E. P. NEEDHAM.

Mechanical Musical Instrument.

No. 213,443 Patented Mar. 18, 1879.

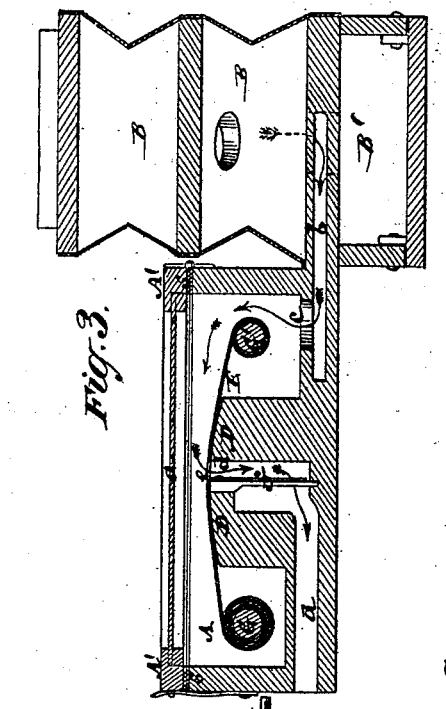

Fig. 3.

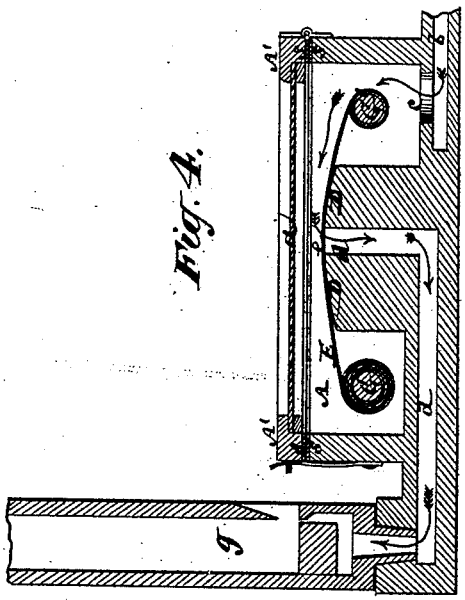

Fig. 4.

