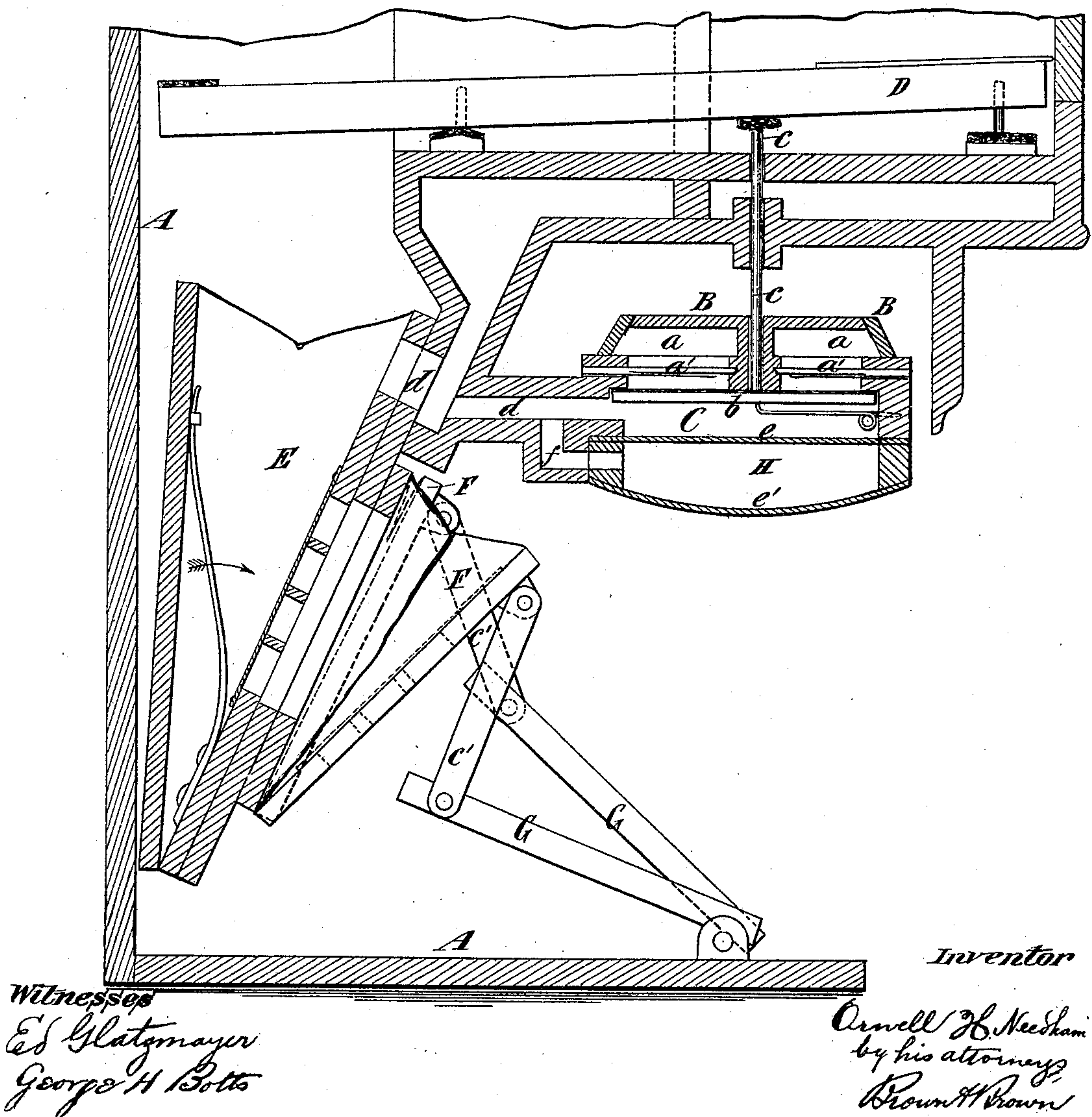


(No Model.)

O. H. NEEDHAM.
MUSICAL INSTRUMENT.

No. 250,834.

Patented Dec. 13, 1881.



UNITED STATES PATENT OFFICE.

ORWELL H. NEEDHAM, OF NEW YORK, N. Y., ASSIGNOR TO ELIAS P. NEEDHAM AND CHARLES A. NEEDHAM, BOTH OF SAME PLACE.

MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 250,834, dated December 13, 1881.

Application filed August 12, 1881. (No model.)

To all whom it may concern:

Be it known that I, ORWELL H. NEEDHAM, of the city and county of New York, in the 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 musical instruments of various kinds, including pianos, reed and pipe organs, and other instruments having sound-boards; and it consists in the combination, with the sound-producing devices of a musical instrument, of a hollow sound-board arranged adjacent to the sound-producing devices, and comprising two imperforate flexible boards, said sound-board being adapted to contain air of a pressure equal to or in excess of that of the atmosphere.

