

P. WELIN.

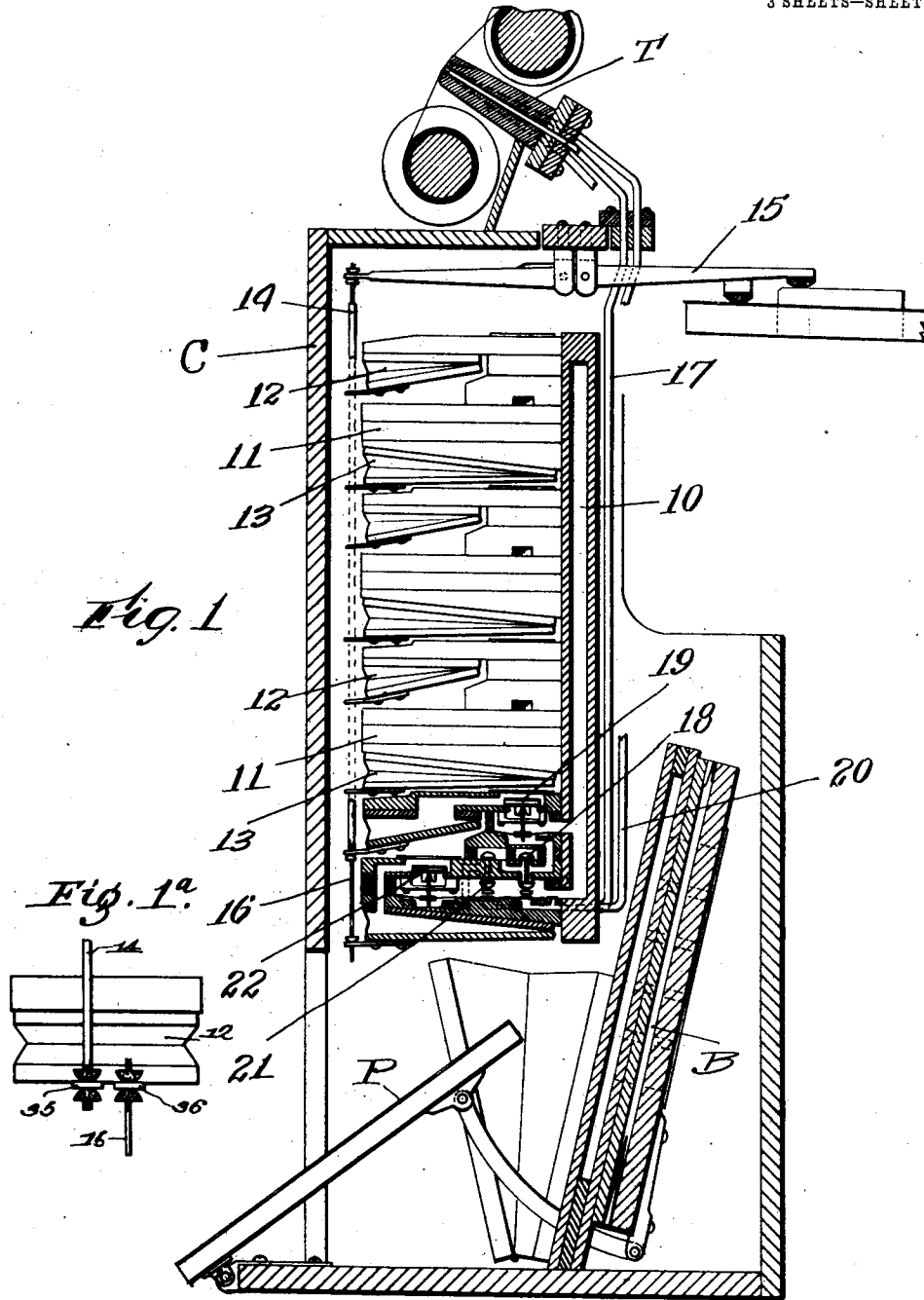
AUTOMATIC MUSICAL INSTRUMENT.

APPLICATION FILED MAY 24, 1904. RENEWED JUNE 15, 1909.

