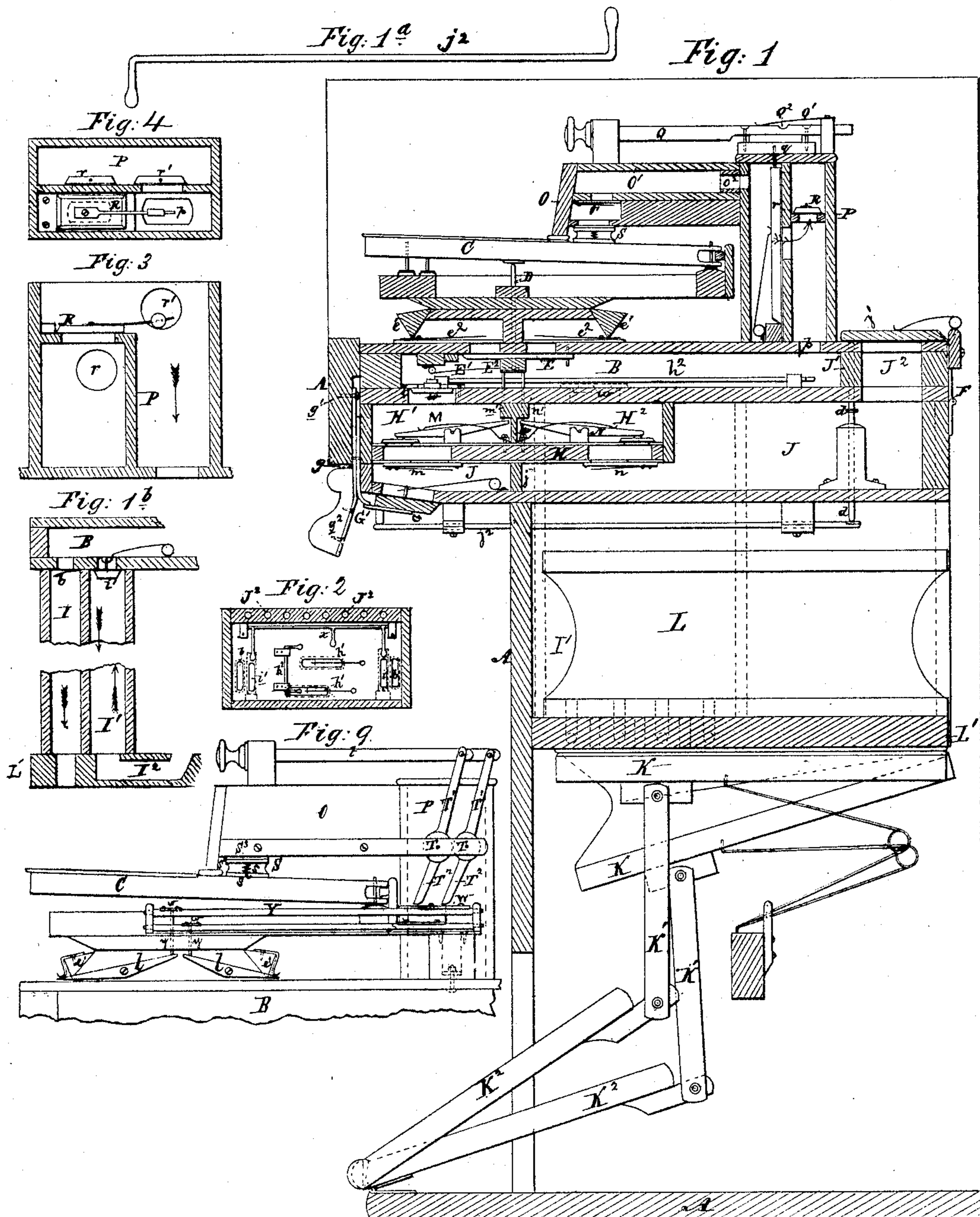


M. J. MATTHEWS.  
Reed-Organs.

No. 148,483.

Patented March 10, 1874.



WITNESSES.

Alf. Westbrook.

