

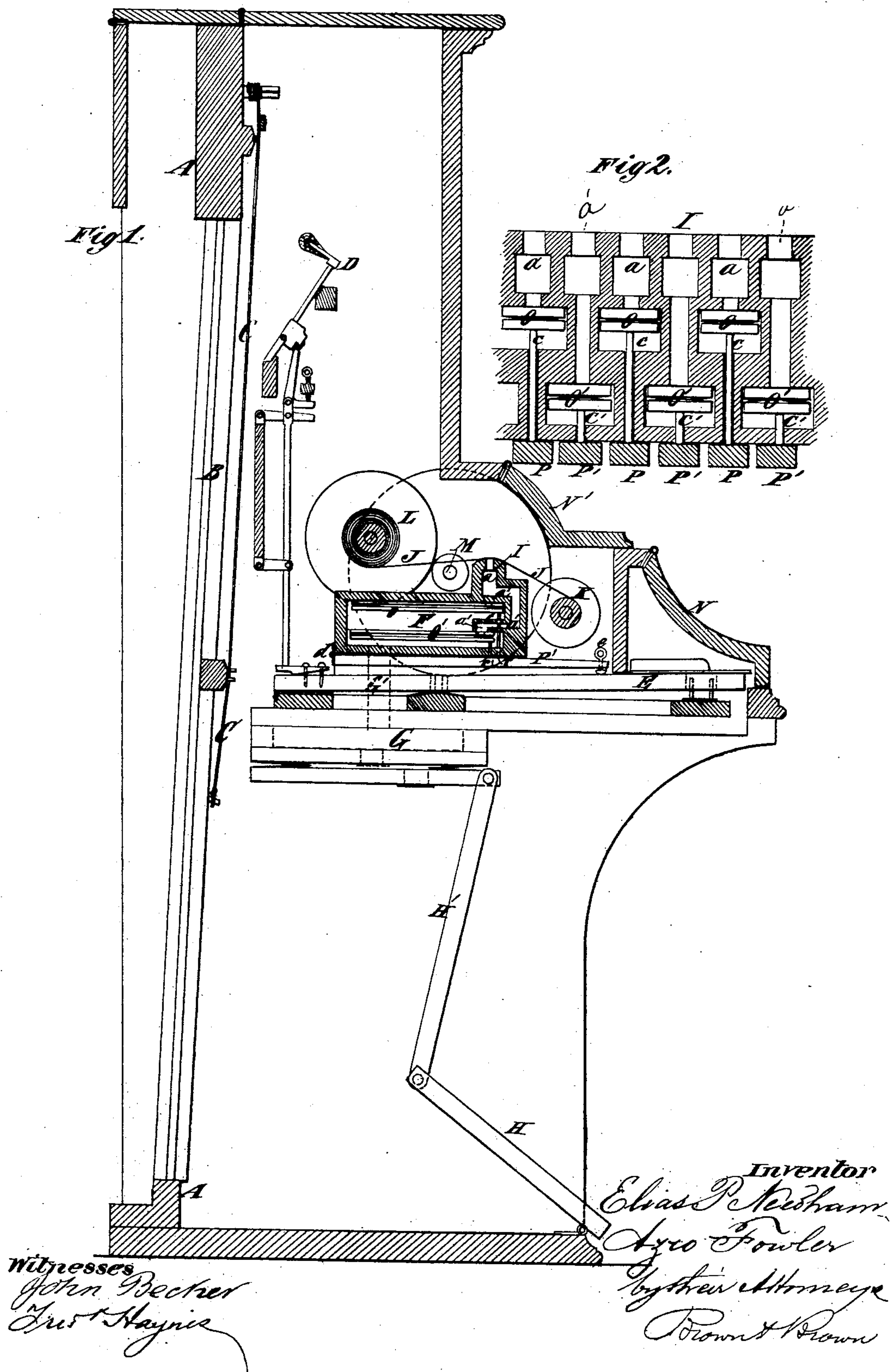
(No Model.)

E. P. NEEDHAM & A. FOWLER.

Mechanical Musical Instrument.

No. 238,145.

Patented Feb. 22, 1881.





# UNITED STATES PATENT OFFICE.

ELIAS P. NEEDHAM AND AZRO FOWLER, OF NEW YORK, N. Y.

## MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 238,145, dated February 22, 1881.

Application filed July 3, 1880. (No model.)

*To all whom it may concern:*

Be it known that we, ELIAS P. NEEDHAM and AZRO FOWLER, both 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.

Our invention relates to musical instruments in which the operation of the sound-producing devices is controlled by a traveling perforated music-sheet or manually; and its object is to so construct a musical instrument having manual keys, more especially a piano, that it may be conveniently operated either manually or by means of pneumatic motors, the operation of which is controlled by a traveling perforated music sheet or card.

To this end our invention consists in the combination, in a piano or other instrument, of a manual key, a pneumatic motor or pneumatic motors, a lever or levers independent of said motor or motors for operating said key, and a tracker-pin or tracker-pins, through which said motor or motors operate said lever or levers. The pneumatic motor or motors for actuating each key are preferably arranged in a wind-chest above the key, midway between the ends thereof, and the lever for imparting the motion of the motor or motors to the key is hinged to the under side of the wind-chest.

The invention also consists in details of construction to be hereinafter described.

In the accompanying drawings we have represented our invention as embodied in a piano; but certain of the improvements are applicable to organs or other instruments having manual keys.