945,887.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.



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Inventor:
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3 SHEETS—SHEET 2.

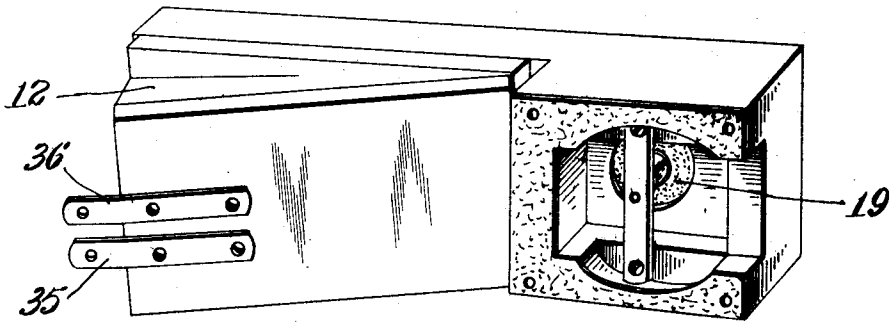


Fig. 2.

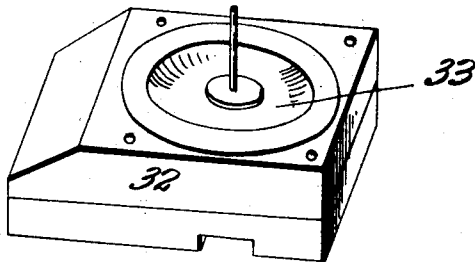


Fig. 3.

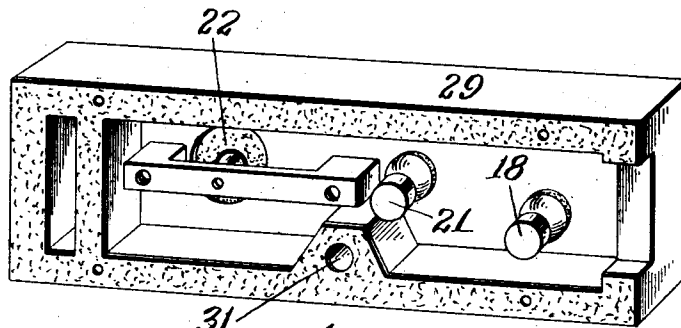


Fig. 4.

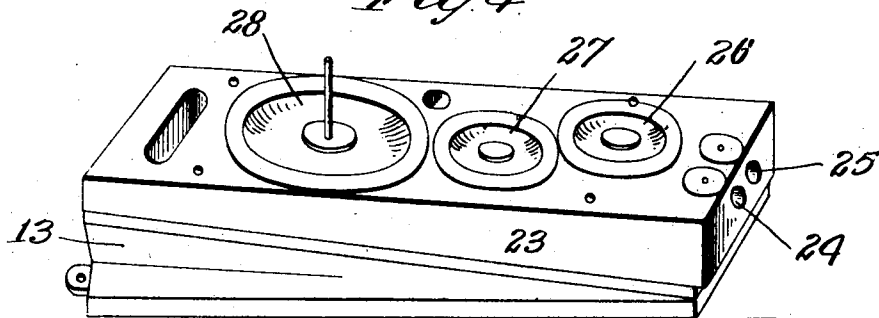


Fig. 5.

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3 SHEETS—SHEET 3.

Fig. 6.

