(No Model.)

E. P. NEEDHAM.

Mechanical Musical Instrument.

No. 238,146. Patented Feb. 22, 1881.

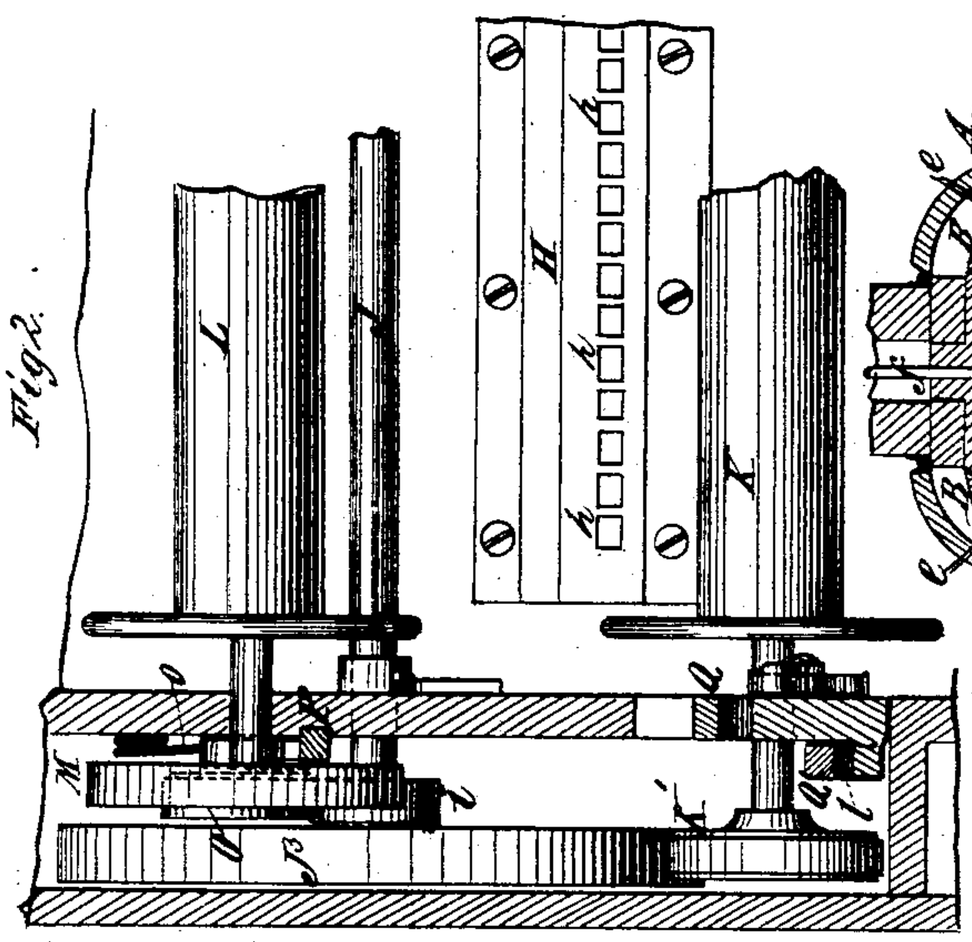

Fig 2.

