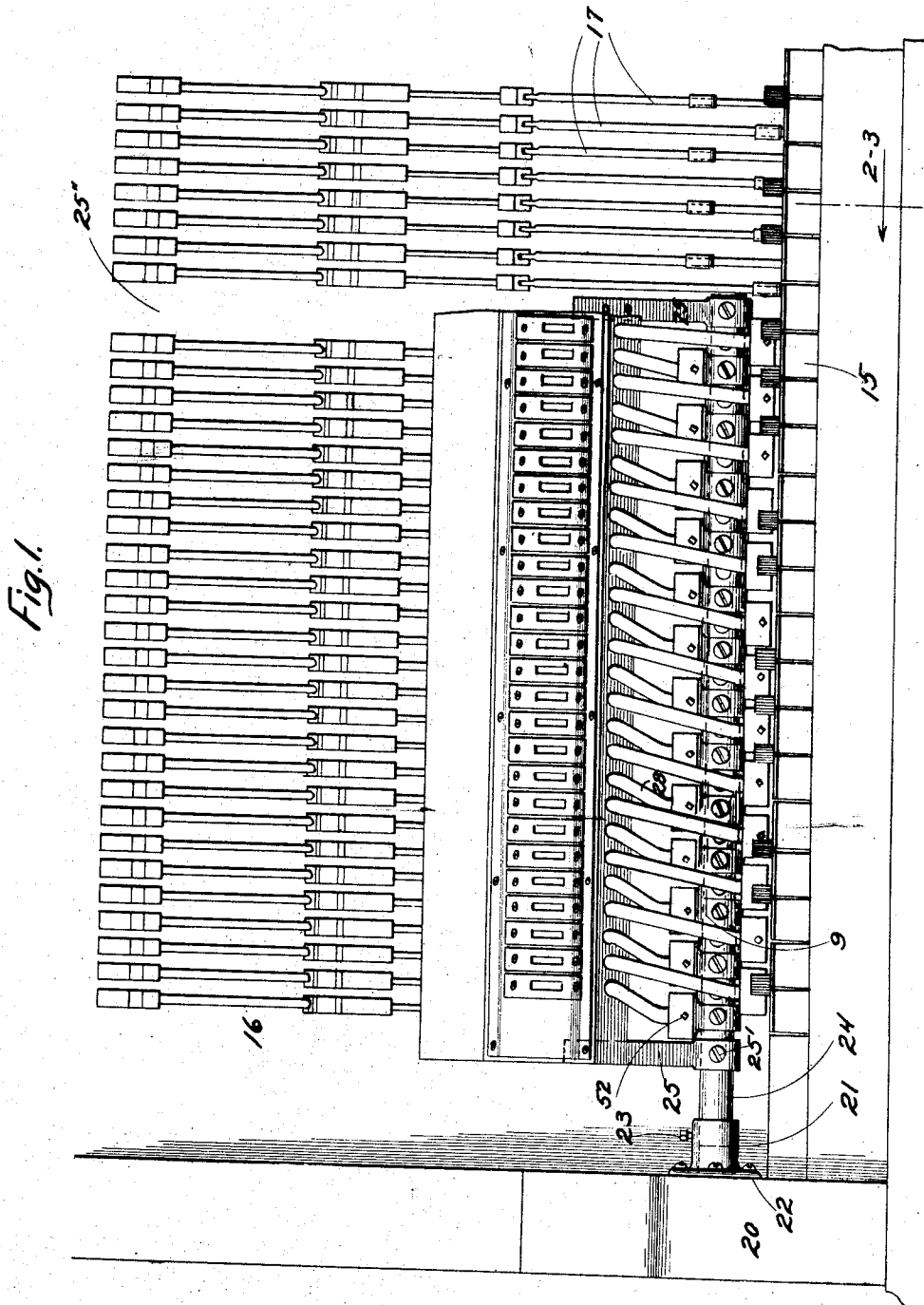


C. FREBORG.
PNEUMATIC PIANO PLAYER.
APPLICATION FILED APR. 16, 1909.

1,043,220.

Patented Nov. 5, 1912.