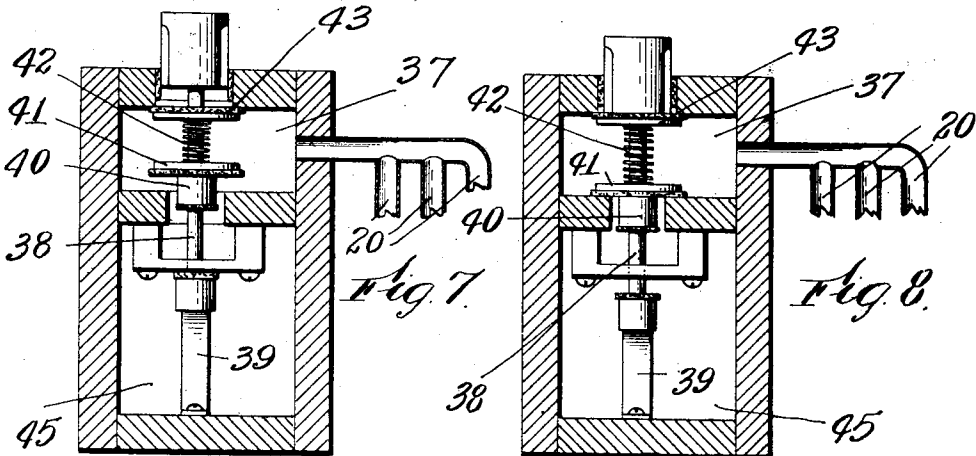
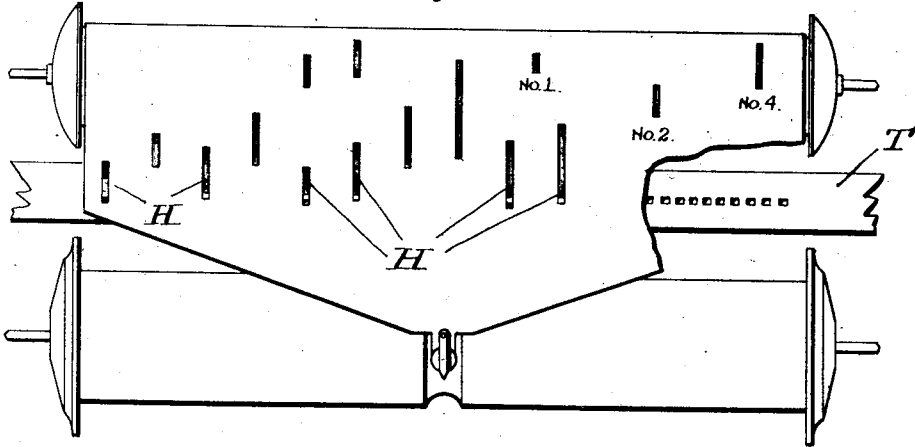
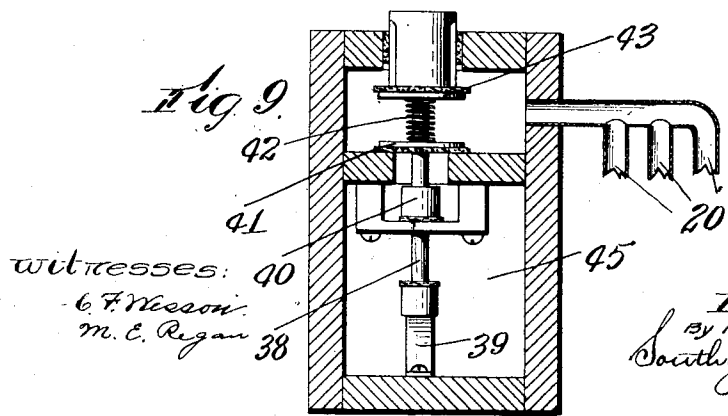


Fig. 7.

Fig. 8.

Fig. 9.



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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.

AUTOMATIC MUSICAL INSTRUMENT.

945,887.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed May 24, 1904, Serial No. 209,449. Renewed June 15, 1909. Serial No. 502,330.

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 Automatic Musical Instrument, of which the following is a specification.

This invention relates to that class of devices which are employed for striking the keys of musical instruments.

The especial object of this invention is to provide a construction by means of which the different notes of a musical composition will be struck with different loudness or force so as to produce accented or modulated effects.

To these ends, this invention consists of the playing attachment for musical instruments and of the combinations of parts therein as hereinafter described and more particularly pointed out in the claims at the end of this specification.

The accompanying drawings show this invention applied to a playing attachment which is arranged in a separate casing from the piano or other instrument in connection with which it is to be used. It is to be understood, however, that this invention is equally applicable to a playing attachment mounted inside of the piano casing itself.

