

M. J. MATTHEWS.

Reed-Organs.

No. 148,480.

Patented March 10, 1874.

Fig:5.

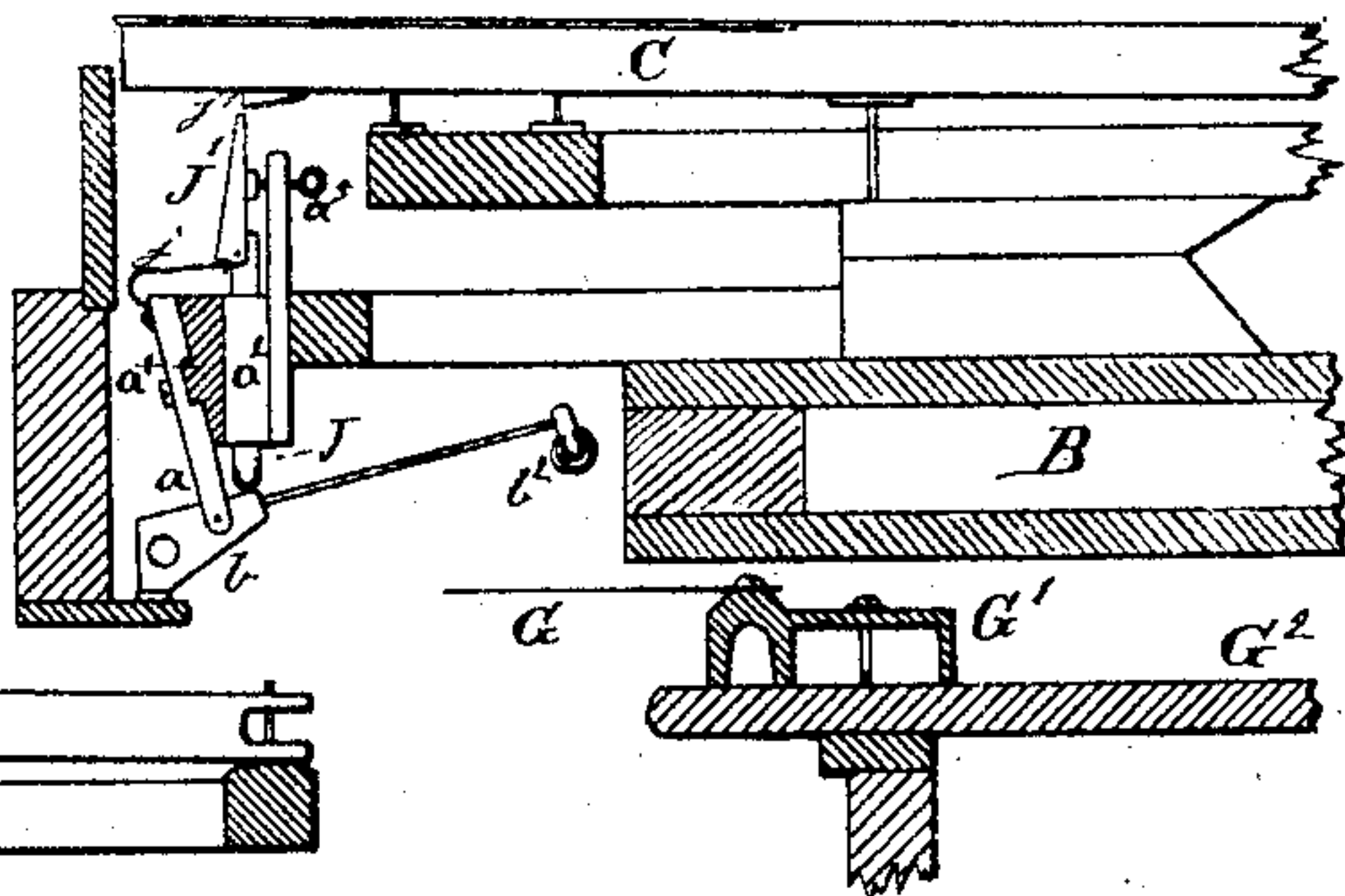


Fig: 1.

