M. J. MATTHEWS.

Reed-Organs.

No. 148,481. Patented March 10, 1874.

Fig: 3.

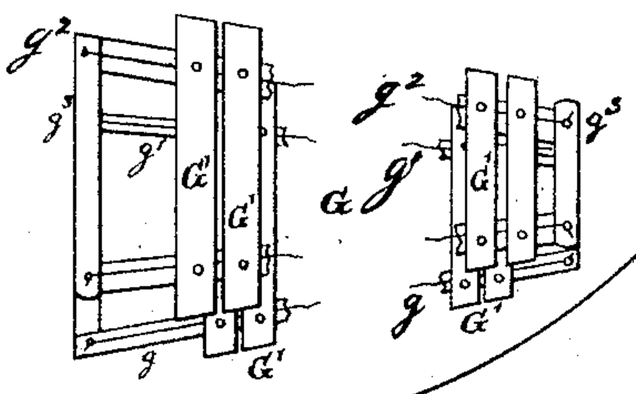
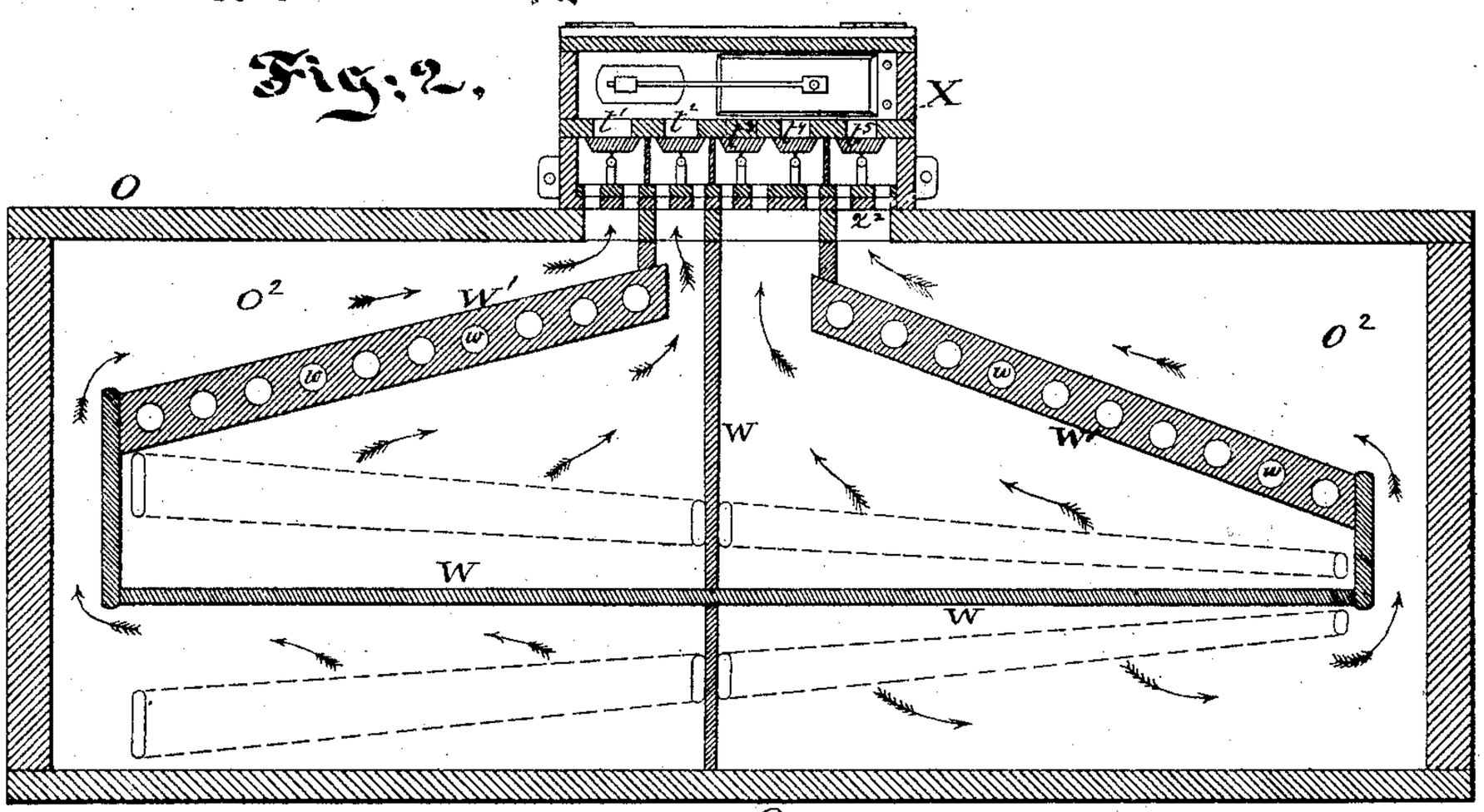