In the drawings, Figure 1 is a sectional view of sufficient parts of a playing attachment for musical instruments to illustrate the application of this invention thereto. Fig. 1^a is a front elevation of one of the pneumatics shown in Fig. 1. Figs. 2 to 5 inclusive are detail views of separate parts of one of the sets of operating connections for sounding one particular note; Fig. 2 being a perspective view of the top part and the service pneumatic carried thereby. Fig. 3 being a perspective view of one of the intermediate parts; Fig. 4 being a perspective view of a second intermediate part; and Fig. 5 being a perspective view of the bottom part and accenting pneumatic carried thereby. Fig. 6 is a plan view partly broken away showing the character of perforated music and tracker-board which may be used to control an automatic playing attachment for musical instruments constructed according to this invention. Fig. 7 is a sectional view of a push button construction which may be used for modulating or accenting a group of three notes; and Figs. 8 and 9 are

similar views showing the parts in different positions.

In order to produce accented or shaded effects by the use of automatic playing attachments for musical instruments, it has already been proposed to vary the air tension or pressure which is used in striking or sounding the different notes. In some constructions it has been proposed to employ two distinct wind-trunks or a divided bellows system, one wind-trunk for a high tension and a second wind-trunk being for low tension. It has also been proposed to operate the entire instrument from a high tension bellows in the first instance, and to throttle or cut down the air tension for such notes as are to be struck softly. In the practical use of these accenting devices for automatic playing attachments for musical instruments, I have found that it requires undesirably heavy work upon the pedals or foot-pieces which operate the bellows. For example, in one class of automatic musical instruments the pressure regulator or throttle which cuts down the air tensions for ordinary playing, necessarily puts a heavy working strain upon the pedals, while all compound bellows with which I am familiar, are necessarily comparatively heavy and complicated, and can be worked only with difficulty.

The especial object of my present invention is to provide a modulating or accenting construction for an automatic playing attachment for a musical instrument in which all accented effects are produced by a single bellows and comparatively low air tensions. To accomplish this result I provide a train of connections for striking each note comprising two distinct pneumatics, one pneumatic being operated when a blow of one force is required, and both pneumatics being operated when a blow of different force is required.

In the construction herein illustrated, for the normal or unaccented playing of any particular note, I employ a small service pneumatic which strikes the note comparatively softly, and in order to strike the note more forcibly, or to strike the note more loudly, I employ an accenting pneumatic which acts simultaneously with the service pneumatic. That is to say, the operative connections for sounding each note comprise two separate pneumatics, the note being

sounded by one pneumatic or by the combined action of both pneumatics as required.

In the special construction I have herein illustrated the accenting pneumatic supplements and acts simultaneously with the service pneumatic, and I have adopted this arrangement as I have found this to give the most economical and reliable results; although the two striking pneumatics cooperating to sound one note might be combined in other cooperative relations, for example, the pneumatics might be set to have opposite effects, so that the action of one pneumatic would serve as a brake, diminishing the force of the other pneumatic, or the pneumatics might be successively brought into use, thus producing a certain force from a small pneumatic, a greater force from a larger pneumatic, and a combined force when both pneumatics act simultaneously.

Referring to the accompanying drawings and in detail, in the automatic musical instrument herein illustrated as embodying one form of my invention, 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 the 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 the 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 winding 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 constructed according to this invention comprises 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-board 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 tension 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 structural details of one of the removable units or elements in the action of an automatic playing attachment for musical instruments constructed according to this invention are shown in Figs. 2 to 5. As illustrated in these figures, the lower section 23 in addition to carrying the accenting or supplemental pneumatic 13 is provided with passages 24 and 25 which connect with the small pipes 17 and 20 before referred to.

