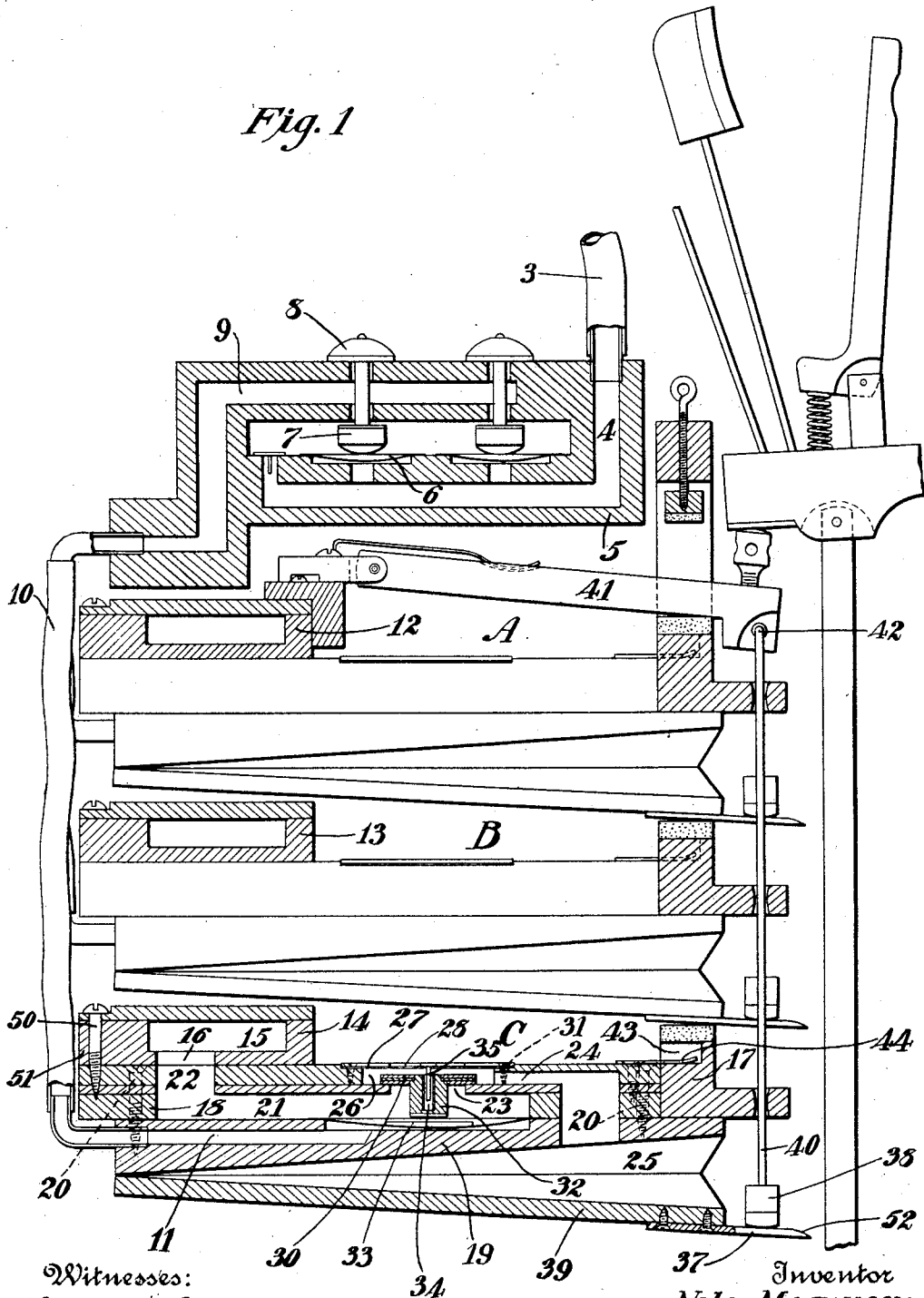


1,041,125.

Patented Oct. 15, 1912.

2 SHEETS—SHEET 1.

Fig. 1



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PNEUMATIC ACTUATING UNIT.
APPLICATION FILED FEB. 9, 1911.

1,041,125.

Patented Oct. 15, 1912.