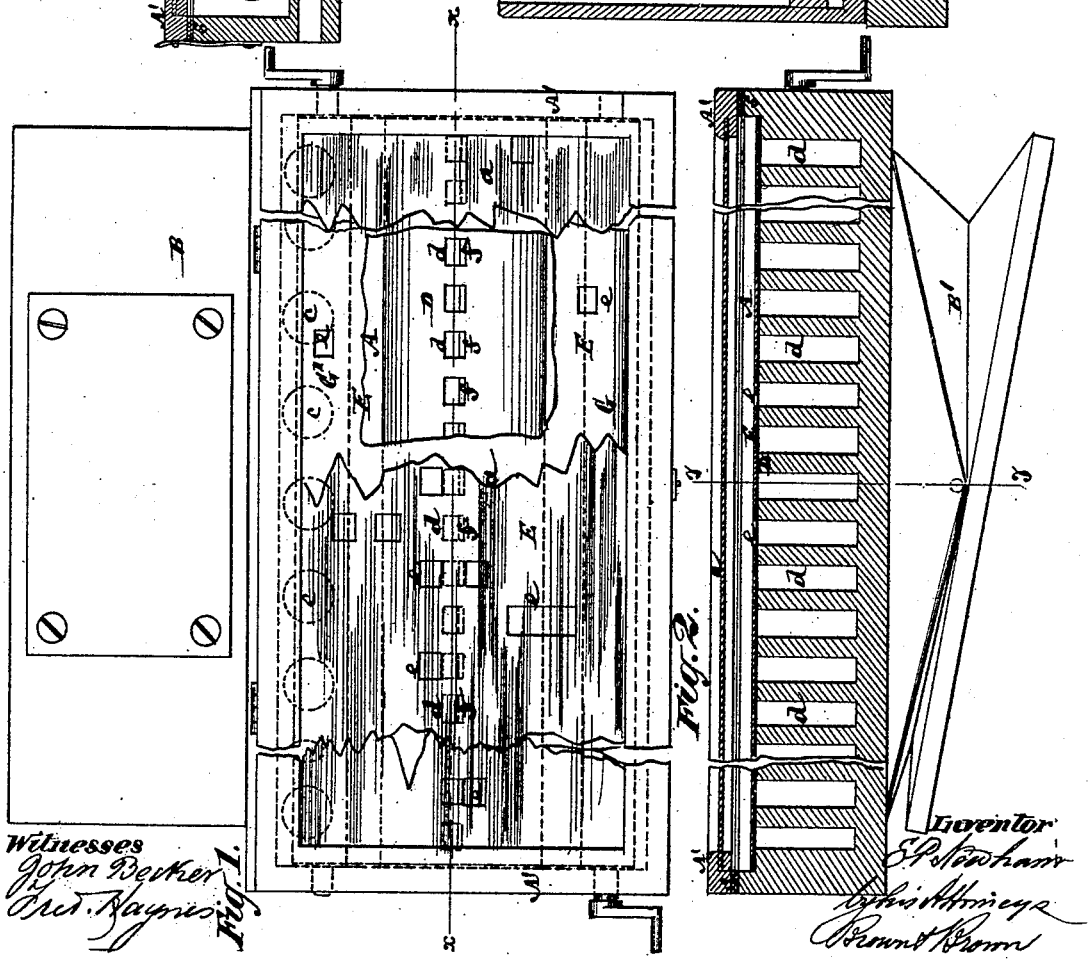

Fig. 1.

Fig. 2.

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ELIAS P. NEEDHAM, OF NEW YORK, N. Y.

IMPROVEMENT IN MECHANICAL MUSICAL INSTRUMENTS.

Specification forming part of Letters Patent No. **213,443**, dated March 18, 1879; application filed January 14, 1879.

To all whom it may concern:

Be it known that I, ELIAS P. NEEDHAM, of the city and State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to organs and other wind musical instruments which are mechanically played or controlled by means of one or more strips or sheets of paper or other suitable material perforated to represent the different notes or sounds it is desired to produce, and caused to automatically pass over air-ducts, which, accordingly as they are opened by the perforations in the paper that has a valvular action relatively to said ducts, causes the reeds or other sounding devices to be played as required.

The invention applies to instruments of this description in which an air-compression pump or bellows is used, as distinguished from an exhaust-bellows, and it will here be described as applied to both reed and pipe organs; but, although herein more fully illustrated as used in connection with a reed-organ, it will be found more advantageously applicable to pipe-organs, which require a forced blast or air under pressure to play them.

Said invention consists in an arrangement within the wind-chest of the instrument of one or more of the perforated strips or sheets hereinbefore referred to, and of the perforated board or other equivalent structure over or in contact with which said perforated strips or sheets travel to control the escape of the wind or air under pressure to the pipes, reeds, or other sounding devices, whereby a very perfect valvular action of the strip or sheet is obtained.

In the accompanying drawings, Figure 1 represents a plan of a reed-organ, in part, having my invention applied; Fig. 2, a vertical section of the same on the line *x x*, Fig. 1; and Fig. 3, a vertical section thereof on the line *y y*, Fig. 2. Fig. 4 is a vertical section of a pipe-organ, in part, having the invention applied.

A represents the wind-chest of the instrument, which is supplied with air under pressure from a weighted air receiver or regulator, B, having the air furnished to it by a force-pump or bellows, B′. The air under pressure passes from the receiver B by a duct, *b*, through one or more apertures, *c*, into the wind-chest A, outside of an action or tube board, D, which has perforations *d*, corresponding in number with the reeds or other sounding devices of the instrument, and which may contain the reeds *f*, as represented in Figs. 1 and 3, or may communicate with the pipes *g* when the instrument is a pipe-organ, as shown in Fig. 4.