4 SHEETS—SHEET 1.



Witnesses:
C. E. Dunlap
Anna L. Walton

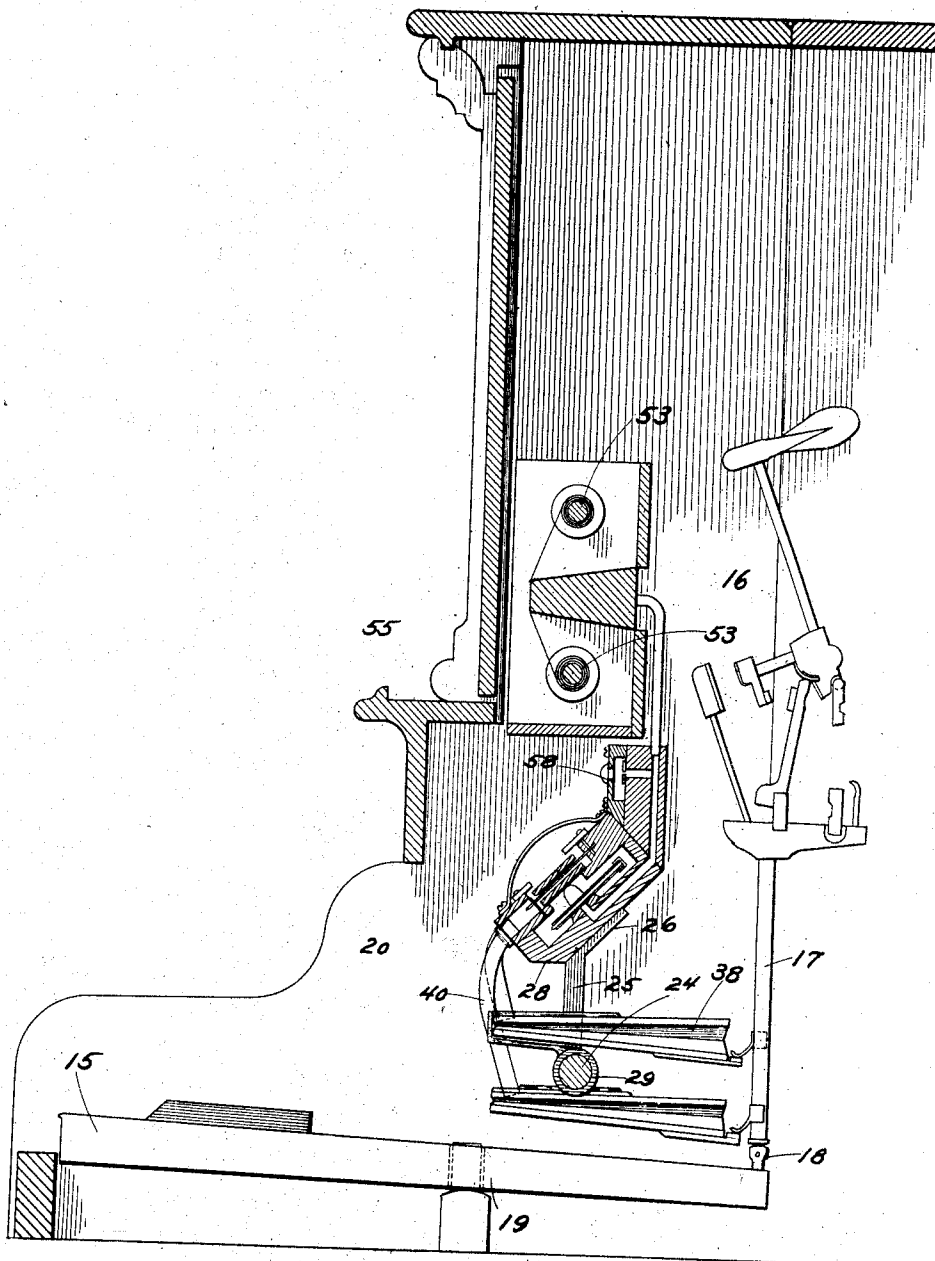
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4 SHEETS—SHEET 2.

Fig. 2.