Fig: 1.

Fig: 2.



Witnesses;

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UNITED STATES PATENT OFFICE.

MASON J. MATTHEWS, OF NEW YORK, N. Y.

IMPROVEMENT IN REED-ORGANS.

Specification forming part of Letters Patent No. **148,481**, dated March 10, 1874; application filed June 19, 1873.

To all whom it may concern:

Be it known that I, MASON J. MATTHEWS, of the city of New York, in the State of New York, have invented certain Improvements in Musical Instruments, of which the following is a specification:

The invention relates mainly to reed-instruments, generally known as reed-organs, cabinet-organs, &c.; but a portion may be applied independently of the reeds and their blowing or exhausting means.

I have successfully combined with a reed-organ a peculiar modification of an instrument known by the name "harmonicon," so as to give facilities for producing sounds not dependent upon the wind, but upon the blow of a hammer.

I have, further, so arranged the vibratory strips or harmonicon-bars that no lengthening of keys nor enlargement of case is necessary, and so that a simple percussion action, connected with the keys, may operate them.

I also arrange said vibratory strips so that they occupy no more width in the instrument than the range of the keys.

I also arrange the several parts constituting the modification of harmonicon, together with the percussion action and keys, so that they can be used as an instrument independent of the reeds.

I have also made several important improvements in the passages and parts relating to the reeds and connections, so as to provide means for producing pleasing variety and much power of tone in the smallest possible compass.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a vertical section of the upper portion of the instrument. Fig. 2 is a horizontal section through the upper wind-chest, with a view of the tremolo-valve and the adjacent parts, and the connected stop-valve box. Fig. 3 represents some of the harmonicon-bars and their connections detached. These parts are represented in plan view, and show distinctly how the lower set projects out beyond the upper set, so that both sets are properly presented to be acted on by the several hammers.

Similar letters of reference indicate like parts in all the figures.

The wind-chest B, tube-board E, and key-frame c^2 are of ordinary construction. The case and all the other parts may be of ordinary construction and arrangement, except in such particulars as are hereinafter specified. The chest O, above the keys, possesses a number of novel features. The part O^1, in which the reeds are inserted, resembles an ordinary tube-board, except that there are holes r^2 r^3 cut opposite what may be called the outer surface of the reeds. This tube-board O^1 is glued to a chamber-board or channel-board, o^3, one inch, more or less, in thickness at the bass end, and quite thin at the treble end. In the under side of this chamber-board, to which the tube-board O^1 is glued, are cut openings r r^1 directly opposite the vibratory parts of the reeds, but the openings p p^1 into the wind-chest reach beyond the heels of the reeds. The distance of the holes r r^1 p p^1 from each other, and the length and depth of the chambers p^2 and p^3 between them, are determined by the pitches of the notes connected therewith. Deep bass-notes will do with such chambers and openings as are shown; but the notes toward the extreme treble require less—in fact, but a very little passage. The sound from the reed, by being drawn into the confined air in the chambers p^2 p^3, and being caused to travel some little distance before reaching the less-confined space in the wind-chest O^2, loses much of its natural roughness, gathers form, and is made smooth and full and agreeable to the ear. On the lower face of the openings r^2 r^3 are seated the pallets o^1, connecting, through the medium of tracker-pins o^2, with levers S, mounted on, or rather in, the keys C. Each pallet o^1, with tracker-pin attached, is of such weight as to fall by its own gravity, being guided in its upward and downward movement by a pin at each end, and by the action of the tracker-pin on the guide-rail o^4, which is fastened to the tube-board by blocks. The levers S are centered in grooves cut on the keys C, and are held down at the back by springs *s*. The front ends of these levers S hold the pallets o^1 to their seats. In front of the fulcrum-pin rail of the key-frame c^2 is a rail, s^1, in which are inserted fixed pegs s^2, which stand in larger holes

