M. ROTHFELD.

PIANISSIMO ATTACHMENT.

APPLICATION FILED SEPT. 12, 1911.

1,043,145.

Patented Nov. 5, 1912.

2 SHEETS—SHEET 1.

Fig. 1

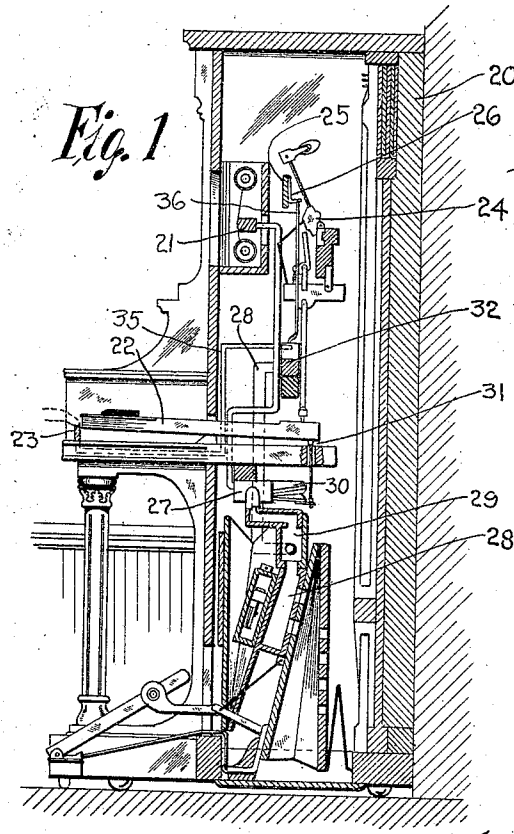


Fig. 2

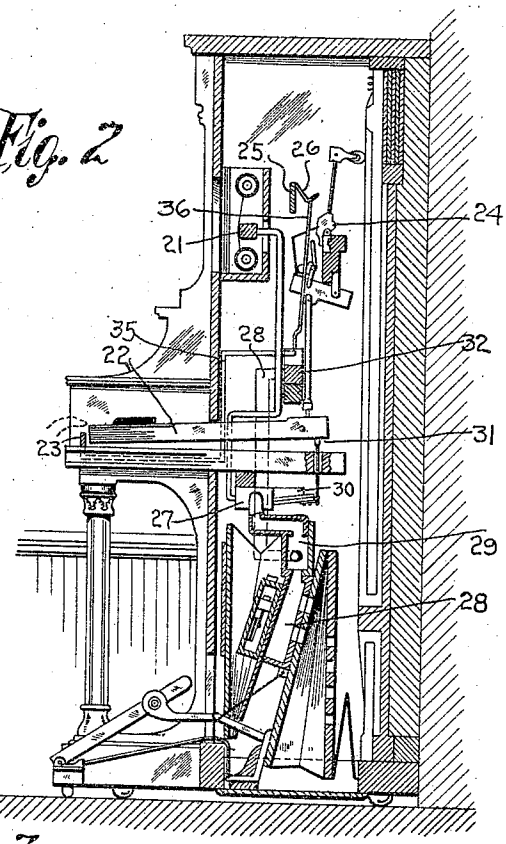
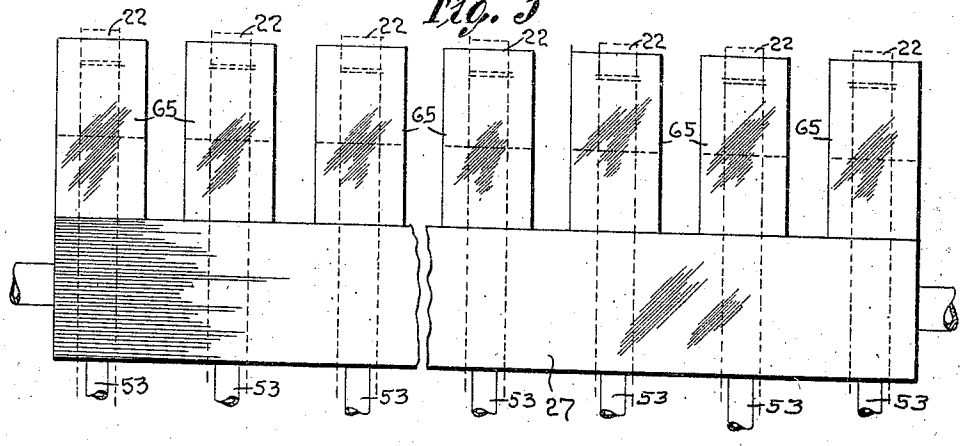