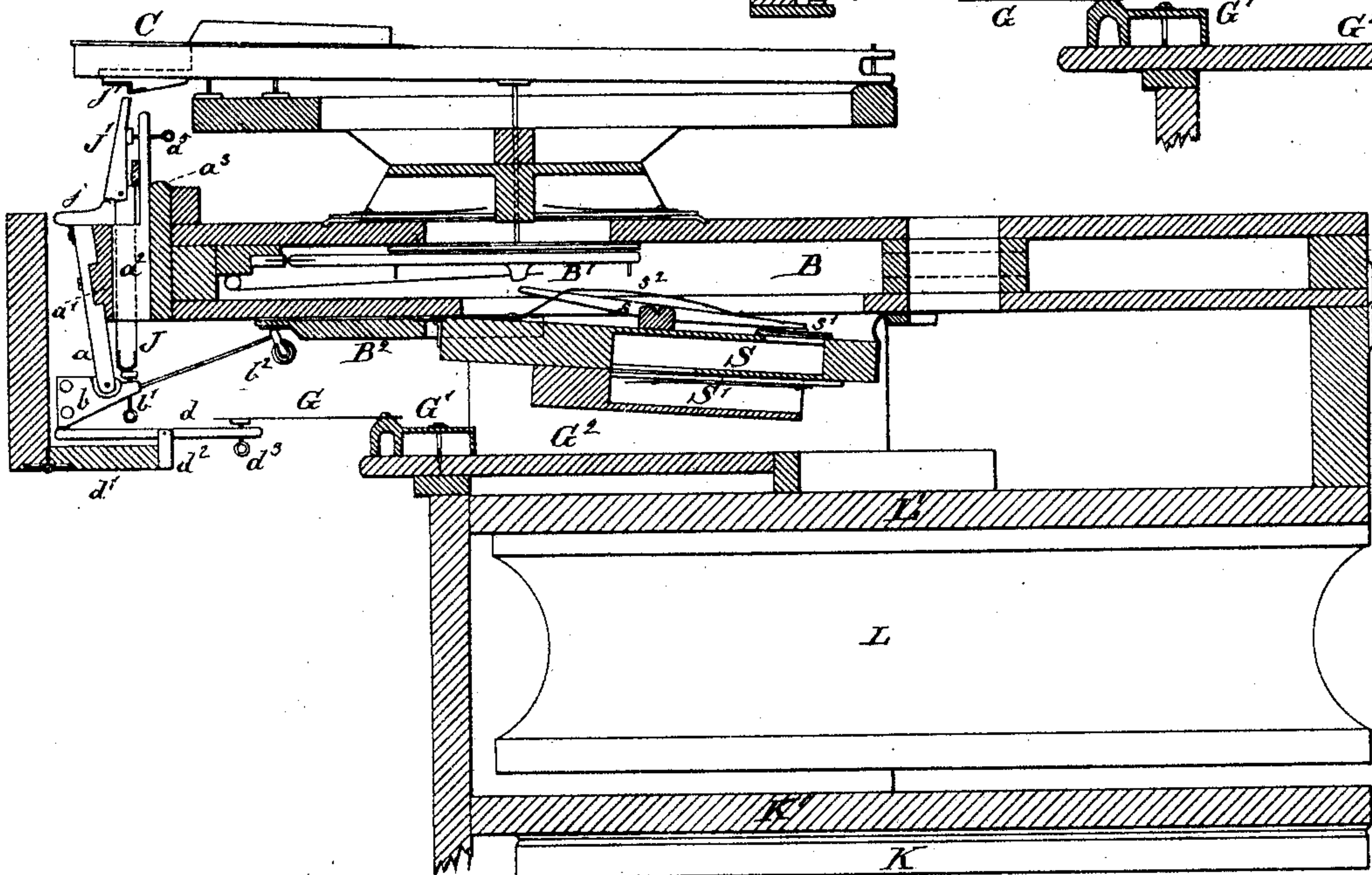