through the keys C, and almost touch the lower faces of the back ends of the levers S.

It will be seen that when a key, C, is depressed, and the lever S is tilted by its contact with the peg s^2, the movement of the lever S at its center and the movement of the key C at the same point being equal, the front end of the lever S will have a larger movement than the key at a corresponding point. This arrangement provides for the pallets o^1 falling far enough from their seats to allow of the free action of the air on the reeds. It is important to leave enough play between the pegs s^2 and the levers S, when the key C comes to rest, to allow the spring s always to drive the pallets to their seats, irrespective of any slight maladjustment of the keys.

The upper chest O contains two sets of reeds, which are controlled by a novel stop-action. It is usual, in American organs, to have long valves extending over the mouths of a long series of tubes, in which the reeds are inserted. In my instrument the mouths of the tubes in the upper chest are kept closed, and the interiors of the tubes open upward into the wind-chest, which is peculiarly partitioned and connected.

In Fig. 2, the inside of the wind-chest O^2 is shown. The partitions W W′ divide the wind-chest into four chambers, each connected with four corresponding chambers in the stop-valve box X, so that single valves in the stop-valve box, one in each chamber, may tightly close the connection from the several corresponding chambers in the wind-chest, and, consequently, the speaking of the several reeds in the four sets in which the reeds are divided. A portion, W′, of the partitions is very wide and affords room for liberal openings w, which extend through the entire wind-chest, being open at the bottom into the swell-tray o, and are open at the top to allow the sound to escape freely into the atmosphere, except when they are closed by the swell-lids w' operated by suitable stops. The dotted lines show the position of the series of holes communicating with the reeds. At the back of this wind-chest O^2 is the stop-valve box X, with five valves in it marked, respectively, t^1 t^2 t^3 t^4 t^5. The valve t^1 covers an opening communicating with the main wind-chest B through a hole or holes at the foot of the box X. The valve t^2 similarly covers another opening, and so of the valves t^4 and t^5. The valve t^3 covers an opening communicating with the under side of the tremolo-valve. The five valves are opened by five stop-draws, x, through the medium of studs x^9, wedge-shaped pieces x^8, push-pins x^7, and three-armed levers x^3. They are closed, respectively, by the grasshopper-springs x^1. The upper end of each three-armed lever x^3 works in an eye in the corresponding valve. This eye is a little larger than the lever passing through it, in order to secure the certain bedding of the front arm on the under side of the block x^2, so as to prevent leak through the pin-holes. When the valve t^1 is opened the front bass-reeds will speak. When the valve t^5 is opened the front treble-reeds will speak. When the valve t^2 is opened the back bass-reeds will speak. When the valve t^4 is opened the back treble-reeds will speak. When the valve t^3 is opened and t^4 is closed the tremolo will operate. The wind in each case is drawn toward the valves in the direction of the arrows. On the lower side of the upper chest O is a tray, o, which has sides fitting closely to the under face of the chamber-board o^3 on all sides. This tray o rests on the key-blocks c^1 at each end of the instrument, and is kept in place by one or more dowels at each end. In the floor of the tray o is cut an opening, which is nearly filled up by the guide-rail o^4. The stop-valve box X is firmly fixed to the chest O, and also at the foot and back to a stout block, which is in turn hinged to the wind-chest B. This provides for the opening up of the top chest O from the tray o, and gives access to the reeds and pallets. When access is desired to the keys C and levers S, the tray o is to be lifted off from the dowels. Below the main wind-chest B, on the reservoir support-board, are mounted sets of sonorous bars G′, adapted to be struck and sounded either in connection with the reeds or separately. G is a tapering box. The two sides, marked g g^1, are wide apart at the bass, and approach toward the treble. On the upper edge of each side lies a cord. The sonorous bars or vibrators G′ rest at their proper nodal points on these cords, and are held in their proper place by pins inserted through holes just outside the nodes of the vibrators. So far this description of the sonorous bars and their adjuncts relates to the parts resembling the ordinary harmonicon. The width of these bars G′ is too great to allow them to be mounted in the ordinary way to be operated by the keys. I therefore provide two layers, one over the other, with the exception that the lower layer reaches forward beyond the upper layer about half an inch. This arrangement reduces the width or compass of the vibrators to the compass of the keys, and thus makes provision for the application of a simple percussion action. Behind and to the tapering-shaped box, I fix an additional board, g^2, the upper edge of which reaches above the first set of vibrators. On this board g^2 I firmly fasten a tapering frame, g^3. (See Fig. 3.) The back rail of this frame g^3 is made wide enough to allow the vibrators G′, lying on it, to reach sufficiently forward. It is important that the two layers of vibrators should be as near to each other as possible. The frame g^3 is made thin, which renders it advisable that the front rail of the frame should have some support toward its center, as well as at each of its ends. I therefore bend some of the pins g^6, which are driven into the side g, so that the front rail rests on them. The upper layer of vibrators lie on cords, and are held in position in precisely the same way as the lower layer. This arrangement of this part of the instrument renders