2 SHEETS-SHEET 2.

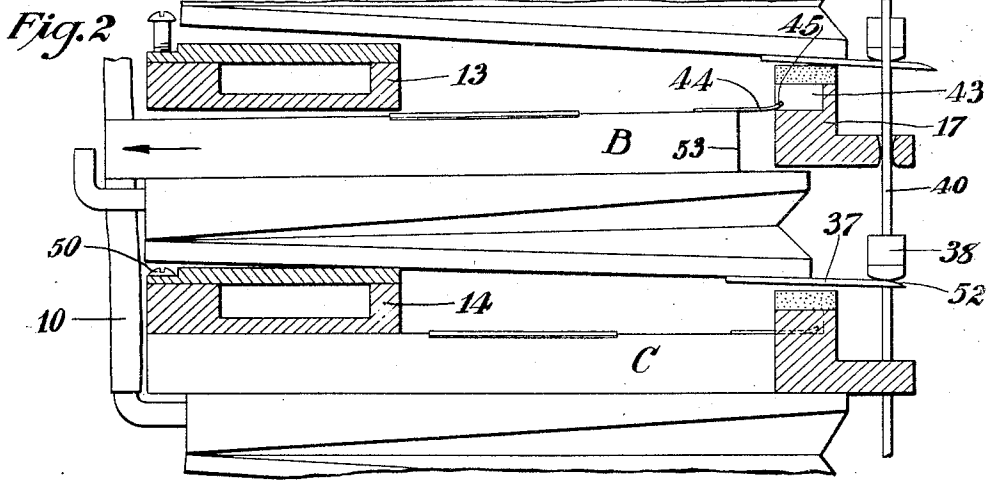
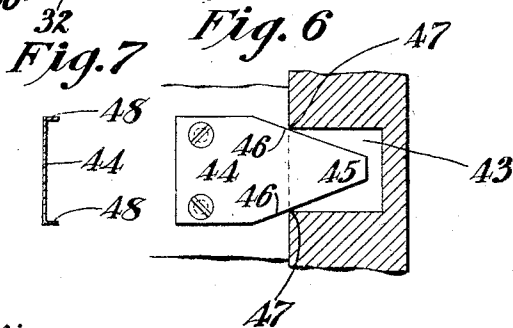
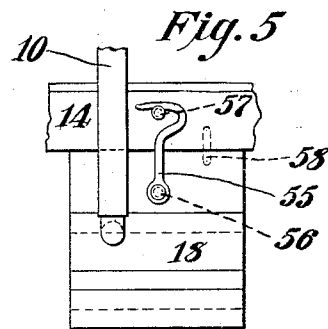
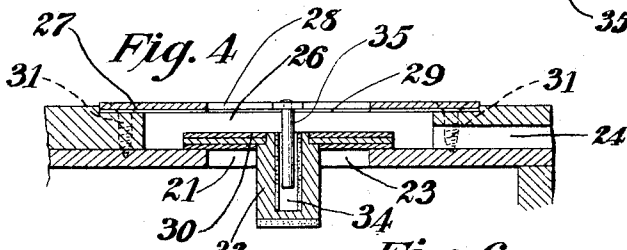
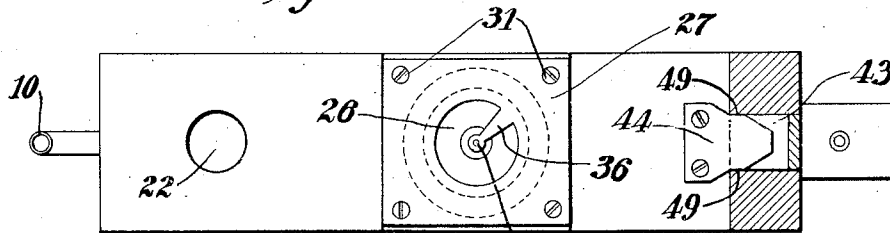


Fig. 3



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UNITED STATES PATENT OFFICE.

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PNEUMATIC ACTUATING UNIT.

1,041,125.

Specification of Letters Patent.

Patented Oct. 15, 1912.

Application filed February 9, 1911. Serial No. 607,640.

To all whom it may concern:

Be it known that I, NELS MAGNUSON, a citizen of the United States, and a resident of Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Pneumatic Actuating Units, of which the following is a specification.

This invention relates to pneumatic actuating units for automatic musical instruments such as player pianos and has for its object to provide a device of the class specified, simple in construction and easily and simply removable and interchangeable in the instrument to which it pertains.

To these ends my improvements comprise means illustrated in their preferred form in the drawings accompanying this specification wherein—

Figure 1 is a vertical sectional elevation of a bank of pneumatic units embodying my improvements. Fig. 2 is a side elevation partly in section showing one of my improved units partly withdrawn. Fig. 3 is a plan view of one of my improved units. Fig. 4 is an enlarged sectional elevation of a detail of my improvements. Figs. 5, 6 and 7 are views of minor modifications of some details of my improvements.