Each of the passages 24 and 25 is provided with the usual leak-disk or small exhaust port, and also arranged in the lower section 23 are the primary pneumatics 26 and 27 which operate the primary valve 18 and the switch valve 21 respectively, and an operating pneumatic 28 having a valve-stem which operates the valve of the accenting pneumatic. In the second section 29 are arranged the primary valve 18, the switch valve 21, and the controlling valve 22, and bored at one side of the exhaust chamber of this section 29 is a channel 31 which is controlled from the switch valve 21 and leads to the operating pneumatic 28. Mounted in the other intermediate section 32 is an operating pneumatic 33 having a valve stem which carries the valve 19 controlling the service pneumatic 12. The movable section of the service pneumatic 12 is provided with two arms 35 and 36 for connection with a striking lever and with the accenting pneumatic respectively. The complete action as thus constructed may be controlled either from the tracker-board which requires the use of a specially perforated music sheet, or from a number of push buttons or keys when a music sheet of the ordinary perforated pattern is to be used.

In practice a number of the controlling pipes 20 may communicate with a single tracker-board channel. That is to say, a single channel of the tracker-board may be made to control the accenting devices of a group of notes preferably three in number, and this can be done without producing confused or blurred effects, as three consecutive notes in a musical composition are never sounded in a perfect chord. The accenting channels in the tracker-board T may be located either at the ends or center of the tracker-board, but in practice I prefer to have the accented channels distributed along the entire length of the tracker-board, and this I have found to be desirable, because it produces a more uniform location of the perforations in the music-sheet, and hence there is less liability for the music-sheet to warp or swell unevenly.

In the construction illustrated in Fig. 6, the music-sheet cooperating with the tracker-board is shown as having a number of special perforations or holes H which cooperate with corresponding holes in the tracker-board to throw in the accenting connections for certain notes, these special accenting holes H being distinguished from the ordinary perforations by being set slightly in advance of such ordinary perforations.

Where the playing attachment is controlled from the tracker-board a specially perforated music-sheet is required, and in some cases, particularly to adapt a mechanism constructed according to this invention for the use of perforated music sheets of

ordinary pattern, it is desirable to control the accenting devices by finger-keys or push buttons. A construction of this character is illustrated in Figs. 7 to 9. As shown in these figures, a group of three of the accenting pipes 20 is connected to a chamber 37. Mounted in the chamber 37 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 having splines or channels in its side. When the parts are in normal position as illustrated in Fig. 7, the chamber 37 communicates with a wind-trunk or vacuum chamber 45. When the finger piece is first depressed as illustrated in Fig. 8, the valve 41 is closed, and thereafter the valve 43 is opened to admit atmospheric pressure to the accenting pipes 20, three such accenting pipes being 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 in an intermediate position.

When the instrument is controlled by specially perforated paper, such for example, as provided with perforations H slightly in advance of the speaking perforations, it will be noted that the accenting or modulating effects will be produced automatically; but when the accenting effects are controlled by 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, as illustrated at the right of Fig. 6, I intend to print characters 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.

In the operation of the complete instrument it will be seen that all operations are effected by the action of a bellows which produces a uniform and comparatively low tension, and on this account I have provided a construction which is of easy and smooth operation, and which at the same time can produce strongly accented effects.

I am aware that numerous changes may be made in practicing my invention by those who are skilled in the art without departing

from the scope thereof as expressed in the claims. I do not wish, therefore, to be limited to the construction I have herein shown and described, but

5 What I do claim and desire to secure by Letters Patent of the United States is:—

1. In an automatic playing attachment for musical instruments, the combination of a service pneumatic for striking a note with
10 one degree of loudness, a modifying pneumatic cooperating with the service pneumatic to produce accented or modified effects, and a primary pneumatic controlling both of said striking pneumatics.

15 2. In an automatic playing attachment for musical instruments, the combination of a service pneumatic for striking a note with one degree of loudness, a modifying pneumatic cooperating with the service pneumatic to produce a modified striking effect,
20 a valve for each of said pneumatics, and a primary pneumatic for each of said valves, one of said valves controlling the conditions of air tension in the chamber in which the other is situated.

3. In an automatic playing attachment for musical instruments, the combination of a service pneumatic for striking a note with one degree of loudness, a modifying
30 pneumatic cooperating with the service pneumatic to produce modified striking effects, a valve for each of said striking pneumatics, a primary pneumatic for each of said valves, a pneumatic channel leading to
35 each of said primary pneumatics and a pneumatic channel leading from one valve to the other.