Fig. 3



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 11

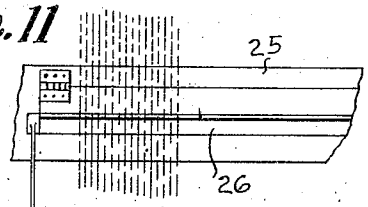


Fig. 10

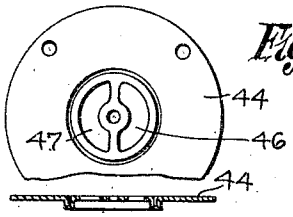


Fig. 8

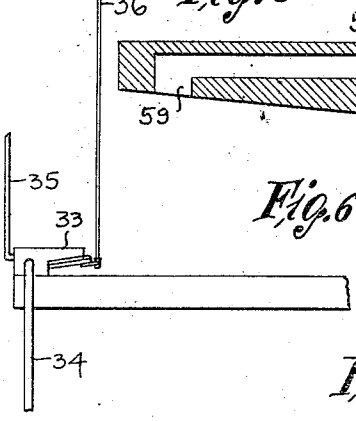


Fig. 9

Fig. 7

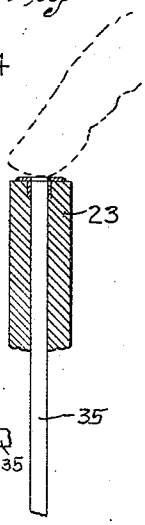


Fig. 6

Fig. 5

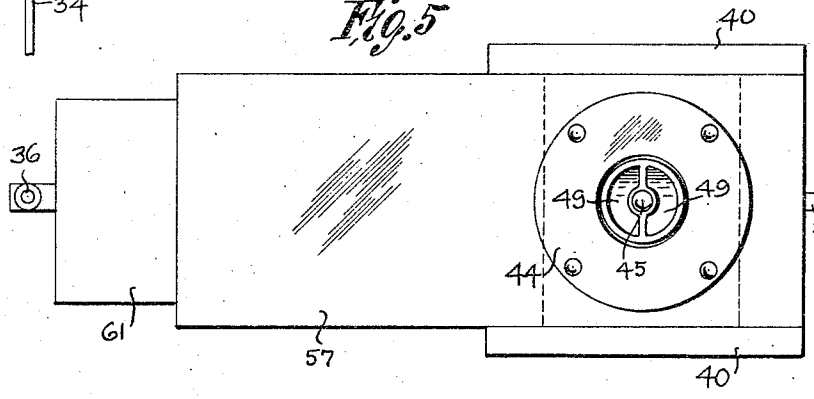
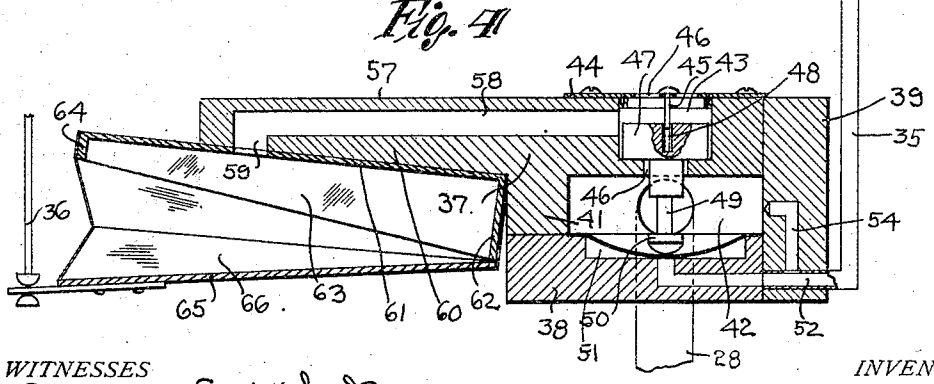


Fig. 4



WITNESSES

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UNITED STATES PATENT OFFICE.

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PIANISSIMO ATTACHMENT.

1,043,145. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed September 12, 1911. Serial No. 648,921.

To all whom it may concern:

Be it known that I, MAX ROTHFELD, a subject of the Emperor of Austria-Hungary, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Pianissimo Attachments, of which the following is a specification.

This invention relates to pianissimo attachments and piano actions used in player pianos.

One of the objects of the invention is to provide a pneumatic means whereby the soft pedal attachment to the hammer rest rail may be controlled by the operator from the front of the piano, preferably from the key slip.

Another object of the invention is to provide an improved pneumatic for a piano action.

