

J. KNAGGE.
 PLAYER PIANO PNEUMATIC BELLOWS.
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1,106,820.

Patented Aug. 11, 1914.

Fig. 1.

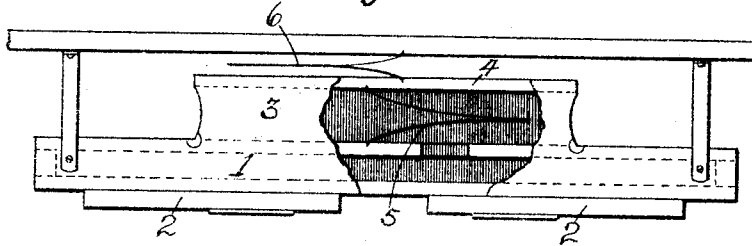


Fig. 2.

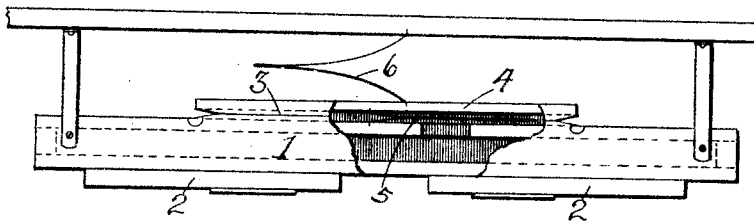
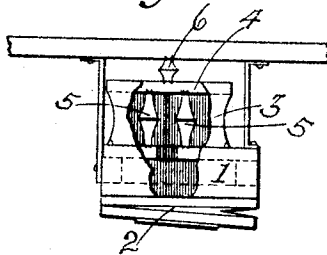


Fig. 3.



WITNESSES:

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PLAYER-PIANO PNEUMATIC BELLOWS.

1,106,820.

Specification of Letters Patent.

Patented Aug. 11, 1914.

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To all whom it may concern:

Be it known that I, JOSEPH KNAGGE, a citizen of the United States, residing at Chicago Heights, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Player-Piano Pneumatic Bellows, of which the following is a specification.

The object of my invention is to improve the action of the bellows, by increasing the range of variation between its highest and lowest tension, thereby increasing the possibilities of musical expression and accentuation through the pedaling alone, independent of other well known means of expression.

In the drawings, Figure 1 is a front view of the bellows and pumpers showing the bellows in open position with both expansion and compression springs. Fig. 2 is a view of the same with the bellows in closed position. Fig. 3 is an end view of bellows and pumpers, showing my improved form of construction.

By a wind chest 1, or in any suitable manner, pumpers 2 are combined with a bellows 3 having its moving board 4 parallel with the wind chest, the upper surface of which becomes the fixed member of the bellows. Expansion springs 5 are placed between the opposed fixed and movable parts of the bellows, thus exerting a tension on the moving board 4 which maintains the bellows 3 in open position.

Under the operation of the pumpers 2 a partial vacuum is formed in the bellows which gradually closes the same with the moving board 4 substantially parallel with the wind chest. The tension of the air in the bellows changes at every step of this motion owing to the increased tension of the springs 5 as they are compressed. When the bellows is entirely closed, the instrument may be subjected to an additional force of tension through the medium of the pumpers, depending upon the will of the operator.

Dynamic effects and musical expression in playing auto-pneumatic piano playing devices require a sensitive variation of air tension, and in order to increase the range of variation in air tension, I apply to the outside surface of the movable member 4 of the bellows, an opposing compression spring 6 or a plurality of such springs of lesser

tension than the expansion springs 5, with the result that the normal tension of the bellows is greatly decreased when in open position, while it is not correspondingly increased in closing position; this gives great elasticity and a wider range to the variation between the lowest and highest tension of the bellows, and increases the possibilities of the instrument for musical expression.

With my improved bellows, it is possible to operate the instrument smoothly with lower tension than is possible with the same bellows not provided with my opposed springs. This increases the beauty of pianissimo effects. At the same time, any sudden force applied to the pumpers results in accentuation which continues only for the moment when such force is applied. This makes it possible to pick out and accentuate the melody notes from any part of the score.

While I have shown my invention as applied to a bellows in which the movable member moves in a parallel plane with the fixed member, it can be applied to any form of bellows with equal success. It is apparent also that any arrangement of opposed springs either outside or inside the bellows will come within the scope of my invention.

Having described my invention, what I desire to secure by Letters Patent, is:—

1. In a mechanical musical instrument: a bellows having means for its expansion, thus exerting suction tension, and opposed lesser means for compression applied to the movable leaf thereof, for the purpose of modifying said suction tension.

2. In a mechanical musical instrument: a bellows having interior means for its expansion, thus exerting suction tension, and opposed lesser exterior means for compression applied to the movable leaf thereof, for the purpose of modifying said suction tension.

3. In a mechanical musical instrument: a bellows having expansion springs for exerting suction tension and opposed compression springs of lesser tension for the purpose of modifying and increasing the range of variation of said suction tension.

4. In a mechanical musical instrument: a bellows having expansion springs for exerting suction tension, and opposed compression springs of lesser power of tension, applied to the movable leaf thereof, for the

purpose of modifying and increasing the range of variation of said suction tension.

5 5. In a mechanical musical instrument, a bellows having expansion springs placed within the same for creating suction tension, and opposed compression springs of lesser tension placed in position outside the bellows and in contact with the movable

wall thereof, for the purpose of modifying and increasing the range of variation of 10 said suction tension.

JOSEPH KNAGGE.

Witnesses:

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