Referring now particularly to Fig. 1, flexible pipe 3 connects one of the plurality of openings in the usual tracker bar, not shown, with channel 4 of box 5 supported in the instrument by any well known means not shown. This box contains the usual primary pneumatic 6 and valves 7 and 8 by which air is admitted to exhaust channel 9, which channel is connected by pipe 10 to channel 11 leading to the underside of controlling or secondary pneumatic 33 in my improved detachable unit. For simplicity of illustration said box 5 is shown as of integral construction but in practice it is preferably built up of a number of parts glued or otherwise secured together as well known in the art. In a vertical row below said box 5 is a plurality of tension boxes 12, 13, 14, connected with the usual exhaust bellows not shown but well known in the art. To the bottom face of each of said tension boxes is secured in horizontal rows respectively a plurality of pneumatic actuating units indicated in a general way by A, B and C. As said tension boxes are duplicates of each other and as said pneumatic units are dupli-

cates of each other a description of one tension box as 14 and of one unit as C connected therewith will suffice for all. Tension box 14 is provided with the usual tension chamber 15 having an opening 16 in the bottom thereof. Pneumatic unit C for operating an individual sound producing device is detachably secured at its forward end to said tension box and at its rearward end to frame 17 of the instrument, by means to be hereinafter more fully described. Said pneumatic unit C comprises two major sections, one being the valve box 18 and the other being the main pneumatic 19 secured to said valve box by any convenient means such as screws 20, 20. Valve box 18 is provided with chamber 21 having opening 22 thereof connecting with opening 16 into tension chamber 15, and opening 23 thereof connecting with channel 24 which channel in turn opens into bellows 25 of main pneumatic 19.

Directly above opening 23 from chamber 21 to channel 24 is opening 26 in the upper wall of said channel. This opening is of sufficient size to permit the insertion or removal of valve 30 and is provided with cover plate 27 having opening 28 there-through thus connecting channel 24 with the atmosphere. Said cover plate 27 is preferably sunk slightly into the upper face of box 18 so as to provide an approximately flat top face for said box. Said plate 27 may be provided with a thin sheet of packing 29 thereunder and may be secured to said box top by screws as 31. Secondary valve 30 lies within channel 24 between openings 23 and 28 and is efficient to alternately close those openings, but normally rests on its lower seat thereby closing opening 23. Said valve is provided with a downwardly reaching stem 32 for engagement with controlling pneumatic 33 fixed to the upper face of main pneumatic 19. Valve 30 and stem 32 have a vertical hole 34 therein for sliding engagement with guide pin 35 supported from inreaching arm 36 of plate 27.

Fixed to movable bottom 39 of main pneumatic 19 and inreaching therefrom is foot 37 for operative engagement with head 38 of connecting rod 40. Said connecting rod 40 is pivotally attached at 42 to the usual action operating lever 41. Said foot 37 has the upper face of its leading end

beveled at 52 so as to permit free entrance under head 38 of rod 40 when said foot is thrust inwardly in installing unit C.

Directing attention now to the means for securing my improved pneumatic unit in position and the facilities for quick and simple replacement of a damaged or worn unit, frame 17 is provided with a mortise 43 therein for the reception and guidance of lip 44 fixed to unit C and preferably to the upper face thereof. Said lip 44 is preferably of spring sheet metal having edges 46, 46 (Fig. 6) tapering toward its upturned point 45. Said tapering edges 46, 46 engage corners 47, 47 of mortise 43 as said unit C is thrust into place and said lip 44 when thrust home fills said mortise 43 from one corner 47 to opposite corner 47 thereof and is located crosswise thereby. To prevent edges 46, 46 from cutting corners 47, 47 it is sometimes desirable to turn said edges upwardly as at 48, 48 (Fig. 7) to provide broader surfaces for engagement with edges 47, 47. Or said lip 44 may be provided with parallel portions 49, 49 (Fig. 3) to afford longer contact faces with the sides of mortise 43 when said lip 44 is seated. Upwardly turned point 45 of said lip 44 is efficient to draw said unit upwardly into place from the position of unit B to that of unit C in Fig. 2. By supporting said unit both at the front thereof to tension box 14 and at the rear thereof to frame 17, I attain a rigidity, precision and accuracy of action not attainable if said unit were supported from said tension box alone.

The forward end of my improved unit may be removably secured in place by means of screw 50 penetrating heel 51 of tension box 14 and having its point threaded into valve box 18 or the end of said box 18 may be provided with fastening means such as hook 55 (Fig. 5) pivoted at 56 thereon and in engagement with pin 57 on tension box 14. A suitable guide pin as 58 may be provided to position box 18 relatively to box 14.