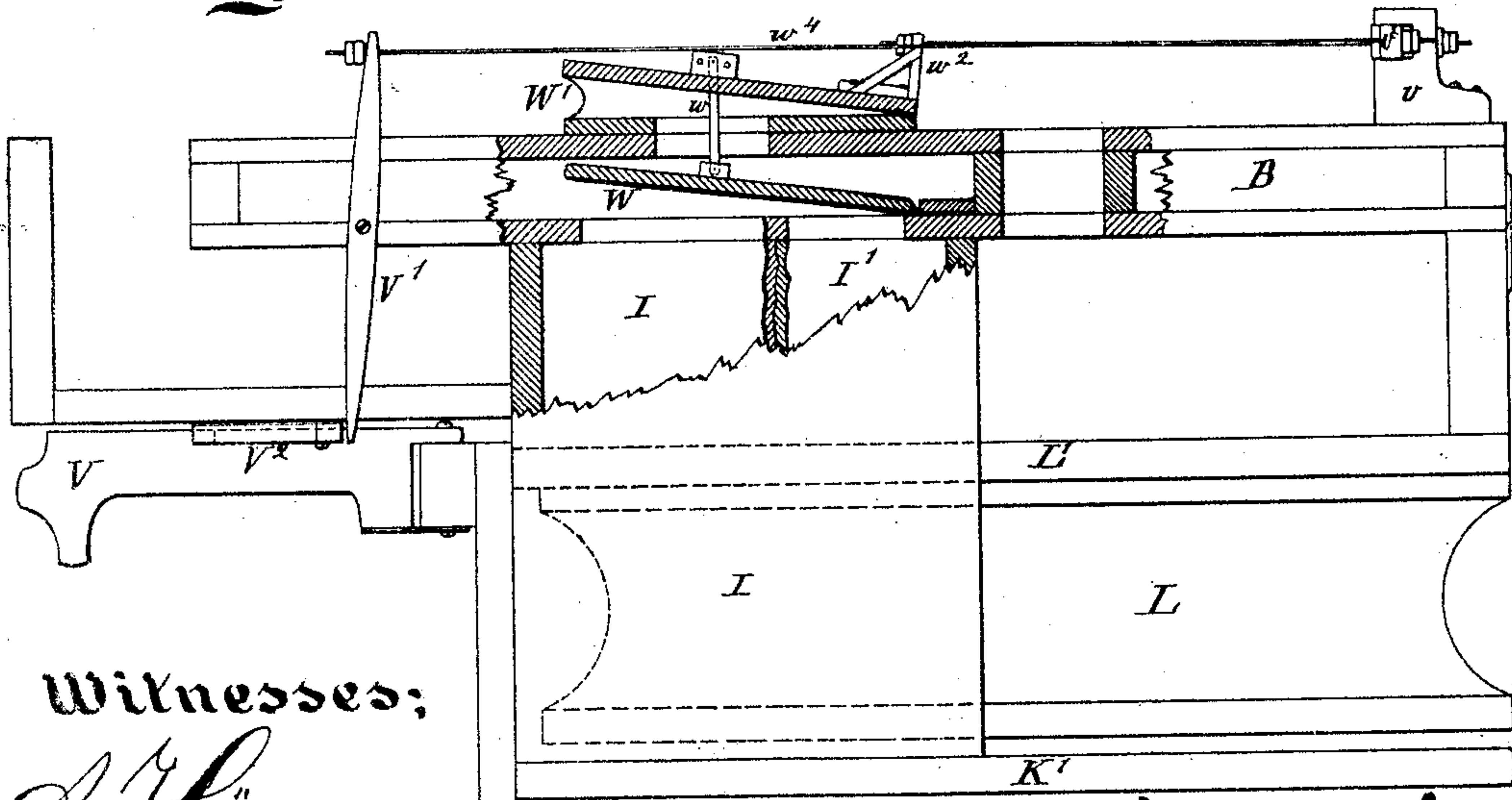


