A. G. GULBRANSEN.

PNEUMATIC FOR AUTOMATIC PLAYER PIANOS.

APPLICATION FILED DEC. 8, 1909.

998,171. Patented July 18, 1911.

Fig. 1.

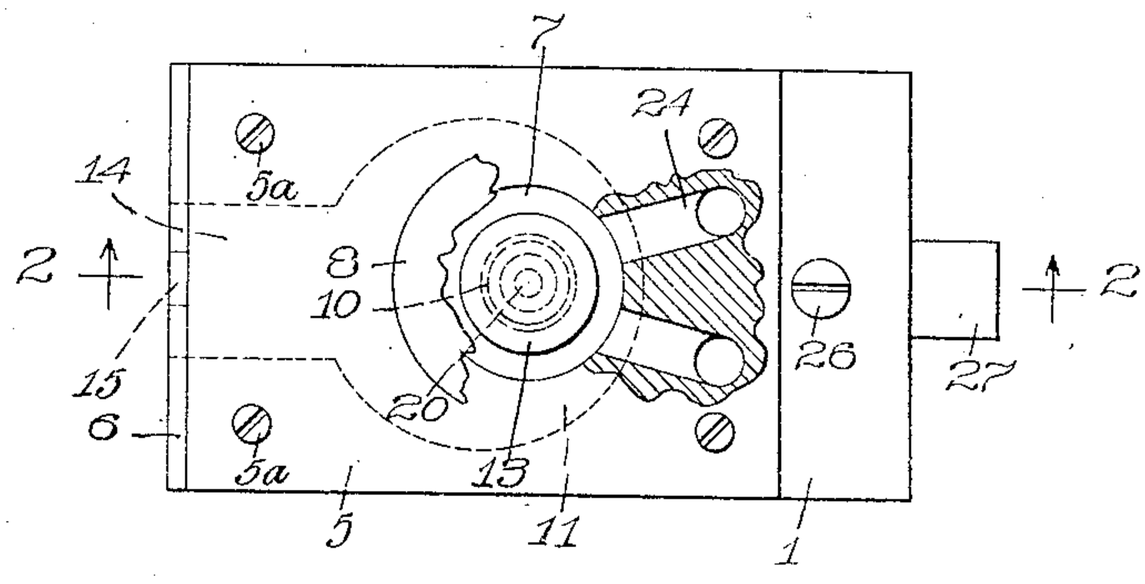
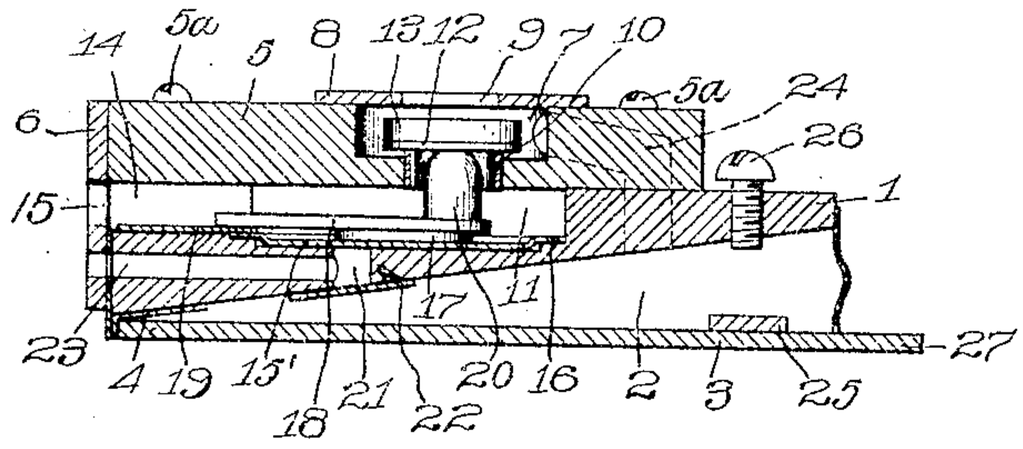


Fig. 2.



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PNEUMATIC FOR AUTOMATIC PLAYER-PIANOS.

998,171. Specification of Letters Patent. Patented July 18, 1911.