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By *Sheridan, Wilkinson & Scott*

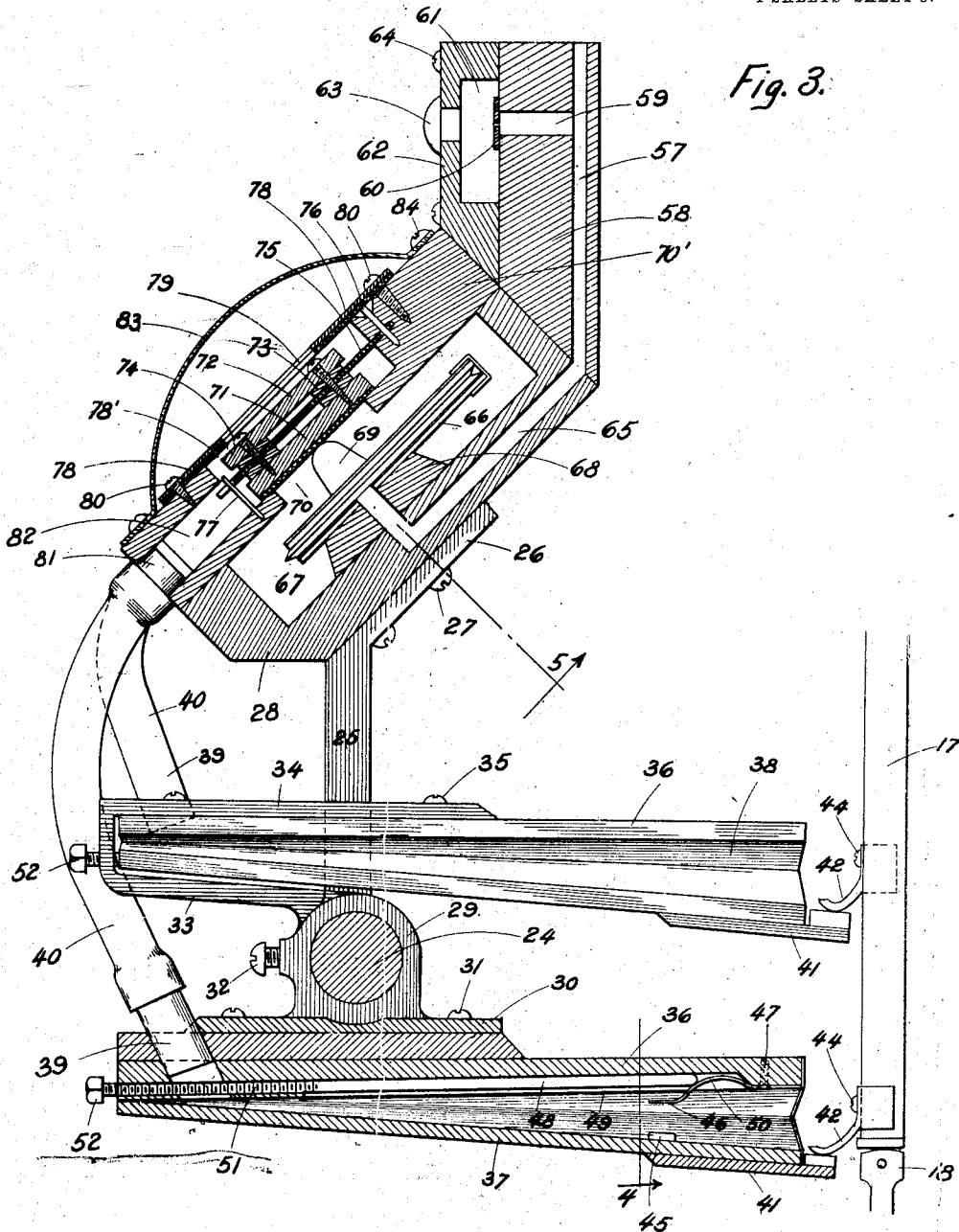
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4 SHEETS-SHEET 3.