M. J. Matthews

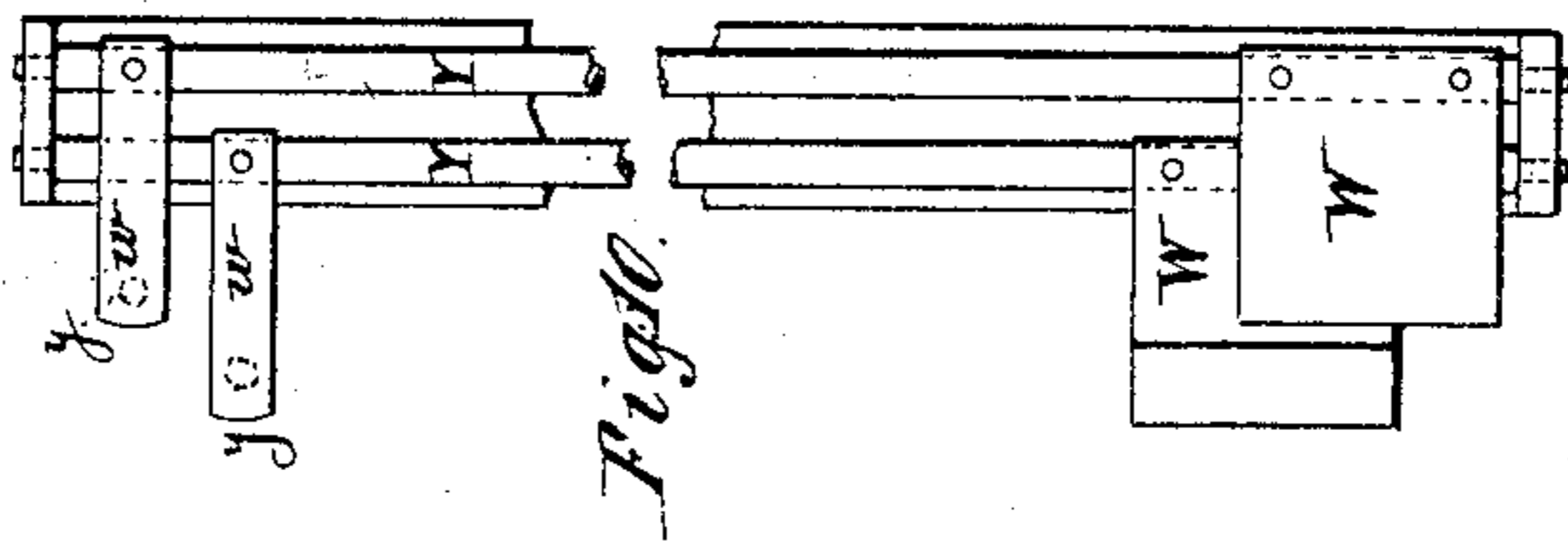
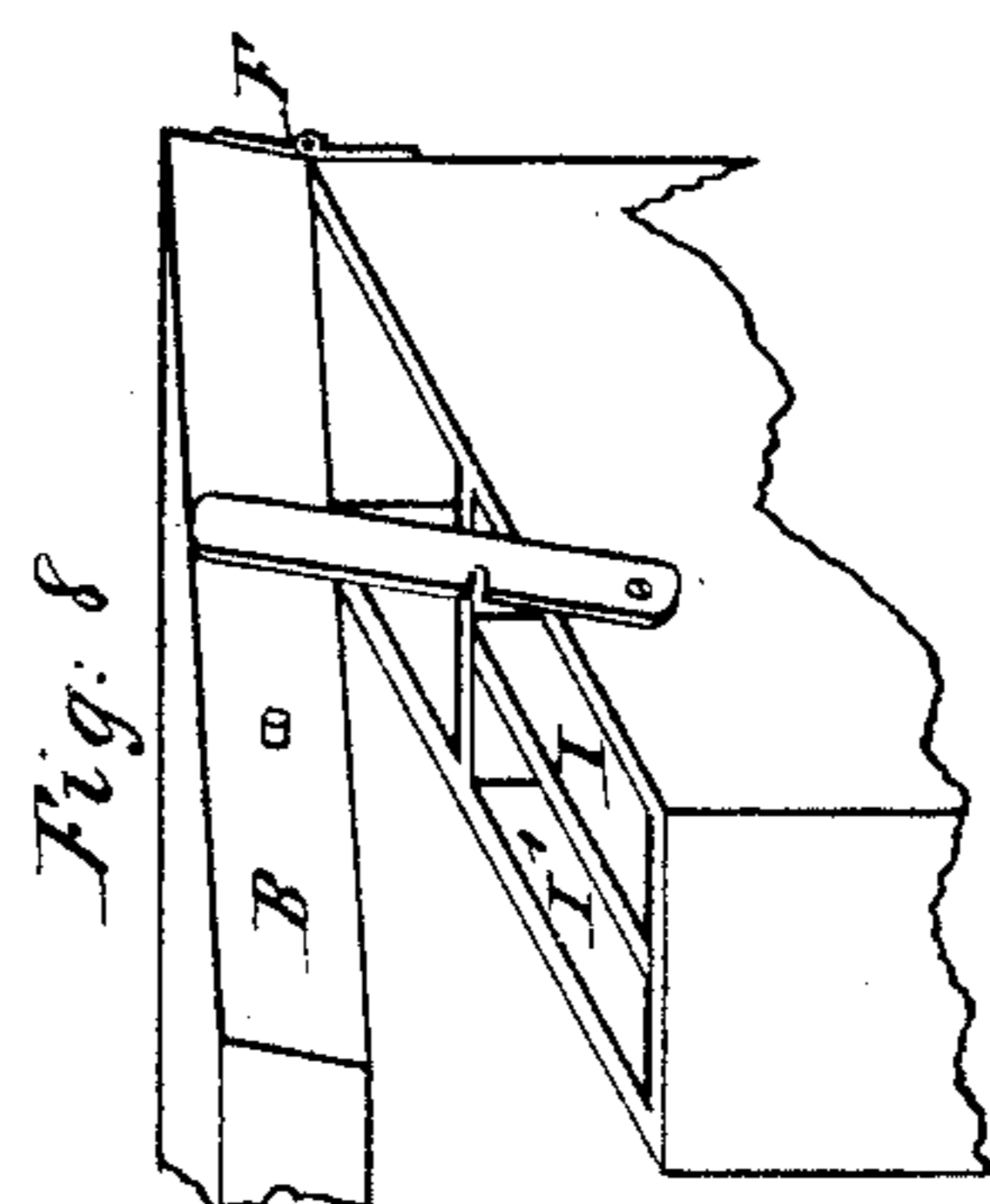
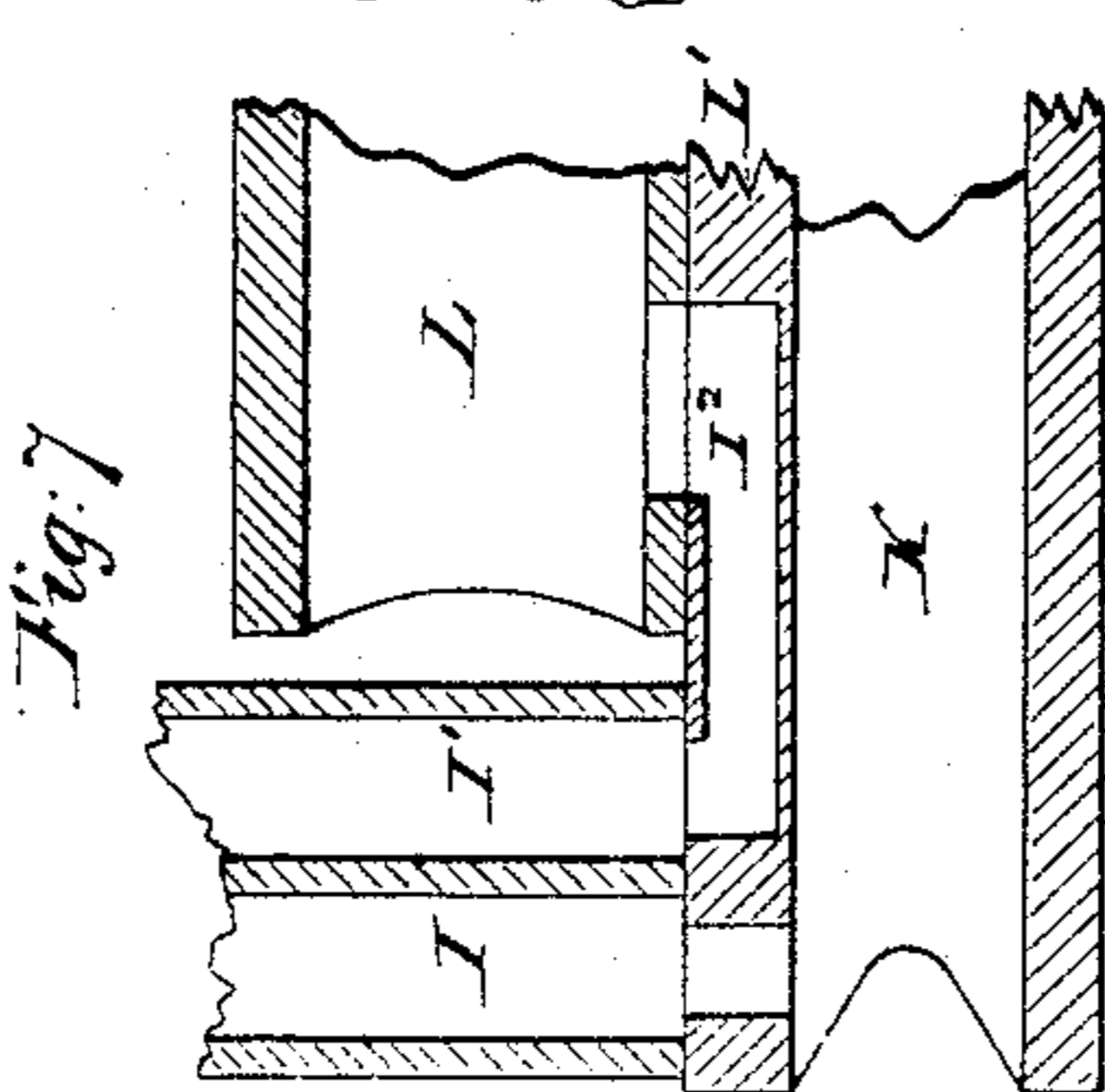