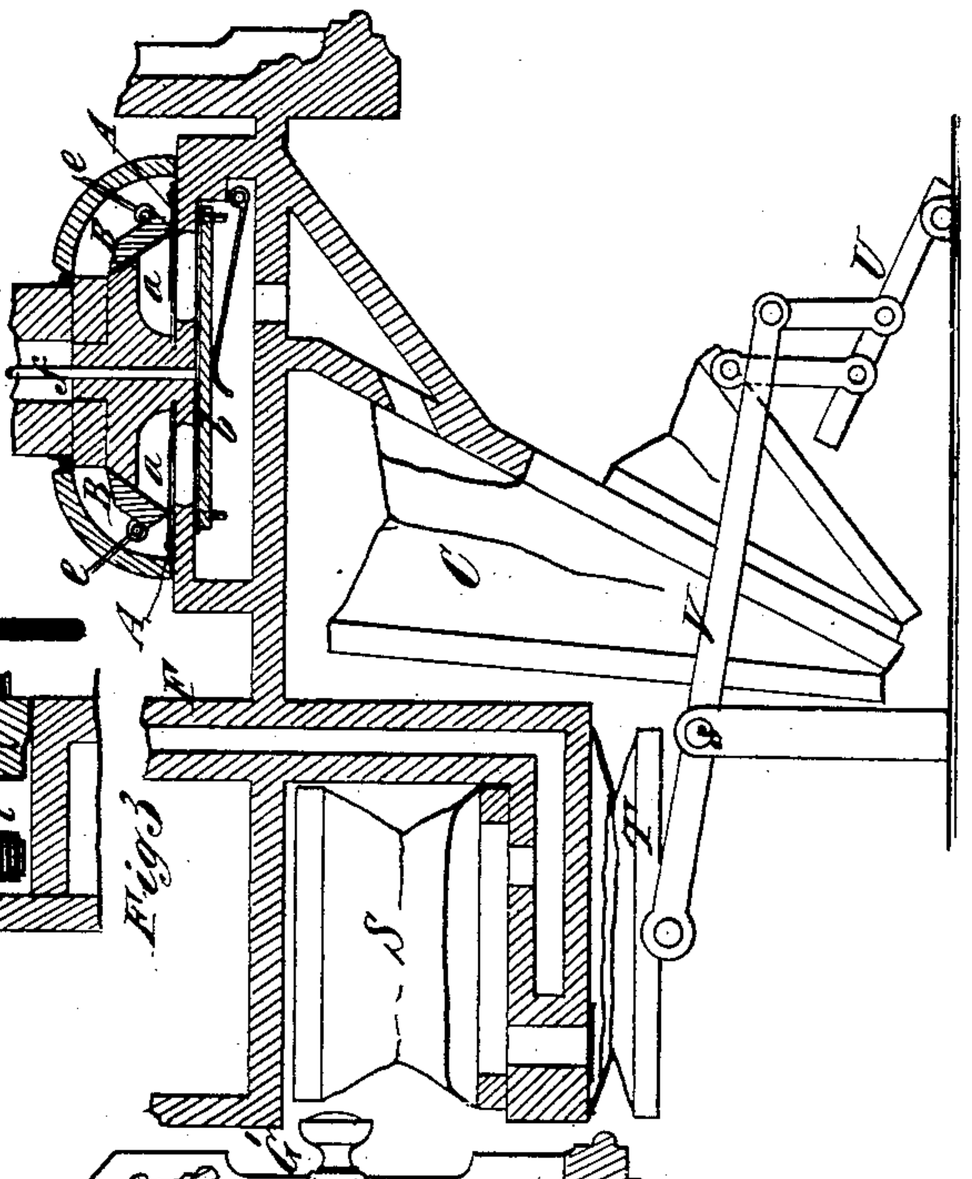

Fig 3

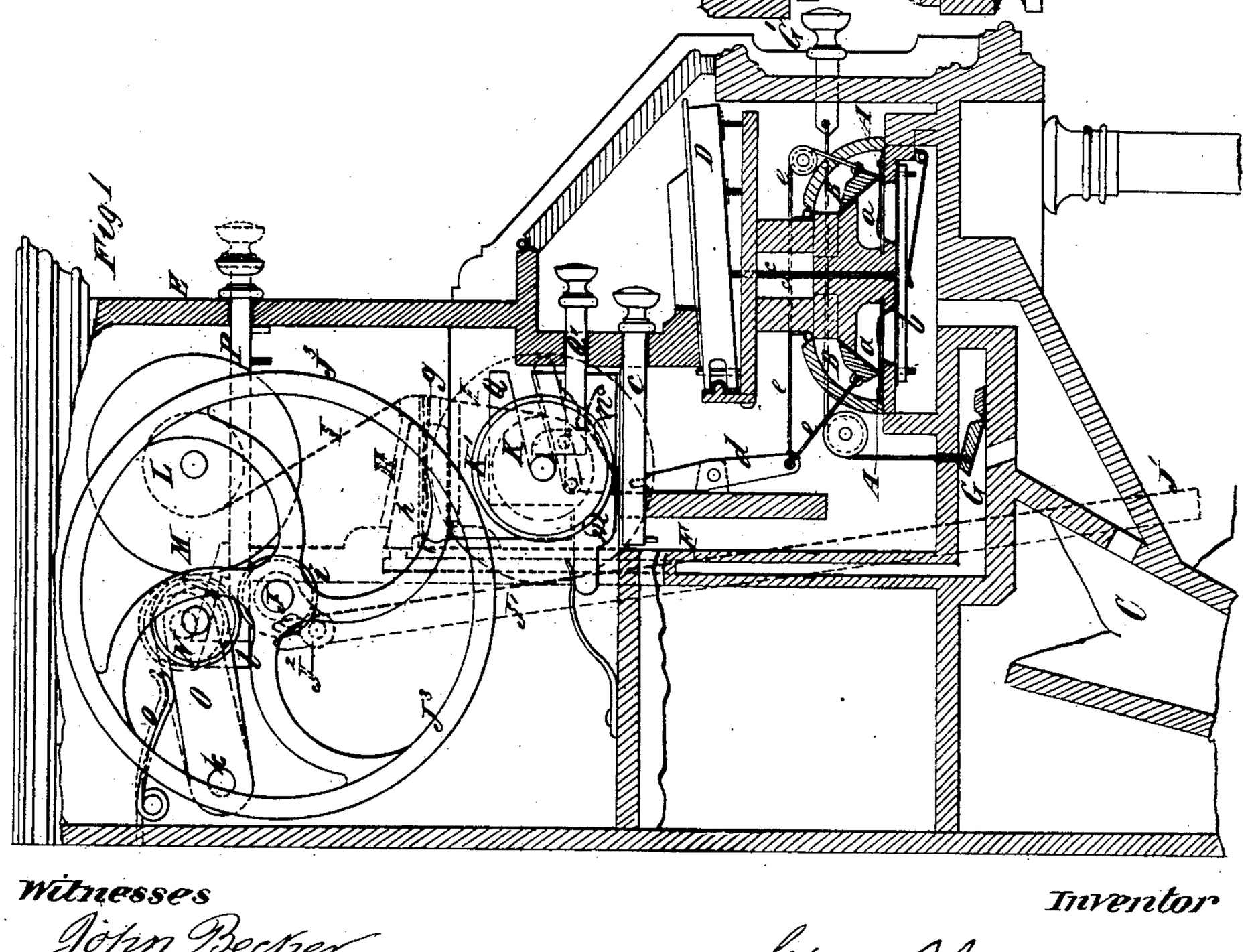

Fig 1

Witnesses

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MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 238,146, dated February 22, 1881.

Application filed June 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, ELIAS P. NEEDHAM, of the city, county, and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

My invention relates to that class of musical instruments which have manual key-boards and are known as "reed" and "pipe" organs and "pianos."

The object of my invention is to combine with such instruments, and without interfering in any way with the most approved features of construction and arrangement, a second series of sound-producing devices, and mechanism for operating them mechanically, so that either set of sound-producing devices may be operated separately, or so that both may be operated together, and a greater range of notes can be played at one time than is possible for a manual performer alone.

To this end my invention consists, essentially, in a musical instrument comprising a set of sound-producing devices, means for operatingthe same, a music card or tablet for controlling their operation, and means, operated by the player, for producing the feed of said music card or tablet, another set of sound-producing devices, means for operating them, and a manual key-board for controlling their operation, all combined and organized so that either series may be operated separately or both series operated together.