4. In a music playing device, the combination with a wind-trunk, of a plurality of
40 service striking pneumatics, a plurality of supplemental or accenting pneumatics, and means for causing said supplemental pneumatics to act in conjunction with the corresponding striking pneumatics when notes
45 are to be sounded with an accented effect, each of said supplemental pneumatics being connected with a service striking pneumatic and removable therewith as a unit from the wind trunk independently of the
50 other striking pneumatics.

5. In a music playing device, the combination of a service pneumatic, a supplemental or accenting pneumatic, a primary pneumatic for controlling the accenting pneumatic, and a primary pneumatic for independently controlling the service pneumatic
55 and for controlling the first named primary pneumatic.

6. In a music playing device, the combination of a service pneumatic, an accenting
60 pneumatic for the same note, a primary pneumatic located in a passage between the wind chest and the accenting pneumatic, and a primary pneumatic located in a passage
65 between the wind chest and the service pneu-

matic, the passage in which the first named primary pneumatic is located also being controlled by the last named primary pneumatic.

7. An automatic playing attachment for
70 musical instruments comprising a plurality of independently removable elements, each of which contains means for controlling the sounding of one note, and each of which
75 comprises the service striking pneumatic, the supplemental or accenting pneumatic which acts conjointly therewith when the note is to be sounded with a modified effect, the primary pneumatic, the controlling
80 valve for the service pneumatic, the switch valve, and the controlling valve for the supplemental pneumatic.

8. In an automatic playing attachment for musical instruments, the combination of a tracker, a service striking pneumatic, a
85 supplemental striking pneumatic, a connection from the tracker for setting the supplemental striking pneumatic in condition ready to be operated, and a connection from the tracker for then simultaneously operat-
90 ing the service and supplemental striking pneumatics by means of a single air impulse.

9. In an automatic playing attachment for musical instruments, the combination of a music sheet and its winding mechanism
95 said sheet having two sets of perforations, one in advance of the other, a set of service striking pneumatics, a set of supplemental or accenting striking pneumatics, a tracker-board having tracker-board channels with
100 connections for controlling the service striking pneumatics, and having supplemental tracker-board channels controlling groups of the supplemental striking pneumatics, said supplemental tracker-board channels
105 being distributed along the length of the tracker-board and cooperating with perforations in the music sheet which are in advance of the speaking perforations.

10. In an automatic playing attachment
110 for musical instruments, the combination of a set of service striking pneumatics, a set of supplemental striking pneumatics cooperating therewith, and push buttons or finger-pieces each connected to throw in a
115 group of supplemental striking pneumatics to operate simultaneously with the corresponding service pneumatics.

11. In an automatic playing attachment for musical instruments, the combination of
120 a set of service striking pneumatics, a set of supplemental striking pneumatics, a set of primary pneumatics or valves for the service striking pneumatics, a set of primary pneumatics and switch valves for the supplemental striking pneumatics, a control-
125 ling-box or chamber connected to control a group of supplemental striking pneumatics, and a finger piece or push button for the controlling chamber having spring-pressed
130

valves mounted thereon for first closing connection between the controlling chamber and the bellows, and for thereafter opening connection between the controlling chamber and the atmosphere.

5 12. In an automatic playing attachment for musical instruments, the combination of a set of service striking pneumatics, a set of supplemental striking pneumatics co-
10 operating therewith, push buttons or finger pieces, each having connections for throwing in a group of supplemental striking pneumatics to operate simultaneously with the corresponding service pneumatics, and
15 a music sheet having characters thereon to show which of the push buttons should be operated to produce desired effects.

13. In a music playing device, the combi-

nation of a set of service striking pneumatics, a set of supplemental striking pneumatics, a controlling box or chamber connected to control the supplemental striking pneumatics, and a finger piece or a push button for the controlling chamber having valves mounted thereon for first closing connection
20 between the controlling chamber, and a bellows, and for thereafter opening connection between the controlling chamber and the atmosphere.

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

PETER WELIN.

Witnesses:

PHILIP W. SOUTHGATE,
LOUIS W. SOUTHGATE.