Witnesses:

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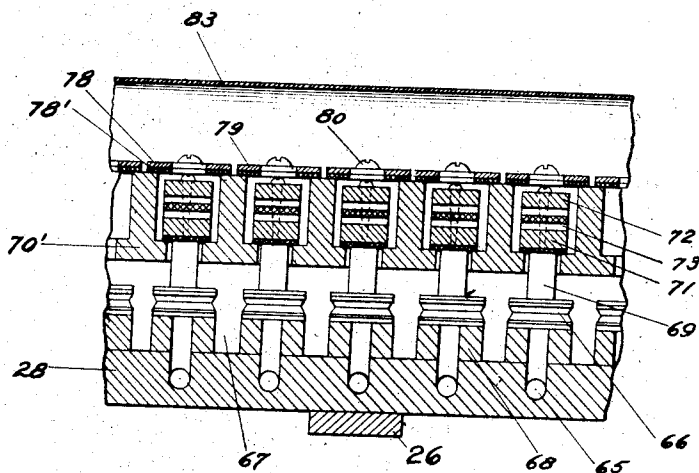


Fig. 5

Fig. 4

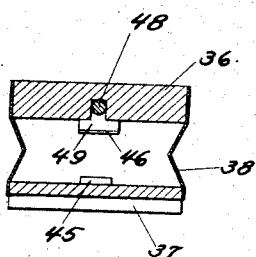
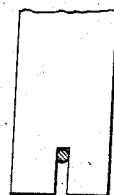


Fig. 6



Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES FREBORG, OF KANKAKEE, ILLINOIS, ASSIGNOR TO SCHAEFFER PIANO MANUFACTURING COMPANY, A CORPORATION OF ILLINOIS.

PNEUMATIC PIANO-PLAYER.

1,043,220.

Specification of Letters Patent.

Patented Nov. 5, 1912.

Application filed April 16, 1909. Serial No. 490,220.

To all whom it may concern:

Be it known that I, CHARLES FREBORG, a citizen of the United States, residing at Kankakee, in the county of Kankakee and State of Illinois, have invented certain new and useful Improvements in Pneumatic Piano-Players, of which the following is a specification.

The principal object of my invention is to provide a new and improved self playing piano adapted to be operated by air pressure.

Another object is to provide a pneumatic piano player which may be readily attached to an upright piano.

Another object is to provide a pneumatic piano player having readily adjustable pneumatics.

My invention also relates to other features and details which will be more readily understood in connection with the following description.

With all of these objects in view, my invention consists of the combination of elements stated in the appended claims.

In the accompanying drawings, I have illustrated one specific embodiment of my invention, which I will now proceed to describe in detail.

Figure 1 is a front elevation of one side of a piano, the casing being removed to show my improvement as applied thereto. Fig. 2 is a vertical section on the line 2-3 in Fig. 1 looking in the direction of the arrow. Fig. 3 is a partial section on the line 2-3 in Fig. 1 looking in the direction of the arrow, this section being considerably enlarged. Fig. 4 is a detail section on the line 4 in Fig. 3 looking in the direction of the arrow. Fig. 5 is a detail section on the line 5 in Fig. 3 looking in the direction of the arrow. Fig. 6 is a view of a detail.

The keys 15 and the hammer actions 16 are of an ordinary type familiar in upright pianos. The keys 15 are pivoted at 19 and carry adjustable studs 18 at their rear ends, which transmit movement through the stickers or abstracts 17 to the hammer actions 16.

Just above, and to the rear of the keys 15 are the sleeves 21 attached by means of screws to the cheek blocks 20 at the sides of the piano. The bar or shaft 24 extends clear across the piano from side to side with its ends resting within the sleeves 21, the set screws 23 being provided to fix the

shaft 24 in this position. It will be observed that within certain limits the shaft 24 is adjustable to right or left, thus adapting it to fit different widths of pianos.

The upright brackets 25 have ring portions which surround the shaft 24 and which carry set screws 25' to clamp them in position thereon. There are several of these brackets 25 distributed along the length of the shaft 24, there being one at each end and several at intermediate points, the intermediate brackets 25 being preferably opposite the spaces 25'' between the hammer actions 16. As shown in Fig. 3 each bracket 25 has its upper end portion 26 inclined, and the transversely extending air chamber 28 is secured thereto in an inclined position by means of the screws 27.

I will now describe how the pneumatics are mounted upon the shaft 24. For each pneumatic, there is a ring or collar 29 surrounding the shaft 24. This collar carries a plate 30, to which the upper member 36 of the little bellows or pneumatic 36-37 is attached by means of screws 31. A set screw 32 is provided to lock the ring 29 at any desired adjustment on the shaft 24. It will be observed that the pneumatic can be adjusted laterally by sliding the ring 29 laterally along the shaft 24, and it can be adjusted further by rotating it around the shaft 24.