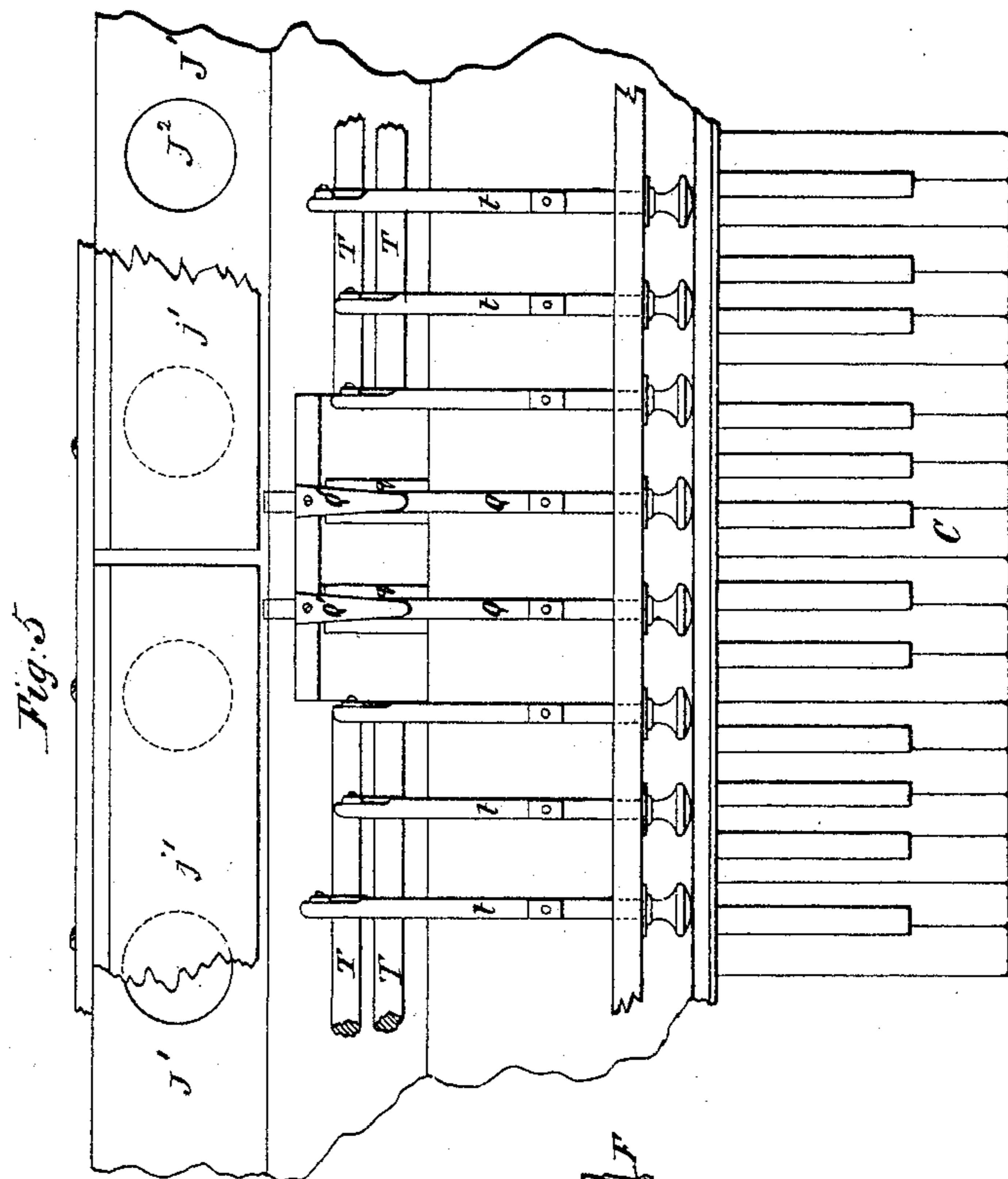
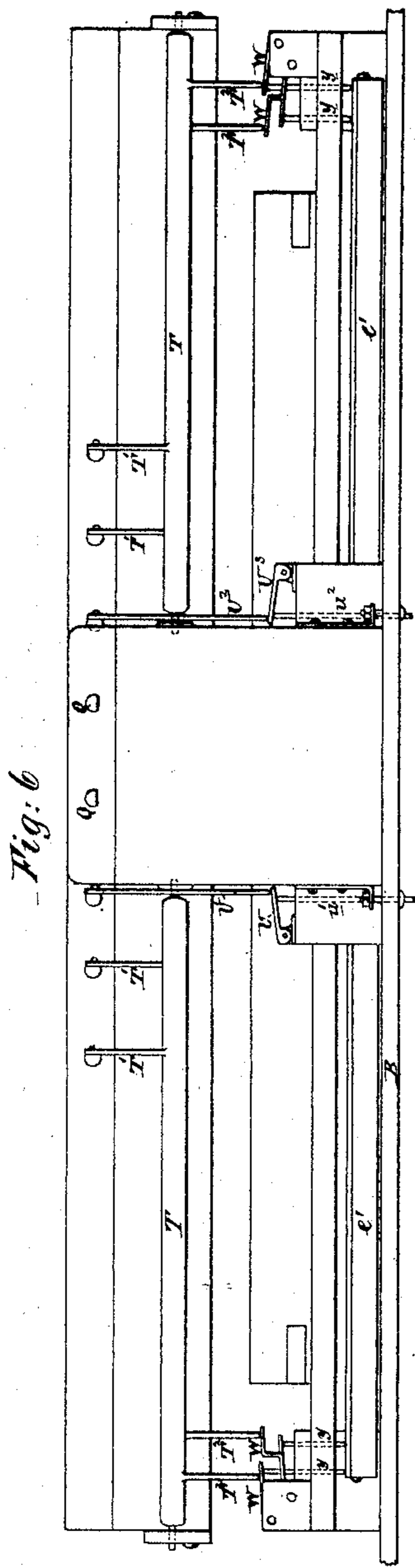
M. J. Matthews,  
by his attorney J. L. S. S. S.