In a piano the means for operating the sound-producing devices will consist of hammers; but in a reed or pipe organ these means will consist of devices for inducing air to the reeds or pipes.

In order to economize space in the instrument, the mechanical sound-producing devices and the operating mechanism therefor may be arranged above or behind the manual key-board and behind the stop-bar in the space generally vacant in an ordinary organ.

Other improvements consist in details of construction and combinations of parts hereinafter specified.

In the accompanying drawings, Figure 1 represents a partially-sectional view of a combined manual and mechanical musical instrument embodying my invention. Fig. 2 represents a longitudinal section, through a certain portion of the mechanism, for operating the mechanical portion of the instrument; and Fig. 3 represents a modification of my invention, in which a separate wind-chest is employed for each set of sound-producing devices.

Similar letters of reference indicate corresponding parts in both figures.

A designates the sound-producing devices, which are to be operated or controlled manually, and which, as shown, consist of reeds arranged in cells *a*, and controlled in their operation by pallet-valves *b*. These may be called the "manual sound-producing devices."

B designates valves by which the reed-cells are opened or closed, and which may be raised to open the cells by a draw-pull, *c*, operating a pivoted lever, *d*, to which the said valves are connected by connections *e*.

C designates a wind-chest, of which a portion is only shown, which is kept in constant communication with the reeds A, and which is supplied with or exhausted of air by means of a suitable bellows and treadle, or other means.

D designates manual keys of the usual form, which act upon the push-pins *f*, and through them open the pallet-valves *b* and cause the reeds to speak. These parts are all similar to organs commonly in use, and therefore a more extended description thereof is not necessary.

In the upper part of the instrument, above the manual keys and behind the stop-bar E, are arranged a series of separate sound-producing devices, and mechanism for controlling their operation through the movement of a traveling music-sheet. These sound-producing devices are shown as consisting of ordinary reeds, *g*, arranged in cells *h*, which communicate, by means of a duct or trunk, F, with the common wind-chest C, under control, however, of a valve, G, which is connected to a draw-pull, G′, by which it may be opened when it is desired to operate the instrument mechanically. These latter may be called the "mechanical sound-producing devices."

The board or frame H, in which are the reed-cells *h*, is so constructed as to form a seat or rest for a music card or tablet, in this instance consisting of a traveling perforated music-

sheet, I, by which the admission of air to the reeds *g* is controlled, and which, therefore, controls the operation of the sound-producing devices.

J designates the main driving-shaft of the instrument, which may be operated through a connecting rod or rods, J′, and crank or cranks J^2.

J^3 designates a fly-wheel upon the end of the driving-shaft, whereby the required momentum is obtained to give the shaft a steady motion.

K designates a roller, from which the music-sheet I is drawn, and from which it passes over the reed-board H, and thence to the take-up roller L, upon which it is wound after passing over the reed-board.

Upon the driving-shaft J is a pulley or wheel, *i*, and upon the take-up roller is a pulley, M, of larger size.

N designates an idler or friction-wheel for transmitting motion from the pulley *i* on the driving-shaft to the pulley M and the take-up roller L, and certain of these pulleys may be covered with india-rubber, to increase the friction of their bearing-surfaces. When the rewinding of the music-sheet upon the music-roller is to be effected, the friction-wheel N is to be removed from contact with the pulleys *i* and M, so as to permit the music-sheet to be freely unwound from the take-up roller L onto the music-roller K. To effect this the friction-wheel N is mounted in bearings in a block, O, pivoted at *k* to the frame of the instrument, and when desired the said friction-wheel can be raised out of contact with the pulleys *i* and M by a draw-pull, P, which has upon it an incline, *l*, bearing upon the under side of the bearing-block O.