As just described, certain of the pneumatics are supported underneath from respective rings 29. From other rings 29 arms 33 extend, as shown in Fig. 3, ending in respective plates 34, to which the upper members 36 are attached by means of screws 35. The upper and lower pneumatics are relatively staggered, and thus it is possible to make each pneumatic substantially twice as wide as an average key space for the keys 15. The upper pneumatics have just the same capability of adjustment as that described for the lower pneumatics. The lower member of each pneumatic is represented by the reference numeral 37, and the upper and lower members 36 and 37 are united by a wall of flexible material 38 closely drawn at the front end (the left as viewed in Fig. 3) so as to make a hinge at this end.

Near the hinge end of each pneumatic an oblique hole is tapped through the upper member 36, and a short tube or thimble 39

is introduced so as to project partially from the hole. A short length of flexible tubing 40, as, for example, rubber, has its end fitted over each thimble 39.

5 The lower member 37 of each pneumatic carries a rearward extension 41 adapted to engage a bracket 42, which is attached by means of a screw 44 to the respective sticker 17. The lower member 37 of each pneumatic carries a little cushion pad 45 of felt on its inner face. A leaf spring 46, seen edgewise in Fig. 3, is bent in the shape there shown, one end being secured firmly to the upper member 36 of the pneumatic by means of the screw 47. A longitudinal groove 49 is channeled in the inner face of the upper member 36 of the pneumatic, and a rod 48 lies within this groove, its end abutting against an oblique or inclined portion 50 of the leaf spring 46. At the front or hinge end of the pneumatic, the rod 48 is screw-threaded, as indicated by the reference number 51. The screw threads engage tightly in an appropriate hole in the upper member 25 36 of the pneumatic, this hole alining with the channel 49. The front extremity of the rod 48 has a head 52 adapted to be engaged by a wrench or pliers.

At the upper part of the piano, in front 30 of the hammer actions, is the paper music roll 53 mounted on the winding and unwinding spools 54 and adapted to pass in its course over the tracker board 55, from which the flexible tubes 56 lead, connecting with 35 the passages 57 in the chambered member or primary air box 28 that extends clear across the piano from side to side thereof. This member 28 as a whole has an upper extension 58 in which are the respective 40 channels 57 with branch passages 59, each such branch passage 59 being capped by a finely perforated disk 60 of celluloid or other material, this perforation being the so-called "bleed" hole. Beyond the bleed 45 hole is a chamber 61, in which, during operation, a vacuum is maintained. This chamber 61 is formed in a member 62, which has holes closed by plugs 63 over the respective bleed holes. The member 62 is 50 attached to the member 58 by means of screws 64.

The channels or conduits 57 are continued downwardly, as indicated by the reference numeral 65, until they open into the 55 respective little bellows 66 arranged side by side in the transversely extending chamber 67. Each bellows 66 has its under member fixed upon a block 68, and its upper member carries a projecting knob 69, which extends 60 up through a rectangular hole 70 in the plate 70' that bounds the chamber 67 on the upper side thereof. This hole 70 is normally closed by a rectangular "button" 71. An outer button 72 is attached to the inner 65 button 71 by means of screws 74, the two

buttons being held apart by the spacing blocks 73. These spacing blocks 73 clamp a leather strip 75 between them, the upper end of this strip 75 having a hole there-through and extending into a slot and then 70 being engaged by a pin 76. The pins 77 are guides for the notched lower ends of the strips 75 (see Fig. 6). A plate 78 of brass or other material overlies the outer button 72, having rectangular holes 79 therein. 75 This plate 78 is fastened to the member 70' by means of screws 80, and underneath it is leather 78' or other suitable material to make a seat for the valve member 72. Branch passages 82 lead through the member 70' from the valve openings 70 and 79. Each such passage 82 ends in a thimble 81, and the respective thimbles 81 are united by the flexible tubes 40 to the corresponding 80 thimbles 39 in the pneumatics.

A piece of transparent celluloid or other suitable material is bent in the shape of a partial cylindrical surface and extends from side to side of the piano over the valve openings 79, thus protecting them from dust. 90 This shield 83 is fastened above and below by screws 84 and is open at the ends.