INVENTOR.

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WITNESSES

*Alf. Westbrook.*

*W. C. Day*

*M. J. Matthews*  
*by his attorney J. S. Stetson*  
INVENTOR.

# UNITED STATES PATENT OFFICE

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

## IMPROVEMENT IN REED-ORGANS.

Specification forming part of Letters Patent No. **148,483**, dated March 10, 1874; application filed October 31, 1873.

*To all whom it may concern:*

Be it known that I, MASON JOHNSTON MATTHEWS, of New York city, in the State of New York, have invented certain Improvements Relating to Reed-Organs, of which the following is a specification:

One object of the present invention is to give capacities for producing the variety, the power, the expression, and all the good qualities of both the American and European instruments. Another object is to secure compactness in construction. I meet the above end by using space directly above the key-board or key-boards, and also space below the main wind-chest for the introduction of reed-chests, each of which may contain one or more sets of reeds. By my arrangement five or more sets of reeds can be operated within a case of similar dimensions to those usually inclosing four sets. Another is to give a peculiar and somewhat ventriloquial effect by introducing a feature not in any previously-known instrument. Another object is to facilitate the successful application, to a suction instrument, of the well-known and valuable stop called "expression." My improvements also include a new and desirable arrangement of the tremolo-valve and connected passages. I have also provided certain self-adjusting pallets mounted on the keys, which maintain their tightness on their seats even if the keys warp or twist, and do not add to the weight of the touch upon the key when in operation. I have also arranged the lower reed-chest and reeds therein to be very conveniently made accessible by hinging all the reed action at the back.