With the above and other objects in view the invention consists in general of certain novel arrangements of details and combinations of parts as will be hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings: Figure 1 is a transverse section through a player piano showing the parts in operative position the hammers being shown away from the springs. Fig. 2 is a similar view showing the parts in operative position. Fig. 3 is a plan view showing a portion of the vacuum box and the pneumatics attached thereto and in connection with the piano action. Fig. 4 is a longitudinal median section through the hammer rest rail actuating pneumatics it being understood that the striking pneumatics are similar to the power pneumatics of this figure. Fig. 5 is a plan view thereof. Figs. 6, 7, 8, and 9, are detail sections through the several parts which are provided to make the vacuum trunk. Fig. 10 is a modified form of closure for the valve chamber illustrated in Fig. 4. Fig. 11 is a rear elevation showing the connection of the bellows with the pianissimo device.

In describing Figs. 1 and 2 only such parts will be described as have to do directly with the present invention and those parts such as the pumping mechanism and the like which are common to all player pianos will not be described as the same forms no part of the present invention.

In the present invention the piano is provided with the usual casing 20, tracker board 21, keys 22, key slip 23, hammer mechanism indicated in general at 24, and the hammer rest rail consisting of a fixed member 25 and a movable member 26, the fixed and movable members being hinged together at their upper edges. It will, of course, be obvious that the movable member may consist of one or more sections according as it is desired to have a pianissimo effect on either the bass or treble, or any other manner of obtaining a local pianissimo effect. These parts are all of the common and ordinary construction and the hammer mechanisms are connected to the keys in any of the ordinary manners.

Coming now to the description of the improved operating mechanism. Beneath the key board there is provided a vacuum box 27 wherein a partial vacuum is produced by means of a suitable exhausting mechanism 28 in communication therewith by one or more ducts 29. Secured to this vacuum trunk 27 are a number of pneumatics indicated in general in Figs. 1 and 2, at 30, and hereinafter specifically described. Each of these pneumatics is connected with a proper key by means of a lift rod 31. The pneumatics are connected with the keys in such position that they lift the rear end of the keys and cause the hammer action to operate exactly as though a finger was pressed upon the front end of the respective key. From these pneumatics the usual ducts 32 lead to the tracker board 21. It is to be understood that the pneumatics are of a type provided with an air cell as will be hereinafter set forth and that these ducts 32 lead to the air cells of respective pneumatics. The various keys are removable as the lift rod 31 is not attached to the keys but abuts against the same. In the present instance the pianissimo attachment has been shown as being provided with one pneumatic 33 but one, two or three may be used according to the division of the piano. The pneumatic 33 is of like construction to the others, and from this pneumatic ducts 34 leading to the exhaust mechanism 28 extend while from the cell of each of these pneumatics a duct 35 leads beneath the keys and opens out on the upper edge of the key slip 23. The pneumatic 33 is connected to the movable member 26 of the hammer rest rail by means of a rod 36 so that as this pneumatic is operated the movable section 26 will be

swung inwardly and upwardly, thus preventing the hammer from having the full stroke as would readily be seen by reference to Fig. 2. In this manner by operating the pneumatic each hammer is given a short stroke and the pianissimo effect is obtained. It is obvious that where two divisions of the member 26 are employed, one division may include or control one-half of the hammers while the other division includes the remaining half. Thus the division to the right may include the treble of the piano while the division to the left includes the bass so that it is possible by opening the appropriate duct 35 to cause either the bass or treble pneumatic to operate and thus produce the pianissimo effect on the similar keys.

In order to control the openings to the ducts 35 the operator simply places the tips of his fingers on these openings and so long as he retains his fingers over the holes the pneumatics will be inoperative. When, however, he removes one or more of his fingers the corresponding pneumatics will be operated in a manner precisely similar to that which takes place when an opening in the music roll comes opposite the mouth of one of the ducts in the tracker board, this operation being too well-known to need further explanation in detail.