Having described the structure of my improved piano player, I will now describe the mode of operation thereof. The pneumatics 95 being mounted upon the bar or shaft 24, the sleeves 21 are slipped over the ends of this bar, and it is then put in position between the cheek blocks 20, as shown in Fig. 1. The parts are secured in position by screws 100 through the flanges 22 and by means of the set screws 23. Referring to Fig. 2, if the hammer actions are so low down as to make it necessary, the member 28 can be tilted forward a little, the brackets 25 being rotated 105 forward around the bar 24, and then clamped by means of the set screws 25'; thus it will be seen that the member 28 has an adjustment of rotation about the bar 24. The little brackets 42, having been previously applied to the respective stickers or 110 abstracts 17, each pneumatic is adjusted laterally by sliding it along the bar 24 until the projection 41 from the under member 37 thereof comes directly beneath the respective bracket 42. Next, the respective pneumatics are rotated about the bar 24 until the projection 41 are brought to have a normal position directly beneath the brackets 42. Finally, the pneumatics are clamped in position by means of the set screws 32. 120

The main suction bellows of the machine (not shown) maintains a moderate degree of vacuum in the chambers 61 and 67, these being connected by an air conduit not shown 125 in the drawings. Normally, the same vacuum is maintained in the conduit 56—57—65 by reason of the communication through the small "bleed-hole" in the disk 60. When- 130 ever an opening in the tracker-board 55 is

uncovered by a slot in the music roll 53, air will rush in through the hole in the tracker-board to fill the conduit 56—57—65.

By reason of the reduced external air pressure on the small bellows 66, the latter will fill with air from the conduit 65. This will cause the projecting knob 69 to raise the valve member 71—72, closing the opening 79 which leads to the external air and connecting the flexible tube 40 through the opening 70 with the vacuum chamber 67. The reduced air pressure in the flexible tube 40 will be communicated to the interior of the pneumatic 36—37 and the external air pressure will cause it to collapse. The upper member of this pneumatic being held in fixed position on the shaft 24, the lower member will rise, carrying with it the sticker or abstract 17. All the time that the hole in the tracker-board 55 remains uncovered, the air will be escaping from the conduit 57 through the bleed-hole 60 into the vacuum chamber 61. But as soon as the hole in the tracker board 55 is closed, by the paper roll 53, the air in the conduit 57 will quickly escape through the bleed hole 60 until equilibrium is reached with the same degrees of vacuum in the conduit 57 as in the vacuum chamber 61. This will cause the little bellows 66 to fall back to its normal position, as shown in Fig. 3 of the drawings. This in turn will cause the valve opening 70 to be closed by the valve member 71—72 and at the same time will cause the valve opening 79 to be opened. This will permit atmospheric air to rush into the conduit 40, thus inflating the pneumatic 36—37 and permitting the abstract or sticker 17 to drop back to its normal position.

I desire to call particular attention to the fact that this pneumatic piano player can be made up complete in advance and that it has such a degree of adjustability that it can thereafter be applied to any ordinary upright piano. This feature of construction avoids the necessity for taking measurements of a particular piano and then designing the player so as to fit that piano. Another advantage of my improvement is that the necessary adjustment of the pneumatics to make them co-act properly with the abstracts or stickers can be accomplished with the utmost readiness. It will be seen that each pneumatic has a lateral and an oscillatory adjustment on the shaft 24, so that it can be brought into exact engagement with its respective sticker or abstract 17. Moreover, the parts are readily accessible for the purpose of making such adjustment; the set screws 32 are at the front, where they are directly accessible, and there is no need for removing any portion of the pneumatic player attachment, nor for getting in behind the pneumatics in order to make the adjustment. In addition to this

adjustability of the pneumatics, it is to be observed that the member 28 has an oscillatory adjustment so that it can be placed in a position not to interfere with the hammer actions, no matter whether the stickers or abstracts are long or short. I desire to direct attention to the fact that I take advantage of the usual spaces in the hammer actions to introduce brackets 25 to support the member 28.

The structures of the valve 71—72 and of the valve openings 70 and 79 are simple and advantageous. By elongating the valve openings in an up and down direction, they may be made sufficiently large without the necessity for staggering them, as might be required if the openings were round. The shield 83 extends above the valve openings 79 and prevents dust from falling into them, but this shield is open at the ends so that the air has ready access. In case these valves are to be worked upon or adjusted the shield 83 can be readily removed by taking out the screws 84.