Application filed December 8, 1909. Serial No. 531,994.

To all whom it may concern:

Be it known that I, AXEL G. GULBRANSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Pneumatics for Automatic Piano-Players, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to pneumatics for automatic player pianos, and has special reference to an improved form of valve which will allow more efficient operation of the pneumatic.

I have already described in previously issued patents the general construction of my automatic player piano and the pneumatics associated therewith. Such descriptions will be found in the following patents:

874,675 of Dec. 24, 1907
874,762 of Dec. 24, 1907
874,763 of Dec. 24, 1907
891,930 of June 30, 1908
913,378 of Feb. 23, 1909.

In the construction of the valve associated with the pneumatics, the form which I have preferably employed is constructed by interposing a leather washer between the end of the valve stem and the lever which is actuated by a rubber diaphragm moved by the pressure of air flowing to the pneumatic from an opening corresponding to any given note in the tracker board mechanism. The leather washer has been glued to the lever above mentioned, and the end of the stem in turn glued to the leather washer. At the other end of the stem a valve button has been attached, a second leather washer being inserted and glued on its two sides to the valve button and the end of the valve stem respectively. On each end the valve stem has been squarely cut off. I have found that according to this construction there is a tendency for the valve stem to be displaced from its normal position, with the result that the valve button does not become seated evenly and satisfactorily on the valve seat.

According to my present improvement, the lower end of the valve stem is squarely cut off and is glued or otherwise suitably attached directly to the lever above mentioned. The upper end of the valve stem is rounded, and the valve button on the under side of which a leather washer is attached, is glued or otherwise suitably fastened to the rounded upper end of the valve stem through the medium of this washer. According to this construction it will be apparent that the valve stem is rigidly mounted with respect to the lever, and for this reason it will always operate in a true and accurate manner, and no guides are necessary, such as are often used in connection with the primary valves of the pneumatics of other construction. On account of the rounded form of the upper end of the valve stem the valve button is allowed to adjust itself with great ease to the valve seat, and always forms a tight and accurate joint. I have found that by means of the improvement above described the operating efficiency of the automatic player piano is considerably increased. These and other advantages of my invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a plan and partly sectional view of a single pneumatic showing the valve in position. Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

The pneumatic has a main mounting block 1 from the lower side of which is suspended a bellows 2. In the drawings I have shown only a single bellows, but it will be understood that any number could be attached in a vertical series to the main mounting block, the lower swinging member 3 of each bellows being connected by a suitable lever mechanism with the swinging member 3 next above. This construction has been described in detail in the patents which I have mentioned above. The swinging member 3 is hinged to the main mounting block 1 by means of the hinge 4, preferably constructed of some suitable cloth and glued to the parts which are thus connected.

Attached to the main mounting block 1 by means of screws 5^a is the valve block 5. A leather strip 6 is glued to the ends of valve block 5 and main mounting block 1, as clearly shown in Figs. 1 and 2. Within the valve block 5 is a valve chamber 7 which is covered by means of leather washer 8, in the center of which is the opening 9. A metallic ring 10, preferably of brass, is

mounted within the valve block 5 and forms a means of communication between the valve chamber 7 and the upper diaphragm chamber 11 within the main mounting block 1. As shown in Fig. 2, the ring 10 extends slightly above the bottom of valve chamber 7 and forms a valve seat on which a leather washer 12 attached to the under side of valve button 13 is adapted to be seated.

As shown by the dotted lines in Fig. 1, the upper diaphragm chamber 11 in the main mounting block 1 is circular in shape and communicates by means of the passage 14 and the opening 15 in the leather strip 6 with the low-pressure chamber which has been described in my previous patents, as, for example, 874,763, of December 24, 1907, but which, for the sake of simplicity, is omitted from the present drawing.

The upper diaphragm chamber 11 has its bottom covered by the disk 15′ of rubber or other flexible material, this disk being glued to the annular raised portion 16 which encircles the diaphragm chamber. Glued to the upper surface of the diaphragm near its center is the leather or felt washer 17. To the upper part of this washer is glued the lever 18, the other end of which is similarly attached to the hinge 19 of cloth or other flexible material, this hinge being attached to the bottom of passage 14.