Figure 1 represents a vertical transverse section of the piano, and Fig. 2 represents a longitudinal section through the wind-chests, sound-board, and motors upon a larger scale, and better showing their arrangement.

Similar letters of reference designate corresponding parts in both figures.

A designates the frame, B the sound-board, and C the strings, of a piano, which are all constructed and arranged substantially like the upright pianos now in use.

D designates the hammer, adapted to be operated by the movements of the manual key E, which is nowise different from the keys of

an ordinary piano. When it is desired to operate the instrument manually, it may be done with the same ease that an ordinary piano can be operated, as the mechanical attachments have no permanent connection with the keys, but simply rest upon them.

F designates a wind-chest, preferably arranged above and nearly midway between the two ends of the keys. This wind-chest is adapted to be exhausted of air by means of a bellows, G, constructed in any suitable manner, and communicating therewith by a trunk or duct, G', at the end of the instrument, (here shown in dotted outline.) The bellows G may be operated to exhaust the air from the wind-chest F by means of a treadle, H, connected to the bellows by a rod, H'. The upper part of the wind-chest is constructed to form a sound-board, I, in which are air-ducts *a*, which are opened and closed by the passage over the sound-board of a traveling perforated music-sheet, J, which is drawn from a music-roller, K, over the sound-board I, and wound upon a take-up roller, L, in a manner common to instruments operated by such music-sheets.

M designates a driving-shaft, by which the feed of the music-sheet from the music-roller to the take-up roller and the rewinding of the said music-sheet upon the music-roller, after playing, are produced, the said shaft being so arranged that motion may be conveniently imparted to either the music-roller K or the take-up roller L independently of the other roller. The driving-shaft may be operated by a treadle or other means. Indeed, it may be connected with the treadle H, which in that case would serve the double purpose of exhausting the air from the wind-chest F and producing the feed of the traveling perforated music-sheet.

The case which incloses the instrument is, as clearly shown, supplied with two hinged covers or portions, N N', the first of which may be lifted to expose the playing ends of the keys for playing manually, and the latter of which may be raised when it is desired to inspect the parts by which the mechanical operation is produced. When the cover N only is raised the playing ends of the keys are exposed, and the instrument in no wise differs in appearance from an ordinary manual piano; but when the cover N' is raised the playing



ends of the keys are not exposed, and the mechanical devices may be altered, repaired, or removed without the danger of dropping anything upon the manual key-board. This arrangement also avoids the necessity of raising a heavy cover when it is desired to play manually, which would have to be done were a single cover used to cover the manual key-board and the mechanical devices.

10 The wind-chests F may be all made separate from each other, or they may be made by dividing a single box or case, as shown in Fig. 2, and each wind-chest contains a pneumatic motor, the operation of which is controlled by  
15 the passage of the music-sheet.

In order to get the required power to operate the keys strongly, we preferably arrange the pneumatic motors in the rows or series in two horizontal planes, one above the other. The  
20 upper series of motors are designated by the letter O, and the lower series by the letter O'. The motors O of the upper series or row are arranged intermediately between those of the lower series or row, as shown clearly in Fig. 2,  
25 and therefore the motors may be of much greater width than if all were arranged side by side. The motors of the upper series or row are supplied with air through air-ducts *a*, and operate upon alternate levers P by tracker-pins *c*, while air  
30 is supplied to the motors of the lower series or row through air-ducts *a'*, and they operate upon the intermediate levers, P', by tracker-pins *c'*. The levers P P' are adapted to bear upon the keys E, and are furnished with adjustable  
35 end pieces or strikers, *e*, which may be adjusted to take up all lost motion.

By our invention we produce a simple instrument, such as a piano or organ, no larger in size than ordinary instruments, and of the  
40 same outward appearance, but which may be operated manually or mechanically with equal convenience, the mechanism for operating mechanically offering no obstruction to its manual operation.

45 What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in a musical instrument, of a manual key, a pneumatic motor or motors, a lever or levers independent of said motor or  
50 motors for operating said key, and a tracker-

pin or tracker-pins, through which said motor or motors actuate said lever or levers, substantially as specified.

2. The combination, in a musical instrument, of a manual key, a pneumatic motor or pneumatic motors, a lever or levers independent of said motor or motors for operating said key, and arranged below said motor or motors, and a tracker-pin or tracker-pins, through which said motor or motors actuate said lever or le-  
60 vers, substantially as specified.

3. The combination, in a musical instrument, of a manual key, a pneumatic motor or pneumatic motors, a wind-chest containing said motor or motors, a lever or levers independent of said motor or motors for operating said key, and arranged below said wind-chest, and a tracker-pin or tracker-pins, through which said motor or motors actuate said lever or levers, substantially as specified.  
70

4. The combination, in a musical instrument, of a manual key, a pneumatic motor or pneumatic motors, a wind-chest containing said motor or motors, a lever or levers independent of said motor or motors, arranged below and hinged at one end to said wind-chest, for operating the said key, and a tracker-pin or tracker-pins, through which said motor or motors actuate said lever or levers, substantially as specified.  
75 80

5. The combination, in a musical instrument, of a manual key, a pneumatic motor or pneumatic motors, a wind-chest arranged above and between the ends of said key, and containing said motor or motors, a lever or levers independent of said motor or motors for operating said key, and a tracker-pin or tracker-pins, through which said motor or motors actuate said lever or levers, substantially as specified.  
85 90

6. The combination, in a musical instrument, of manual keys E, levers P P', motors O O', and pins *c c'*, through which said levers and keys are operated by said motors, substantially as herein specified.

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Witnesses:

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