It will be seen that the specific embodiment of my invention which I have described in the foregoing specification is adapted to perform the objects already stated and that it realizes the advantages which I have enumerated.

I claim:

1. In a device of the class described, a bar adjustably supported at its ends, and a series of pneumatics adjustably mounted on said bar.

2. In a device of the class described, flanged sleeves adapted to be attached to the cheek blocks of a piano, a bar having its end supported in said sleeves, and a series of pneumatics adjustably mounted on said bar.

3. In a device of the class described, a bar supported at its ends, a series of pneumatics, rings on said bar to which the respective pneumatics are attached, and means for fixing the rings in any desired adjustment on the bar.

4. In a device of the class described, a bar supported at its ends, a series of staggered pneumatics arranged respectively above and below the bar, rings on the bar to which the respective pneumatics are attached, and means for fixing the rings in any desired adjustment on the bar.

5. In a device of the class described, a series of pneumatics, supporting means for said pneumatics adapted to permit lateral adjustment thereof, and rotational adjustment thereof about a transverse horizontal axis.

6. In a device of the class described, a series of piano action stickers, a bar adapted to be adjustably supported at its ends in front of said stickers, brackets on the respective stickers, pneumatics adjustably mounted on the bar, each pneumatic having

a part adapted to engage a respective sticker bracket, and means to fasten the pneumatics on the bar in position to properly engage the sticker brackets.

- 5 7. In a device of the class described, a row of piano action stickers, a bar adapted to be adjustably supported at its ends in front of said stickers, a series of pneumatics each comprising two relatively movable members, and a series of adjustable mountings upon the bar attached respectively to one member of each of the series of pneumatics, the other members of the pneumatics being adapted to engage the respective stickers.
- 10 8. In a device of the class described, a pair of sleeves adapted to be attached respectively to a piano framework at its sides, a bar adjustably supported in said sleeves, means to fasten the bar in any desired position, and a series of pneumatics adjustably mounted on said bar.
- 15 9. In a device of the class described, a piano action sticker having a bracket thereon, a pneumatic comprising two relatively movable members one of them being adapted to engage said bracket, and a mounting for the other member of the pneumatic, said mounting being adjustable with relation to the direction of movement of the sticker so as to bring the pneumatic into proper engagement with the bracket on the sticker.
- 20 10. In a device of the class described, a bar supported at its ends, brackets on the bar, and an air chamber mounted on said brackets.
- 25 11. In a device of the class described, a bar supported at its ends, a plurality of sleeves on said bar with respective integral projecting members, an air chamber attached to the extremity of said members, and means to lock the said sleeves in any desired position on the bar.
- 30 12. In a device of the class described, a bar supported at its ends, a series of pneumatics adjustably mounted on said bar, and an air chamber also adjustably mounted on said bar.
- 35 13. In a device of the class described, a

bar adjustably supported by the frame, and a series of pneumatics adjustably supported on said bar. 50

14. In a device of the class described, a bar supported by the frame, means whereby said bar may be attached to frames of different widths, and a series of pneumatics adjustably mounted on said bar. 55

15. In a device of the class described, a bar adapted to be supported at its ends in front of a row of piano action stickers, a series of pneumatics each comprising two relatively movable members, and a series of adjustable mountings upon the bar attached respectively to one member of each of the series of pneumatics, the other members of the pneumatics being adapted to engage the respective stickers. 60

16. In a device of the class described, a plurality of rows of pneumatics, and means for supporting said pneumatics in variable lateral positions of adjustment thereof and in variable rotational positions of adjustment thereof in planes transverse to the direction of said lateral adjustment. 65

17. In a device of the class described, a plurality of rows of pneumatics arranged in a vertical series, and means for supporting said pneumatics in variable lateral positions of adjustment thereof and in variable rotational positions of adjustment thereof in planes transverse to the direction of said lateral adjustment. 70

18. In a device of the class described, a series of piano action stickers, a plurality of rows of pneumatics arranged in a vertical series in operative relation to said stickers, and means for supporting said pneumatics in variable rotational positions of adjustment thereof in planes parallel to the direction of movement of the stickers. 75

In testimony whereof, I have subscribed my name. 80

CHARLES FREBORG.

Witnesses:

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HENRY A. PARKS.