necessary a peculiar striking action. In ordinary cases where a percussion action is used, whether in pianos or harmonicons, the hammers strike either upward or forward. In my instrument they strike downward. Each hammer-head b^2 is of wood, with a rubber face or tire, and is attached to a shank, b^1, which is glued into the corresponding hammer-butt b. These butts b are centered into the forks or hinge-pieces a, which in turn are fastened to the strip a^1, which extends through the compass of the vibrators. J is one of a series of hoppers or jacks, each formed of two pieces of wood hinged together. The lower or wedge-shaped part, which I call the tail, is centered into the forked and lower end of the upper part, which I call the head, and the spring a^3 keeps the tail of the jack pressed against the inclined face of the button or nut on the regulating-screw a^2.

When the key C is pressed down the corresponding jack J is depressed. It strikes a shoulder formed on the hammer-butt b, but it is caused to slip off instantaneously by the movement of the sloped tail of the jack on the regulator a^2, and thus escapement is effected. The combined action of the hopper-springs a^3, the springs j on the under side of the key-frame c^2, and the weighted butts, secure the immediate return of the jacks J and hammers b^2 to their normal position, so that they are always ready to repeat their action. Firmly fastened into the lower part of each jack-head is a guide-rod, a^4, which, passing through holes bushed with cloth in the guide-piece a^5, guides the upward and downward movement of the hoppers. I provide below the percussion a set of dampers, d, to check the sound of the vibrators simultaneously with the rising of the keys. Each damper consists of a lever with a wire arm suitably bent. On the outer and heavier end of each of these wires is fixed a patch of soft felt, cloth, or leather, which serves as a damper by being held up against its corresponding vibrator by the weight of the loaded hammer-butt b resting on the lighter end of the damper-lever d.

It will be understood that simultaneously with or a little previous to the blow of the hammer, there must be a temporary removal of the dampers from the vibrators in order to allow the bars to sound. While the key C is held depressed, it is important to prevent the hammer b^2 from moving quite back to its bed, and thus to prevent the damper from touching the vibrator until the key is released. For this purpose a patch is provided on the shank b^1 of the hammer b^2, so that the tail of the jack, on its escapement from the shoulder on the hammer-butt b, will rest on the patch so as to allow the hammer b^2 to rise from the vibrator just enough to allow its sounding, but not enough to allow the connected damper to come into play until the key C is again allowed to rise.