The invention also consists in the combination, with the sound-producing devices of a wind musical instrument, of a pressure wind-chest from which air is supplied for their operation, and a hollow sound-board forming one of the walls of said wind-chest and comprising two flexible imperforate boards, said sound-board being adapted to contain air of a pressure equal to or in excess of that of the atmosphere. The said sound-producing devices are preferably arranged on one side of the wind-chest, while the said sound-board forms the opposite wall of the wind-chest, and hence the air in passing to the sound-producing devices will move away from the sound-board, and the latter will only be affected by the sound-waves. The side of the sound-board upon which the sound-waves strike is preferably flat, and as the air in the sound-board is compressed by the sound-waves striking against the exterior, the amplitude of the sounds is increased before reaching the ear, and better effects obtained.

The invention also consists in the combination, in a wind musical instrument, of sound-producing devices, a pressure wind-chest from which they are supplied with air for their operation, and a hollow sound-board forming an imperforate wall for said wind-chest opposite the sound-producing devices, and adapted to contain air under tension and of a pressure equal to or in excess of atmospheric pressure. The air in passing from the wind-chest to the

sound-producing devices moves away from the adjacent imperforate wall formed by the sound-board, whereby the pressure of air upon the imperforate wall of the sound-board is maintained more constant and uniform.

The accompanying drawing represents a vertical section of such portions of a reed-organ as are necessary to illustrate my invention.

A designates the case of the instrument, and B designates a reed-board contained therein, and provided with two rows of reed-cells, *a*, in which are reeds *a'*.

C designates a pressure wind-chest, arranged below the reed-board; and *b* designates a valve, whereby the passage of air to operate the reeds is controlled.

D designates a manual key, which acts upon a tracker-pin, *c*, and through said pin operates valve *b*.

E designates a receiver, which is supplied with air under pressure by means of bellows F F, which, as here represented, are operated by treadles G G, connected with said bellows by rods *c'*.

The receiver E communicates with the wind-chest C by means of a passage or conduit, *d*, and it is obvious that whenever the valve *b* is opened by depressing the key D the reed or reeds which said valve controls will be caused to speak.

Arranged immediately below the wind-chest C is a hollow sound-board, H, here shown as comprising a flat top board, *e*, and a convex bottom board, *e'*, and the flat top board, *e*, of the sound-board also forms the lower wall of wind-chest C. Both the boards *e e'* are thin enough to be flexible under the impact of sound-waves, and both are imperforate.

Air is supplied to the interior of the sound-board H through a passage or conduit, *f*, which leads from the passage or conduit *d*; and it will therefore be seen that whatever the pressure of air in the receiver E, a corresponding pressure of air will be maintained in the sound-board H. The sound-board H is wholly imperforate except for the passage or conduit, *f*, and hence it will be seen that the air in the sound-board will be under tension.

In lieu of the sound-board being supplied with air from the same receiver which supplies

air for operating the reeds, two pressure-receivers might be employed, and the pressure of air in the receiver which supplies the sound-board might be greater than the pressure in the receiver which supplies the sound-producing devices.

It will be observed that the top board, *e*, of the sound-board *H*, which forms one of the walls of the wind-chest *C*, is imperforate, and that the sound-board has no communication with the atmosphere.

In lieu of being supplied with air in excess of the atmospheric pressure, the sound-board *H* might contain air of the atmospheric pressure, and it would in such case be wholly imperforate. When the reeds *a'* are caused to speak, the sound-waves striking upon the flat exterior of the top *e* of the sound-board compress the air within the sound-board and slightly increase the tension thereof. The air then reacts upon the outer wall, *e'*, of the sound-board, and the sound-waves are reproduced by it with greater amplitude.

In lieu of the reeds being operated by air under pressure, they might be operated by exhaustion, and in such case the receiver *E* and bellows *F* should be constructed accordingly.

Although my invention is only here shown as embodied in an organ to be operated manually, it can be embodied with equal advantage in instruments which are operated or which have their operation controlled by a traveling music sheet or card, perforated or otherwise constructed to produce a tune, and it can be embodied in violins, piano-fortes, and many other kinds of musical instruments, the sound-board being always arranged adjacent to the sound-producing devices, so that the sound-waves will impinge upon its exterior.

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

1. The combination, with the sound-producing devices of a musical instrument, of a hollow sound-board arranged adjacent to the sound-producing devices, and comprising two flexible imperforate boards, said sound-board being adapted to contain air of a pressure equal to or in excess of that of the atmosphere, substantially as specified.

2. The combination, with the sound-producing devices of a wind musical instrument, of a pressure wind-chest for supplying air for their operation, and a hollow sound-board forming one of the walls of said wind-chest and comprising two flexible imperforate boards, said sound-board being adapted to contain air of a pressure equal to or in excess of that of the atmosphere, substantially as specified.

3. The combination, with the sound-producing devices of a wind musical instrument, of a pressure wind-chest, on one side of which said sound-producing devices are arranged, and which supplies them with air, and a hollow sound-board forming the wall of said wind-chest opposite the sound-producing devices, and comprising two flexible imperforate boards, said sound-board being adapted to contain air of a pressure equal to or in excess of that of the atmosphere, all substantially as specified, whereby air in passing from said wind-chest to said sound-producing devices moves away from the sound-board.

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Witnesses:

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