For removing a pneumatic unit without disturbing any other unit or any other part of the instrument of which it is a part it is necessary only to disconnect pipe 10 and loosen screw 50 from engagement with valve box 18 or to loosen hook 55 from engagement with pin 57, when the forward end of said unit will drop, see B. Fig. 2, onto the tension box below and upon drawing said unit forwardly in the direction of the arrow thereon, lip 44 will be freed from engagement with mortise 43 and foot 37 will be drawn out from under head 38 of rod 40 whereupon said unit having a flat top face, may be drawn straight out without interference with any of the adjacent units or with any other part of the instrument. Said unit may be replaced or another one substituted

therefor by reversing the procedure just described, the beveled end 52 of foot 37 passing freely under head 38 and the upturned nose 45 of lip 44 freely entering mortise 43 and as said unit is pushed home, in the direction opposite to that indicated by the arrow on unit B, Fig. 2, its back wall 53 will abut frame 17 and its front end be positioned for receiving the point of screw 50 by which said front end may be secured in operative position against tension box 14.

I am familiar with a number of so-called detachable pneumatic actuating units in which the primary pneumatic and its valves are included thereby producing undue complication and expense. In my improved arrangement it will be observed that the primary pneumatic 6 and valves 7, 8 operated thereby are mounted in a separate continuous member 5 fixed relatively to the frame of the instrument and relatively to the vertical bank of tension boxes to which my improved units are detachably connected. Said primary pneumatics and valves are subject to very slight wear and deterioration and may be operated for a long period without attention or renewal. My improved detachable unit includes only those parts of a pneumatic operating device which are subjected to the hardest service and therefore most liable to wear and deterioration. By omitting therefrom the primary pneumatic and valves said replaceable unit is reduced to its lowest terms whereby the cost of renewals is reduced to a minimum, in time, money and convenience.

The only construction in the prior art with which I am familiar in which the primary pneumatic and its valves are omitted from the detachable unit is so constructed and arranged relatively to its tension box as to preclude the removal of said unit without the removal of said tension box as a whole, an obviously inconvenient and objectionable proceeding.

The operation of my improved device to actuate rod 40 upwardly is as follows: When that opening in the tracker bar connected by pipe 3 with channel 4 is uncovered or exposed, air is admitted to said channel 4 and thence to the underside of pneumatic 6. Whereby said pneumatic is operated to close valve 7 and open valve 8 thus opening channel 9 to the atmosphere. The air thereupon enters said channel 9, which was previously under exhaust pressure, passes through pipe 10 to channel 11 and under controlling secondary pneumatic 33. Said pneumatic is thereby forced upwardly, lifting valve 30 to uncover opening 23 and cover opening 28. This provides an open way from tension chamber 15 through openings 16 and 22, channel 21 opening 23 and channel 24 to bellows 25 which bellows is

thereupon collapsed and foot 37 drives rod 40 upwardly to operate the action. The tracker bar opening being again covered, pneumatic 6 collapses to its place, valves 7 and 8 fall and tension is again established in chamber 9 and thence through tube 10 to channel 11 whereby pneumatic 33 is collapsed, valve 30 falls and air is again admitted through opening 28 and channel 24 to bellows 25 thus permitting said bellows to expand and foot 37 and rod 40 to return to their idle positions all as shown in Fig. 1.

I claim:

1. A musical instrument including in combination, a tension box, a rear frame, a pneumatic actuating unit, means detachably securing said unit to said tension box and a tapered member rearwardly reaching from said unit detachably securing it to said frame.

2. A musical instrument including in combination, a tension box, a rear frame, a pneumatic actuating unit and means detachably securing said unit to said tension box and means rearwardly reaching from said unit detachably securing it to said frame, said unit when detached being removable horizontally forwardly from the instrument.

3. A musical instrument including in combination, a rear frame, a pneumatic unit having a tapered lip at its rear end, means on said rear frame for supporting and guiding said tapered lip and means supporting the forward end of said pneumatic unit.

4. A musical instrument including in combination, a tension box, a rear frame having a mortise therein, a pneumatic actuating unit having a tapered lip at its rear end for engagement with and guidance by said mortise in the rear frame and means detachably securing said unit to said tension box.

5. A musical instrument including in combination, a tension box, a frame independent of and parallel with said tension box, a pneumatic actuating unit, means detachably securing said tension box to one end of said actuating unit and a tapered lip on the other end of said actuating unit removably securing it to said frame.

6. A musical instrument including in combination, a tension box, a frame parallel with and independent of said tension box, a pneumatic actuating unit, means detachably securing one end of said unit to said tension box and spring means on the other end of said unit removably securing it to said frame, said unit when detached thus being free for removal in parallelism with said tension box.

Signed this 30 day of Jan. nineteen hundred and eleven (1911) before two subscribing witnesses.

NELS MAGNUSON.

Witnesses:

HERBERT H. BOND,
JNO. M. KUHN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."