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 sectional elevation from front to back, in which the several parts of the entire instrument indicated by the letters are shown to the best advantage in one view. Fig. 1<sup>a</sup> is the rocking-lever, which operates the swell-lids, detached. Fig. 1<sup>b</sup> is a section, showing the connections of the trunks to the main wind-chest and reservoir. It corresponds with Fig. 7. Fig. 2 is a horizontal section through the wind-chest B, showing the valves, valve-

actions, and channel-blocks therein. Fig. 3 is a vertical section of a part taken at right angles to the section in Fig. 1. Fig. 4 is a horizontal section, showing the same parts. Fig. 5 is a plan view of a portion of the instrument with the top of the casing removed. Fig. 6 is a back view of a portion. Fig. 7 is a vertical section of a portion. Fig. 8 is a perspective view of a portion. It represents the parts adjacent to the hinge which connects the main wind-chest and its connections to the double trunks which I employ to connect the exhausters and reservoir. It shows the wind-chest partially raised. Fig. 9 is an end elevation, partly in section, showing the stop-work for the operation of the valves which control the tube-boards above the wind-chest. Fig. 10 is a plan view of a portion of the stop-work shown Fig. 9.

A is the framing or stationary supporting-parts, generally termed the case. B is the main wind-chest. C are the keys, and D the main tracker-pins. E is a pallet, operated by the pin D and held up by a spring, E<sup>1</sup>, which pallet, on being depressed by the key, performs its ordinary functions relatively to the sets of reeds *e*, which speak or not, according to the positions of their respective stop-valves *e*<sup>1</sup>, all of which are of the ordinary construction, with the exception of the addition of a small block, E<sup>2</sup>, to the under side of the pallets E, for the purpose described hereafter.

It will be understood that this is a suction instrument, in which the air is drawn in through either or all of the sets of reeds as they are required to speak, and discharged from the feeders or exhausts below the reservoir. Instead of suspending the reservoir to the under side of the main wind-chest B, as is sometimes done, I employ double chambers or trunks I I<sup>1</sup> for the passage of the air, as hereinafter described. This arrangement admits of the utilization of the under side of the main wind-chest B, as shown in Fig. 1. The top board of the reservoir may be left free at all its sides. The reservoir L does not extend the full width of the instrument, room being left for the double trunks or chambers I I<sup>1</sup> at each end of it. I attach the under side of the reservoir L to the upper face of the support-board L<sup>1</sup>, on the under side of which the feeders or exhausts K K

are also attached, as shown. The exhausts K are of ordinary construction, and are well known to the trade.

Instead of connecting the exhausts K with the treadles  $K^2$  indirectly by webbing or other flexible material, I secure the necessary rigidity, to perfectly control the expression by the foot of the player, by employing strips  $K^1$  attached to both exhausts and treadles by screws and blocks. These strips can be used if the exhausts are hinged at the front as well as at the back, the latter way being shown in the drawings.

For wind communication I employ a double trunk or trunks, I  $I^1$ , Figs. 1<sup>b</sup>, 7, and 8, by preference rigidly fastened to the support-board  $L^1$ . The air passes through the trunks I  $I^1$ , as indicated by the arrows in Fig. 1<sup>b</sup>, down the outside passages I to the exhausts K, and alternately up and down the inside passages  $I^1$  to and from the reservoir L. At the top of the outside passages I I, and on the under side of the main wind-chest B, are small leather valves  $b$   $b$ , which serve to prevent the return of the air to the chest B. At the top of the other passages  $I^1$   $I^1$ , on the under side of the chest B, are placed properly faced wood valves  $i'$   $i'$ , which, when closed by their stop-draw, cut off all wind communication with the reservoir L, and thus leave the wind force under the player's control. By thus confining and controlling the wind, I make a successful application to a suction instrument of the valuable stop called "expression." A series of holes,  $I^2$ , are made within the thickness of the support-board  $L^1$ , from the foot of the inside trunk passages  $I^1$  toward the center of the reservoir L. Openings are also made into these holes from within the reservoir L. Separately boxed channels or passages might also be used. The outside passages, I, of the trunks are connected directly with the exhausts K by means of holes made through the board  $L^1$ .

It is not essential to have a double trunk, I  $I^1$ , at both sides of my instrument, and consequently two expression stop-valves,  $i'$ . A double trunk and expression-valve at one side, the same with a single trunk at the other side, or four single trunks, two at each side, kept at a distance from each other, instead of joining each other, as is shown, would serve.

The entire action above the bellows, with the exception of certain swell-lids and means for operating them, is connected at the back by hinges F, so as to afford ready access to the lower reed-chest and other parts.

Other fastening means might be employed, as it is not necessary to the correct working of the wind-connections that the action should so hinge.

The tops of the trunks are faced with soft leather, and carried as far as possible toward the front of the instrument away from the hinges F, so as to allow the under side of the main wind-chest to shut evenly upon them. They are held together by hooks.

A means of giving variety, power, and compactness of construction to my instrument, is the placing one or more sets of reeds,  $m$   $n$ , in a separate chest, H, upon the under side of the main wind-chest B, so that they can be operated by pallet levers or couplers in that position. In accommodating two sets of reeds in this chest H, I divide it into two compartments,  $H^1$   $H^2$ , by means of a partition,  $h$ , with a projecting top, through which the lower tracker-pins,  $m'$   $n'$ , pass into the compartments  $H^1$   $H^2$ , thus operating the pallet-levers M N therein.