At or near the end of lever 18 is glued the valve stem 20, this stem being directly mounted on the lever with no intervening washer of leather or other material. The upper end of valve stem 20 is rounded as shown in Fig. 2, and the leather washer 12 is glued to this rounded end of the valve stem. It will be observed that the end of lever 18 to which the valve stem 20 is attached extends considerably beyond the middle of the diaphragm 15. The object of this construction is to afford a greater degree of movement for the valve stem 20 and its associated valve button 13 than would be the case were the valve stem mounted nearer the hinged end of the lever.

Below the diaphragm 15′ is the lower diaphragm chamber 21, communication of which with the bellows is prevented by means of the disk 22. Connecting with the lower diaphragm chamber 21 is the passage 23, which is connected by suitable means which I have described in my previous patents, with an opening in the tracker-board which is assigned to the hammer of the piano which the pneumatic is arranged to operate.

The inside of bellows 2 communicates through passages 24 in the main mounting block 1 and the valve block 5 with the valve chamber 7.

The operation of the pneumatic will now be clearly understood. Inasmuch as valve chamber 7 communicates through opening 9 with the atmosphere it is evident that atmospheric pressure will pass to bellows 2, which will thereby be kept in its distended condition as shown in Fig. 2. Upper diaphragm chamber 11, as explained above, is constantly in direct communication with a low pressure chamber, and is sealed against the admission of air by the seating of valve button 13 on its seat 10. When an opening in the music roll comes opposite the appropriate opening in the tracker-board, air is admitted, by means which have been described in my previous patents, into passage 23 and lower diaphragm chamber 21. The diaphragm 15′ is thereby forced upwardly, and by the action of lever 18 the valve button 13 is unseated from its valve seat 10, and the communication of valve chamber 7 with atmosphere is cut off by the seating of valve button 13 against the washer 8. It is now evident that communication is established between valve chamber 7 and the low pressure chamber through upper diaphragm chamber 11, passage 14 and opening 15 in the leather strip. This communication with the low pressure chamber also extends through passages 24 to the bellows 2, which is thereby contracted, and the swinging member 3 is raised until disk 25 comes in contact with the lower end of screw 26 which passes through the main mounting block 1. The end 27 of swinging member 3 is adapted to come in contact with a suitable abutment member on an abstract rod, and the note is thereby sounded. The construction is precisely the same in principle as if, instead of a single pneumatic, a series or tier of pneumatics is used. When air no longer passes through passage 23 into lower diaphragm chamber 21 the diaphragm 15′ again passes into its position shown in Fig. 2, and the normal positions of the various parts are again assumed.

Certain changes could be made in the exact construction of the parts which I have described without departing from the spirit of my invention.

What I claim is:

1. In an automatic piano, an actuating valve stem having a rounded end, and a valve in the form of a button having a flexible part secured to said rounded end of said valve stem.

2. In an automatic piano, an actuating valve stem, the top of said valve stem being rounded, a valve in the form of a button having a disk of flexible material secured to the under side thereof, said disk of flexible material being glued to a considerable area of the rounded end of said valve stem.

3. In pneumatic action mechanism for mechanically operated musical instruments, the combination with the bellows, of a valve for controlling the bellows, a valve stem with a

rounded end to which said valve is flexibly secured, a lever to which said valve stem is rigidly attached, and a diaphragm for operating said lever, said lever being hinged at one side of said diaphragm and extending over the same and said stem being secured to said lever beyond the point of connection between said diaphragm and said lever.

4. In an automatic piano, an actuating lever, a valve stem rigidly secured to said lever, said stem having a rounded end, a valve in the form of a button having a flexible disk secured to said rounded end of said valve stem, and a bellows controlled by said valve.

5. In an automatic piano, an actuating lever, a valve stem rigidly secured to said lever, the top of said valve stem being rounded, a valve in the form of a button having a disk of flexible material secured to the under side thereof, said disk of flexible material being glued to a considerable area of the rounded end of said valve stem, and a bellows controlled by said valve.

In witness whereof, I hereunto subscribe my name this 30th day of November, A. D. 1909.

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Witnesses:

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