The music-roller K is provided with a pulley, K′, which is rotated by contact with the fly-wheel J^3, and the roller is supported at one end in a hinged bearing, Q, pivoted at *m* to the frame of the instrument; and Q′ designates a draw-pull carrying an incline, *n*, for depressing said bearing to move the pulley K′ out of contact with the fly-wheel J^3. When it is desired to operate the mechanical sound-producing devices, the draw-pull P is operated to permit of the spring *o* moving the friction-wheel N into engagement with the pulleys *i* and M, and the draw-pull Q′ is operated to move the pulley K′ out of engagement with the fly-wheel J^3; but when the music-sheet is to be rewound the draw-pulls are operated in a reverse direction.

Although the wind-chest C is here shown as in communication with both series of sound-producing devices, it might be connected only with the manual sound-producing devices, as shown in Fig. 3, and in such case a separate wind-chest, S, is employed to induce air for the operation of the mechanical sound-producing devices. The wind-chest S has combined with it a bellows, T, which is operated by the same treadle, U, which is employed in connection with the wind-chest C, the bellows T being connected with said treadle by a lever, V, pivoted at *s*.

Although the mechanical sound-producing devices are here shown as arranged above the level of the manual key-board, they might, if desired, be arranged behind the latter, they being in all cases in the space not ordinarily occupied by the manual action, and preferably behind the plane of the stop-bar.

By my invention I provide an instrument which is not larger than an instrument employing the same manual sound-producing devices only, and which provides for a much greater range or compass than the ordinary manual instruments, inasmuch as the mechanical sound-producing devices may be operated with manual action. Not only do I provide an instrument in which two sets of sound-producing devices may be operated separately or together, thus making a manual instrument a mechanical instrument, or a combined manual and mechanical instrument, but, inasmuch as the means for supplying wind to operate the wind-instrument, and for feeding the music card or tablet, are all controlled and operated by the player, a wide range of expression can be obtained.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A musical instrument comprising a set of sound-producing devices, means for operating them, a music card or tablet for controlling their operation, and means, to be operated by the player, for producing the feed of said music card or tablet, another set of sound-producing devices, means for actuating them, and a manual key-board for controlling their operation, all combined and organized so that the sets of sound-producing devices may be operated separately or both together, substantially as specified.

2. A musical instrument comprising a set of sound-producing devices, means for operating them, and a music card or tablet for controlling their operation, a set of wind sound-producing devices, means for inducing air to them, a manual key-board for controlling their operation, and means, to be operated by the player, for producing the feed of said music card or tablet, and for inducing wind for the operation of the set of wind sound-producing devices, all combined and organized so that the sets of sound-producing devices can be played separately or both together, substantially as specified.

3. A musical instrument comprising a series of sound-producing devices and a manual key-board for controlling their operation, a second series of sound-producing devices and a music card or tablet for controlling their operation, and a common wind-chest communicating with both series of sound-producing devices, all combined and organized so that the series of sound-producing devices can be played separately or together, substantially as and for the purpose specified.

4. The combination, in a musical instrument, with a series of sound-producing devices and a manual key-board for controlling their operation, of a second series of sound-producing devices and a music card or tablet for controlling their operation, a common wind-chest communicating directly with the sound-producing devices controlled by the key-board, and a valve for controlling the communication between said wind-chest and the sound-producing devices controlled by the music card or tablet, substantially as specified.

5. The combination, in a musical instrument, with a series of sound-producing devices and a manual key-board for controlling their operation, of a second series of sound-producing devices, a music card or tablet for controlling the operation of the last said series of sound-producing devices, a music-roller and a take-up roller for said music card or tablet, and a driving-shaft for operating the same, all arranged above the level of the manual key-board and behind the plane of the stop-bar of the instrument, and all organized so that the series of sound-producing devices may be operated separately or together, substantially as specified.

6. The combination of the driving-shaft J, provided with a pulley, *i*, the take-up roller L, provided with a pulley, M, the friction-wheel N, supported in the hinged bearing-block O, and a draw-pull, P, for actuating said bearing-block, substantially as specified.

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Witnesses:
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