A suitable coupler attachment could be used, dispensing with the valves in the under side of the wind-chest B.

The small blocks  $E^2$ , on the under side of the pallets E, furnish a seat for the heads of the two lower tracker-pins  $m'$   $n'$ , as shown. I fasten the reeds horizontally to the outside of the lower chest H by screws.

This chest H can be placed at any point within the case A, beneath the wind-chest B, and may contain any number of sets of reeds desired, as nearly the entire lower surface of the said chest B is available for this purpose.

In describing the knee-swell, of which there may be one or more, I refer more particularly to Figs. 1 and 1<sup>a</sup>. A strip of metal,  $g$ , is fastened, by a screw,  $g^1$ , at its top end, into a suitable recess formed near the front central part of the case of the instrument. The lower end of this strip  $g$  is turned inward, and acts on a projecting strip of metal,  $G'$ , which is inclined sufficiently to permit the strip  $g$  to open the swell  $G$ , thus giving the player control of the opening and closing of the said swell-lid  $G$  by means of a knee-board,  $g^2$ , which is suitably attached to the strip  $g$ . I use a swell-box, J, on the under side of the reed-chest H, reaching to or near the trunks I  $I^1$ , for the purpose of giving crescendo and diminuendo effects to the sound from reeds placed below the chest B. When these are not required, the said box can be dispensed with. The position of this box J provides facilities for the production of novel effects of a ventriloquial character; so much so that I purpose labeling the stop-draw controlling the speaking of the back lower set of reeds  $n$  "the ventriloquim." The partition  $j$  in the swell-box J, between the front and back sets of reeds, cuts off communication between them, and confines the passage of the sound from the back set to outlets  $J^2$ , made through the main wind-chest B. These holes  $J^2$  are bored through blocks in the said chest B, so as to preserve the air-tight qualities of the latter. Either set of reeds,  $m$  or  $n$ , can be placed alone below the chest B, if desired. When it is desired that the sound from the back lower reeds should be subdued, it is confined within the back compartment of the swell-box J by means of a swell-lid,  $j^1$ , which covers the outlets  $J^2$ . When the reverse is desired, the swell-lid  $j^1$  is opened by the transverse lever-rod  $j^2$ , (shown in Fig. 1<sup>a</sup>), operated by means of the knee-board  $g^2$ . (See Fig. 1.)

This rod  $j^2$  passes under and outside of the swell-box J, to which it is suitably hung. One arm is made to pass below a stud or screw on the under side of the front swell-lid G. On the other or rear arm rests a tracker-pin,  $d$ , which passes through the swell-box J, and up through the blocks  $J^1$  in the wind-chest B, to the lower side of the upper swell-lid  $j^1$ . By the depression of the front arm, and consequent rising of the rear arm of lever  $j^2$ , the knee-board  $j^2$  controls both the upper and lower swell-valves G and  $j^1$  simultaneously.

It is more convenient than necessary that these swell valves or lids be operated in the precise manner shown and described. Two or more of these swell-actions may be used.

I do not confine myself to the precise position of the outlets or channels  $J^2$ , as they can be made and the sound from the lower reeds conducted through various parts of the instrument.

The back tracker-pin  $d$ , which operates the upper swell-lid, is in two parts, which connect together beneath the under side of the main wind-chest, so that they will separate when the action is lifted on its hinges.

Another important and distinctive feature in my instrument, affording an additional means of giving variety, power, and compactness of construction, is the placing of one or more sets of reeds in a separate chest, directly above the keys, in or near the position usually occupied by the name-board or stop-rail. As here arranged, I place the stop-rail over the upper reed-chest. Besides the consideration before named in regard to the utilization of space in the position of this upper reed-chest, by so placing it I am able to produce the following effect, viz.: To bring the volume of tone from a set or sets of reeds placed directly above the key-board to the player's ear without the interposition of the deadening influences of partitions of solid or fretted wood-work, such effects to be controlled by the player by swell-lids and stop-valves, so that the power of tone from reeds so placed can be increased or diminished at pleasure.

I do not confine myself to the use of a reed-chest, in the position shown and described, without fret-work or additional casing, as the same may be used at discretion; but I prefer to leave the volume of tone from the reeds unobstructed, as above described.

The application of swell-lids, as above mentioned, is optional. In the arrangement of this upper chest, as shown at O, I inclose a single set of reeds,  $o^1$ , which are intended mainly for solo purposes. Swell-lids are not applied. The full power of the tone from the reeds is always heard when the said reeds are caused to speak by the operation of the stop-valves  $r$   $r'$  controlling air communication thereto. This reed-chest O is somewhat similar to the American tube-boards inverted. The reeds pass into the tubes which are covered by the "name-board," which is screwed on, although other covering means may be employed. The air is drawn

through these reeds into the chamber or chest  $o^1$  above them, and through a hole,  $o^2$ , to the tremolo-valve box P. This box P is shown mounted on the main wind-chest B, at or about the center of the compass of the instrument, a simple connection between it and the main chest B being made through a suitable hole,  $p$ . The stop-draws Q are connected with the valves  $r$   $r'$  in the tremolo-box by means of small wires extending upward from their ends, and into slide-pallets  $q$ . On each of the stop-draws Q rests a spring,  $Q^1$ , as shown. These latter serve the double purpose of holding the slide-pallets  $q$  to the box P, and, by slipping into the notches  $Q^2$  when the stop-draws Q are drawn, prevent the said stop-draws from returning of their own accord. The object of the slide-pallets  $q$  is to prevent leakage from the box P through the slots in its top. Direct connection is made between the upper reeds  $o^1$  and the main wind-chest B through the hole  $o^2$ , valves  $r$   $r'$ , and hole  $p$ .