The passages *d* in the action or perforated board D, which is inclosed by the wind-chest, form inlets for the air under pressure to the reeds, pipes, or other sounding devices whenever the perforations *e* in a playing strip or sheet, E, of paper or other flexible material (which perforations correspond with the notes or sounds to be produced) are respectively brought over the passages *d* in the board D. Said strip or sheet (or there may be two or more of such strips or sheets, arranged either side by side or otherwise) is also contained within the wind-chest A, and is made to travel over or against the board D for the purpose of opening or closing, as required, by its perforated and unperforated portions, the mouth or receiving ends of the passages *d*. The requisite motion of the perforated strip or sheet E for this purpose may be produced by fastening one end of said strip or sheet to a winding-roll, G, on one side of the board D, and the other end of said strip or sheet to an unwinding-roll, G′, on the opposite side of said board, and by suitably rotating the roll on which the strip or sheet is wound.

By the arrangement of the perforated strip or sheet within the wind-chest under pressure of the air therein as supplied by the force-pump or bellows or weighted receiver connected with the bellows, a very perfect valvular action is obtained for said strip or sheet, as its unperforated portions lie or pass over the mouths or receiving ends of the passages *d*, which conduct the wind to the reeds, pipes, or other sounding devices, the compressed condition of the air in the wind-chest aiding very materially to effect this result, and in proportion as the valvular action of the

strip or sheet is improved will the performance of the instrument as effected or controlled by the perforated strip or sheet be perfected.

The wind-chest A should be constructed with a hinged or other suitably opening and closing lid or cover, A′, to provide for inserting and removing the perforated strip or sheet E, and replacing it by another when necessary to change the tune.

One or more packing-strips, *s*, of india-rubber or other suitable air-tight material, should be applied to the meeting faces or surfaces of said cover and the chest A, so that when the cover is closed it will exclude the escape of air from the wind-chest at the joint formed by the cover. Furthermore, if desired, said cover may be a glazed one, or be fitted with a glass, *a*, in order that the operation of the paper may be inspected from time to time.

Although the device or part D is here termed an "action-board," and a perforated board for the perforated strip or sheet to pass over or in contact with is preferable, it is not absolutely necessary that the same should literally be a board, inasmuch as any structure having passages which serve to conduct the wind to the reeds or other sounding devices, and providing for the passage of the perforated strip over the mouth or receiving ends of said passages, would be the equivalent of what has here been termed an "action-board."

The arrangement of the perforated strip or sheet relatively to the winding-roll, unwinding-roll, and the action-board, as here represented, is such that the curvature of the strip or sheet between said rolls is always in the same direction as its curvature when on the rolls, and consequently the strip is not strained against the bend given to it by the rolls; but this arrangement of the strip or sheet, which has many advantages, forms no part of the present application, and it is my intention to make it the subject of a separate application for Letters Patent.

I claim—

1. In a mechanical musical instrument in which the required musical effect is produced or controlled by one or more traveling perforated strips or sheets, and in which air under pressure is used to produce the necessary notes or sounds, the arrangement within the wind-chest of the instrument of the action-board or other equivalent structure, over or in contact with which the perforated strips or sheets are made to travel for the purpose of opening and closing the mouths or receiving ends of the passages which conduct the wind from the chest to the pipes, reeds, or other sounding devices of the instrument, substantially as specified.

2. In a mechanical musical instrument in which the required musical effect is produced or controlled by one or more traveling perforated strips or sheets, the combination, with a wind-chest having air under pressure supplied to it, of an action board or other equivalent structure arranged within said wind-chest, and having the mouths or receiving ends of its passages opening into said chest, and one or more traveling perforated playing strips or sheets, and means for carrying the same, also arranged within said wind-chest, essentially as described.

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