Considering now the particular pneumatic used in this invention. In Figs. 4 to 10 there are shown the different portions of a pneumatic arranged for single operation wherein the vacuum trunk is that for a single pneumatic and may rather be termed a vacuum cell. It is obvious from what follows that a number of these pneumatics may be connected side by side for the piano action so that they form a long trunk. Each of these pneumatics includes an upper member 37, a lower member 38, a rear member 39, and an end member 40. The upper member 37 is provided with a flange 41 which forms the front wall of a vacuum cell 42 when the members are assembled as clearly shown in Fig. 4. In the upper member 37 is formed a valve chest 43 and it will be understood that where more than one pneumatic is included in the same vacuum trunk in connection with the pianissimo attachment, the number of the valve chests 43 will equal in number the number of pneumatics to be controlled thereby. This valve chest opens outwardly into the atmosphere and the outer end is closed by means of a plate 44 which is provided with a pin 45 extending inwardly in the valve chest. Around this pin are formed openings 46 and these openings may either be in the form of circular holes, as shown in Fig. 5 or as arcuate slots as in Fig. 10. The valve chest 43 is provided with an opening which communicates with the vacuum chamber 42. Within the valve chest 43 is movable a valve 47 provided with a centrally disposed opening 48 slidable upon the pin 45, the lower end of the opening 48 being closed by means of a stem 49 screwed therein and provided with a head 50. Immediately below the head 50 is an air cell 51 formed in the lower member 38 and this air cell communicates with the tracker board or like air controlling device by means of a duct 52 and a pipe 53 leading therefrom. Leading from the air cell to the vacuum box 42 is a small bleeder 54 and the air cell is closed at its upper end by means of a flexible diaphragm 55. From the vacuum chamber 42 there extends a duct 56 which communicates with suitable exhaust apparatus of any desired description. The upper member 41 is provided with a rearwardly extending portion 57 through which passes a duct 58 which opens downwardly as at 59 at the rear end of the extension 57. The underside of this extension is beveled rearwardly and upwardly, as shown at 60, and to this beveled portion is attached the bellows of the pneumatics. This bellows is provided with a top member 61, front member 62, side member 63, and rear member 64. The front member 62 is of greater height than the rear member 64 and the lower edges of the side member slant from the lower edges of these parts so that there is formed a box which constitutes the upper or fixed member of the bellows. Hinged to the front member 62 is the lower member or bottom 65 and this lower member has its sides and rear edges connected to the sides and rear of the box by means of flexible cloth or the like as indicated at 66.

In the operation of this pneumatic, let it be supposed that a vacuum is being maintained in the vacuum chamber 42 and that the duct 53 is closed, either by the music roll or by the finger of a person. Then by reason of the fact that the air pressure on both sides of the diaphragm 55 is equal, its equality being maintained by the bleeder 54, the valve 47 will close the opening 46 and the opening 49 will be in communication with the bellows through the duct 58. This will allow the bellows to open. Now, let it be supposed that the duct 53 be opened to the atmosphere. Immediately the pressure on the lower side of the diaphragm 55 will be greater than the pressure on the upper side thereof, and by reason of the fact that the opening 46 is of less area than the cell 42, the diaphragm will move upwardly and carry the valve 47 with it so that the duct 58 will be placed in communication with a vacuum chamber 42 through the opening 46. The air will be exhausted from the bellows and the bottom member 65 will close up. Now, when the duct 53 is closed pressure on both sides of the diaphragm will again

be equalized and the parts will assume the position previously described since there is no possibility of the lower member 65 of the bellows sticking to the fixed member on account of the fact that contact takes place only along the edges. In this manner one of the principal defects, that is to say the sticking of the bellows, in player pianos, has been eliminated and the improved form of pneumatics provided.

There has thus been provided a simple and efficient device of the kind described, and for the purpose specified.

It will be obvious that the device may be used upon any upright piano and also with any piano which is provided with a pianissimo attachment. Of course, where the hammers are divided into one, two, or three groups the number of pneumatics will have to be arranged to suit the number of divisions, one being used to each division. Only one pneumatic is used to control each division in connection with the pianissimo attachment, while one pneumatic is used for each key in connection with the piano action.

Having thus described the invention, what is claimed as new, is:

In a device of the kind described, a plurality of hammers, a hammer rest rail against which said hammers normally lie, said hammer rest rail having hinged sections adapted to be moved to raise the hammers, pneumatics having operative connection with said hinged sections, a key slip, tubes leading from said pneumatics to said key slip, a series of pneumatics individually connected operatively to individual hammers, all of said pneumatics comprising a valved controlled cell opening inwardly and outwardly, a valve for controlling said cell, said pneumatics being also provided with a second cell, a flexible diaphragm extending over the second cell, a valve stem resting on said diaphragm, a bellows comprising a rigid box having sides of greater height at one end than at the other, and a rigid top hinged to the higher edge of said box, and connected to the remainder by a flexible member, said pneumatics being further provided with ducts leading from the valve controlled cells to said bellows, and other ducts leading from beneath said diaphragm, a tracker board, and tubes connecting the hammer actuating pneumatics with said tracker board.

In testimony whereof I affix my signature in presence of two witnesses.

MAX ROTHFELD.

Witnesses:
GEORGE T. CREEK,
L. H. MARTIN.