When the tremolo is desired to influence the sound, the stop-valve  $r'$  is closed and the stop-valve  $r$  is opened. This opens an indirect wind communication between the upper reeds  $o$  and the wind-chest B, as follows: The tremolo-valve R (which may be of ordinary construction) is seated over an opening in the horizontal partition in the box P. The compartment beneath it has no direct communication with the main wind-chest B, (see Fig. 3,) so that, on the admission of the air to it by the opening of the stop-valve  $r$ , it passes upward, and forces its way through the opening on which the tremolo-valve R sits, and thus over and downward through the opening  $p$  to the wind-chest B.

The valves or pallets S, which admit the air to the reeds  $o^1$  in the upper chest O, and which operate from the keys C in front of the fulcrum-rail of the said keys, are constructed as follows: A spiral spring,  $s$ , (see Fig. 9,) is inclosed between two small strips of wood,  $S^1$   $S^2$ , which strips are connected at their ends by pieces of leather or other flexible material. The face of one of these strips, S, is prepared to act as a seat against the aperture in the tube or chamber in which the corresponding reed  $o^1$  is held. The other face,  $S^2$ , is glued or otherwise fastened to the upper surface of the corresponding key C. These valves are thus constructed to insure their closing perfectly on their seats, notwithstanding any twisting or warping of the keys. On the key C rising to its normal position, these upper pallet-valves S will shut promptly, an inappreciable period in advance of the pallets, in or on the other chests below, thus securing an effectual closing of all the pallets.

The plate S operates in front on the fulcrum-rail of the keys. I prefer to place the chest O in the forward and exposed position shown, and in front toward the player as far as possible. This arrangement of the exposed upper chest O and its action may be applied to existing reed-organs without altering the keys

of the same, being placed and operated, as here shown, above the front of the key-board.

To operate the expression-valves  $v^1$  and air-valves  $h^1$   $h^1$ , which control the lower reed-chest II, I use practically the same stop-action as is used in the European harmonium. I employ for the operation of the former within the main wind-chest B, when two expression-valves are used, a three-armed lever,  $x^2$ , one arm at each end and one near the center, directly under a depression-pin,  $w^1$ , Fig. 6, which is under a platform, U, which platform is acted upon by a curved lever,  $U^1$ , formed of a continuous piece. The lever  $U^2$ , which operates the valves admitting air to the lower reeds in the chest II, is also formed of one piece. A two-armed lever,  $h^2$ , engaging, by one arm, its respective tracker-pin and platform  $w^2$   $U^3$ , acts, by its other arm, on the valve  $h^1$ , which controls the front half of the lower reed-chest II, to open the said valves on the operation of the stop-draw, as required.

In Fig. 2 only one of these valves,  $h^1$ , is shown connected by its lever, the other being operated by the same means.

I will now describe my arrangement of rocking shafts.

The stop-draws  $t$  are attached to the upper halves  $T^1$  of the corresponding rocking shaft T, and the feet of the lower halves  $T^2$  act directly on platforms W W in the required place, as shown. The rods Y are placed beyond the range of the American tube-board  $c^2$ , and are suitably attached to the upper surface of the chest B. The feet  $T^2$  of the levers T act against the platforms W W. As previously stated these platforms are connected to rods or rollers Y, as in Fig. 10, which communicate with tracker-pins  $y$  by means of other engaging-lips  $w$   $w$ , at the required point, each of which tracker-pins  $y$  acts on one end of a simple lever,  $l$ , to depress it. The other end of said levers  $l$  is attached to the stop-valves  $v^1$ , thus opening them, as required. (See Fig. 9.) By a peculiar bending of one of the flanges or platforms W on the rod or rods Y the rods or rollers T are brought almost close together.

It is not necessary that these platforms W should be so bent, and that the rollers T be arranged precisely as described; but I prefer that arrangement.

When the upper reed-chest O is dispensed with, the rollers T and their transverse levers  $T^1$   $T^2$  may be placed in suitable bearings directly above the keys, in the space occupied by the said chest, and below the board on which the music-desk usually rests.

Modifications may be further made in many or all of the several parts of the instrument without sacrificing all the benefits of the invention.

The following are among many which may be introduced by any good mechanic. In the use of the double trunks I I<sup>1</sup> two support-boards might be used, and the reservoir suspended from the upper one, and the exhausts or feeders from the lower one, in which case