Many modifications may be made in the details by any good mechanic. Proper stop-connections may be variously arranged to throw the whole or any part into or out of action at will. The bars and the connected actions for striking them may be worked alone without the reeds, and the instrument may be quite effective when formed with these parts only connected to the keys, the reeds and blowing means being entirely omitted. I propose to make cheap instruments in this manner.

The upper portion may be held down firmly upon the lower main portion by the ordinary harmonicon-hooks, or by any other convenient means.

Instead of the front of the swell-tray o reaching up to the top of the wind-chest O^2, it may be cut off so that the height of the swell-tray shall be equal at all its sides, and the wind-chest O^2 may be enlarged so as to entirely cover it. A molding may be put on the front of the chest, so as to make a pleasing finish.

Where the tremolo is not required, it may be desirable to have a separate double trunk (with front and back compartment) to each stop, and to set them at a distance from each other.

A modification of this same stop-action may be used in the ordinary wind-chest.

Instead of arranging the sonorous bars or vibrators in two layers, they may be arranged in three or more. Instead of placing them in the exact position shown, they may be placed in other parts of the instrument, provided suitable connections are made from the keys to operate them.

Instead of bending some of the pins which are driven into the box G, the front of the frame might be made wide enough to reach over the straight pins.

The parts of the percussion action, as also of many other portions of the instrument, may be attached to each other to facilitate their removal from the instrument when necessary.

When in any case it may be important to greatly economize room, the sounding-bars may be brought nearly up to the under side of the wind-chest B by sufficiently shortening the members of the percussion action and cutting away a part of the wind-chest and reversing the position of the valves therein. I propose to set this forth more fully in another application for patent.

I claim as my invention—

1. The wind-chest O^2, divided into separate chambers by partitions W W′, in combination with sets of reeds communicating with the several chambers and with a correspondingly-divided stop-valve box and valves, substantially as and for the purposes herein specified.

2. The partitions W, having vertical passages w, in combination with corresponding perforated upper and lower boards of the wind-chest to allow the sound to pass through the wind-chest, and to be controlled by the top swell, as specified.

3. The reversed double pallets o^1, arranged,

as shown, relatively to the top chest O, in combination with operating means worked by the keys C, as herein specified.

4. The levers S, keys C, pallets o^1, and pegs S^2, relatively arranged as described, so as to give a wide opening to the pallets o^1, as herein specified.

5. The chambers p^2 p^3 in the chamber-board o^3, arranged relatively to the reeds in the tube-board O^1 and suction wind-chest O^2, as and for the purposes herein specified.

6. In a reed-instrument, the three-armed levers x^3, in combination with the grasshopper-springs x^1, stop-valves t^1 t^2 t^3 t^4 t^5, pins, stop-draws, and connections, as specified.

7. In a reed-instrument having sounding-bars, the overbalanced hammers b^2, in combination with the keys C and intermediate mechanism, as herein specified.

8. The sonorous or vibratory bars G′, arranged in two series, one projecting beyond the other, in combination with the support-boards g g^1 g^2, and frame g^3, as herein specified.

9. The dampers d, in combination with the bars G′ and hammers b^1 b^2, when constructed and arranged as herein specified.

10. The jacks J and springs j, in combination with the guide-blocks a^5 and the keys and hammer-butts, as herein specified.

11. The swell-tray o, arranged, as shown, relatively to the movable reed-chest O, and resting on the key-blocks c^1 to allow access to the mechanism below, as herein specified.

In testimony whereof I have hereunto set my hand this 18th day of June, 1873, in the presence of two subscribing witnesses.

MASON J. MATTHEWS.

Witnesses:

WM. C. DEY,

ALF. C. WESTBROOK.