in combination with a piano action operatively connected with the main pneumatic.

4. In an automatic musical instrument, a pneumatic action comprising a collapsible pneumatic, a valve box having a plurality of chambers including a valve chamber, a communication between one of the chambers and the pneumatic, the last said chamber having also having an opening to the outside air, a valve in the valve chamber for controlling the passage between the valve chamber and the chamber communicating with the pneumatic, means for controlling the said air opening, a diaphragm chamber, a diaphragm in the chamber, a venting chamber having direct communication with the diaphragm chamber and also with the valve chamber, said venting chamber being provided with an opening in one wall, a transparent closure for the opening individual to the action and directly opposite to the passage leading to the valve chamber, and means whereby

the fluid may be exhausted from the venting chamber in the valve box to cause the diaphragm to seat the valve and open the said opening to permit the outside air to enter the said pneumatic, in combination with a piano

5 action connected with the main pneumatic.

5. In an automatic musical instrument, a pneumatic action comprising a collapsible pneumatic, a valve box having a plurality of chambers including a valve chamber, a communication between one of the said chambers and the pneumatic, the last said chamber having communication with the valve chamber and also having an opening to the outside air, a valve in the valve chamber for controlling the communication between the valve chamber and the pneumatic, a valve for controlling the said air opening, a connection between the valves, a diaphragm chamber, a diaphragm in said chamber, a venting chamber having direct communication with the diaphragm chamber and also with the valve chamber, said venting chamber being provided with an opening in one wall, a transparent closure for the opening individual to the action and directly opposite to the passage leading to the valve chamber, said venting chamber including means whereby the fluid may be exhausted therefrom to cause the diaphragm to seat the first said valve and to unseat the second said valve to permit the outside air to enter said pneumatic, in combination with a piano action connected with the main pneumatic.

6. In an automatic musical instrument, the combination of a support, a pneumatic action, means for detachably securing said action to the support, said action including a main pneumatic, a piano action to be operated including a movable element, an arm carried by and projecting from said element, said arm being provided with an open bifurcated portion and adapted to project under the action, and means supported by the movable member of the said pneumatic at a point intermediate the ends of the pneumatic and remote from the fulcrum of said movable member and adapted to enter the said bifurcation in the arm and also adapted to operate the piano action.

7. In an automatic musical instrument the combination of a support, a pneumatic action, means for detachably securing said action to the support, said action including a main pneumatic, a piano action to be operated including a movable element, an arm carried by and projecting from said element, said shoe being provided with an open bifurcated portion and projecting under the said action, there being provided a projection supported by and depending from the movable member of the pneumatic at a point intermediate the extremities thereof and remote from the fulcrum of said member, said projection being adapted to enter the bifur-

cation in the arm whereby said pneumatic action will have a detachable engagement with the piano action, and an adjustable member supported by the depending member beyond the arm and adapted to engage the arm to actuate the piano action when the pneumatic action is collapsed.

8. In an automatic musical instrument the combination of a support, a pneumatic action, means for detachably securing said action to the support, said action including a main pneumatic, a piano action to be operated including a movable element, an arm carried by and projecting from said element, said arm being provided with an open bifurcated portion and adapted to project under said action, there being provided a projection supported by and depending from the movable member of the pneumatic at a point intermediate the extremities thereof and remote from the fulcrum of said member, said projection being adapted to enter the bifurcation in the arm whereby said pneumatic action will have a detachable engagement with the piano action, and an adjustable member supported by the depending member beyond the shoe and adapted to engage the arm to actuate the piano action when the pneumatic action is collapsed, said piano action being also adapted for independent action with respect to the action of the pneumatic action.

9. In an automatic musical instrument, the combination of a piano action, a longitudinally arranged wind chest adapted to be connected with a plurality of piano actions, a main pneumatic operatively connected with said piano action, a controlling pneumatic, a valve operatively related to the controlling pneumatic for controlling the main pneumatic, a housing for the controlling pneumatic and valve connected with the wind chest, said controlling pneumatic being disposed at the side of the housing in a plane cross-wise of the wind chest and being movable lengthwise of the wind chest.

10. In an automatic musical instrument the combination of a piano action, a longitudinally arranged wind chest adapted to be connected with a plurality of piano actions, a main pneumatic operatively connected with said piano action, a controlling pneumatic embodying a movable diaphragm, a valve operatively related to said diaphragm for controlling the main pneumatic, a housing for the diaphragm and valve connected to the wind chest, said diaphragm being disposed at the side of the housing in a plane crosswise of the wind chest and movable lengthwise of the wind chest.

11. In an automatic musical instrument the combination of a piano action, a wind chest adapted to be connected with a plurality of piano actions, a main pneumatic operatively connected with said piano ac-

tion, a controlling pneumatic embodying a movable diaphragm exposed to direct atmospheric pressure on one side and operating in an upright plane, a valve operatively related to said diaphragm for controlling the main pneumatic, and a housing for said diaphragm and valve removably connected with the said wind chest.

12. In an automatic musical instrument the combination of a piano action, an oscillatory key for controlling said action, a main pneumatic operatively connected with said piano action, a controlling pneumatic, a valve operatively related to the controlling pneumatic for controlling the main pneumatic, a housing for the controlling pneumatic and valve arranged above said key and in front of said action, said controlling pneumatic being situated in a plane extending lengthwise of the plane of oscillation of said key and movable in a direction crosswise of said plane.

13. In an automatic musical instrument the combination of a piano action, an oscillatory key for operating said action, a main pneumatic operatively connected with said piano action, a controlling pneumatic embodying a movable diaphragm, a valve operatively related to the diaphragm for controlling the main pneumatic, and a housing for said diaphragm and valve arranged above said key and in front of said action, said diaphragm being situated in a plane extending lengthwise of the plane of oscillation of said key and movable in a plane crosswise of said plane of oscillation.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this ninth day of June, A. D. 1908.

EUG. E. T. TURNEY.

Witnesses:

Wm. H. COLLINS,
C. A. LITT.