the opening into the reservoir would be through the side of one of the trunks into suitable channels within the thickness of the upper support-board, or separately boxed therefrom, and thence into the reservoir. Connection with the exhausts or feeders in this case would be direct from the main wind-chest through the other trunk and lower support-board. The upper support-board would, in this case, answer for the bottom of the swell-box, if such is required. The expression-valve might be placed either at the top of the inside trunk, or within it over the opening to the reservoir. In the place of the upper support-board, above referred to, an extra or supplementary wind-chest might be used, and the reservoir suspended therefrom. Another variation of position is, hanging the exhausts K, reservoir L, and support-board L<sup>1</sup> in an almost vertical position, and leaving the reservoir of equal length with the latter. The trunks I I<sup>1</sup> would in this case be set angularly to connect the board L<sup>1</sup> to the wind-chest B, and the outside passages would connect the chest B and reservoir L and the inside passages, through channels in the support-board L<sup>1</sup>, the exhausts K, and chest B, thus necessitating a change of the relative positions of expression-valves  $v^1$ , and light leather valves  $b$ , from over one trunk to the other. A variation of the lower chest II can be made by dispensing with the frame around it, in which case the part to which the reeds are attached, and upon which the lever-pallets M N operate, may be screwed or otherwise fastened to the under side of the chest B. The box or chest II can be partitioned off so as to separate the bass from the treble in both the front and back sets  $m$   $n$ , in which case four valve-connections would have to be made with the wind-chest B, and separate stops employed for the operation of the same. Variations can be made in the construction of the pallet for the operation of the reeds in an upper chest, occupying this position as follows: A block-pallet attached to the key C directly beneath the openings to the reeds by means of a piece of felt, or other flexible material, would answer; or a spring attached to the upper surface of the key at one of its ends, and a properly-faced pallet fastened on the upper face of it toward its other end, and prevented by a stud or screw from rising too far, would answer; or a spring attached to the under surface of the key C, and connected by a tracker-pin through the said key to a properly-faced piece or pallet, covering the opening to the reed, would, also, answer; but I prefer the above-described self-adjusting spring-pallet.

The reeds  $o^1$ , in the upper chest O, can be tuned in unison with the principal set, or a little above or below, so as to produce the well-known "celeste" effects.

When the tremolo is not applied to the upper reed-chest a single channel or trunk, with valve therein or applied thereto, would be required for wind communication to the chest B from the chest O, as will be obvious, the posi-

tion of the said channel being optional. The air might also be cut off from the upper chest or the mouths of the tubes by means of stop-valves similar to those used on the tube-board above the main wind-chest B. Either the upper reed-chest O or the set or sets of reeds  $e^2$  directly over the main wind-chest B or the lower reed-chest H, can be made and used as distinct and separate instruments, either by the use of my improved wind apparatus and connections or other ordinary arrangements of bellows and reservoir.

Having thus particularly described my improvements, what I claim as my invention is—

1. The expression-valve  $i'$ , controlling the passage  $I^1$  between the wind-chest B and the reservoir L, in combination with the passage I and exhaust K, for producing a partial vacuum, substantially as herein specified.

2. The two sets of double trunks or passages  $I^1 I^1$ , and corresponding expression-valves  $i' i'$ , arranged relatively to each other and to the support-board  $I^1$  and reservoir L, and to the exhaust or exhausts K, as and for the purposes described.

3. The arrangement of the reeds  $m$  and  $n$  on the outside of the lower reed-chest H below the main wind-chest B, as set forth.

4. The swell-box J and chaunels  $J^2$ , arranged relatively to the lower reed-chest H and main wind-chest B, substantially as and for the purpose set forth.

5. The combination and arrangement of the keys C, main wind-chest B, pallet-levers M N, lower reed-chest H, reeds  $m n$ , tracker-pins  $m' n'$ , tracker-pin D with its block  $E^2$ , swell-box J, partition  $h$ , channels  $J^2$ , swell-lids G and  $j^1$ , substantially as and for the purpose described.

6. The combination and arrangement of the swell-lids G and  $j^1$ , knee-board  $g^2$ , inclined surface  $G'$ , transverse lever-rod  $j^2$ , and tracker-pin  $d$ , substantially as and for the purpose described.

7. The top reed-chest O, with pallets opening downward in front of the fulcrums of the keys, as herein specified.

8. The arrangement of said reed-chest O and

its contained reeds and pallets over the front of the key-board, so that the sound shall issue unobstructedly close to the ivories of the keys.

9. The combination and arrangement of the upper reed-chest O, reeds  $o^1$ , stop-valves  $r r'$ , pallets S, keys C, tremolo-valve box P, tremolo-valve R, air-chambers  $O'$  and  $p$ , and wind-chest B, substantially as and to the effect set forth.

10. The box P, with its several partitions and wind-passages, and arranged to serve relatively to the tremolo-valve R, chest O, and main wind-chest B, substantially as and for the purpose set forth.

11. The keys C, combined and arranged relatively to the spring-valves S, reeds  $o^1$ , chest O, and the several sets of reeds and pallets below, as and for the purpose described.

12. The employment in a suction instrument of the lever  $U^1$ , platform U, tracker-pin  $u^1$ , and necessary connections, with the expression-valves  $i'$ , combined and arranged substantially as and for the purpose set forth.

13. The rock-shafts Y, actuated, as shown, with their respective plane and bent extension-arms W  $w$ , in combination with the tracker-pins  $y$ , levers  $l$ , and stop-valves  $e^1$ , substantially as and to the effect set forth.

14. The combination of the rock-shaft levers  $h^2$ , tracker-pin  $u^2$ , and platform  $U^3$ , as specified, for the operation of the stop-valves  $h^1$ , controlling the sets of reeds  $m n$ , substantially as and for the purpose described.

15. The arrangement at the back of the instrument of the hinges F of the main wind-chest B, lower reed-chest H, expression-valves  $i' i'$ , and their appendages, so as to open and allow access to the parts, substantially as and for the purposes herein set forth.

In testimony whereof I have hereunto set my hand this 28th day of February, 1873, in the presence of two subscribing witnesses.

MASON J. MATTHEWS.

Witnesses:

WILLIAM H. GOODCHILD,  
WM. C. DEY.