Fig: 2.



Witnesses;

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Alfred Westbrook

Inventor: M. J. Matthews
by his attorney S. D. Stearns

by his attorney *S. S. Stearns*

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Fig. 3.

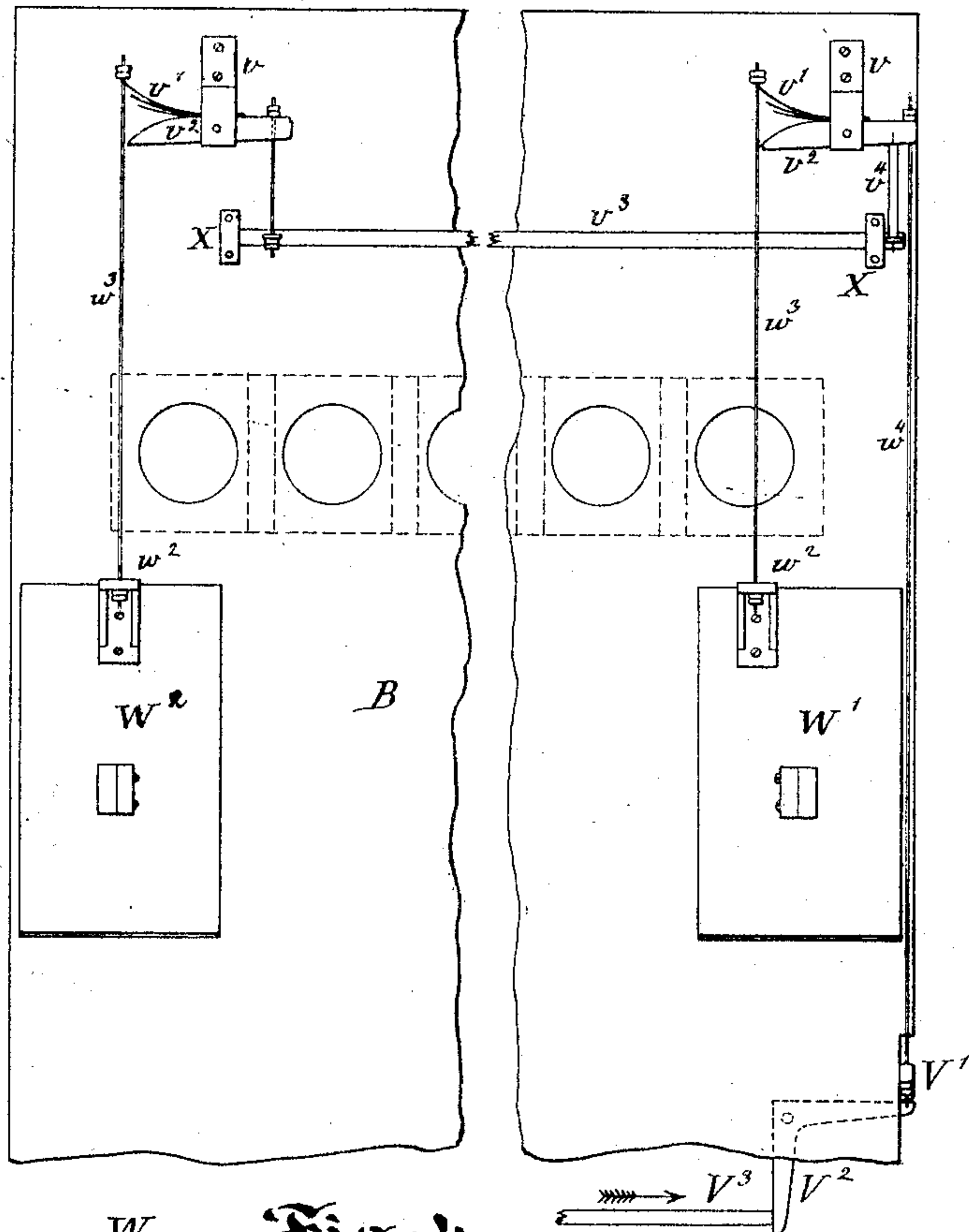
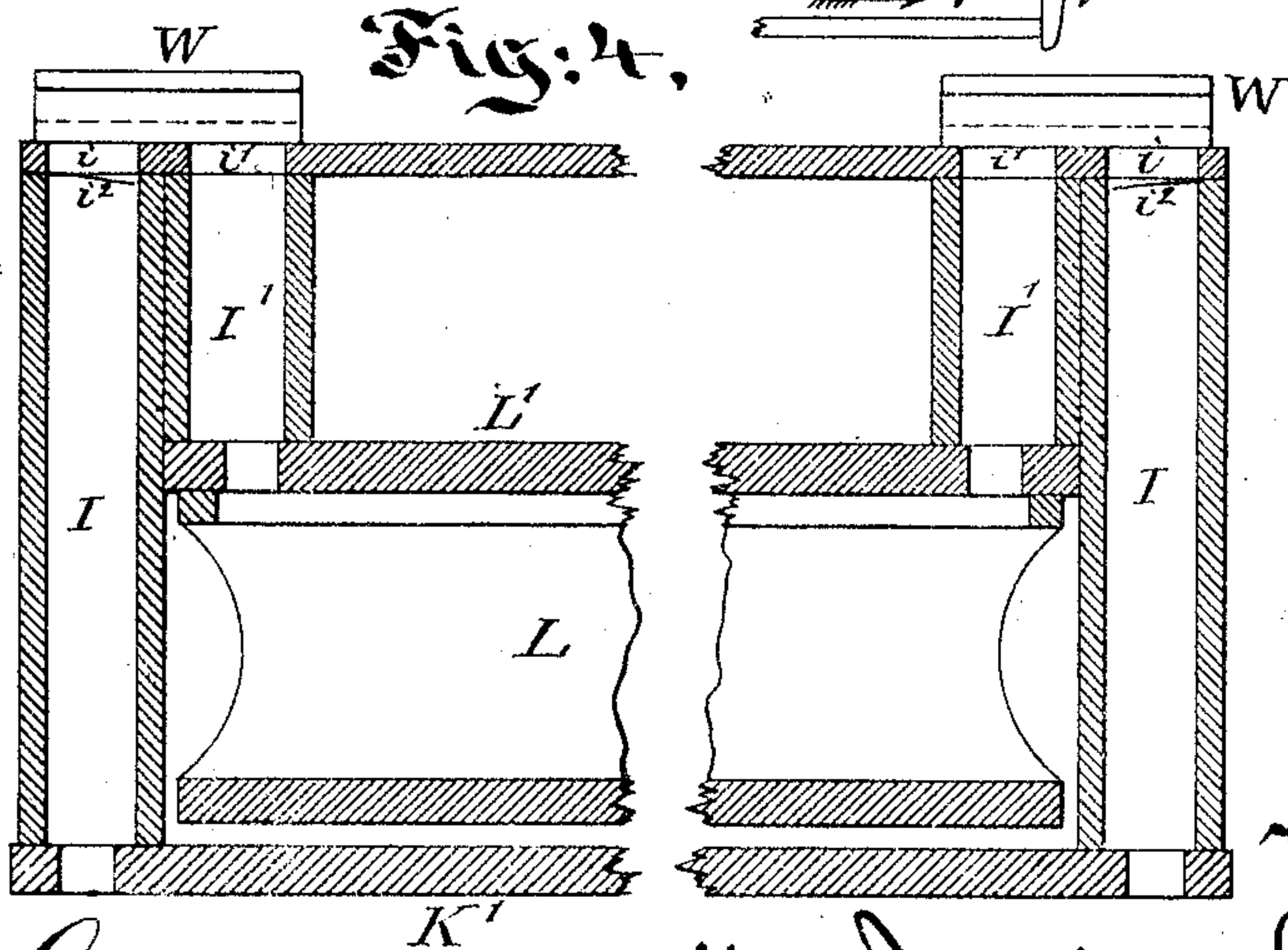


Fig. 4.



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. 148,480, dated March 10, 1874; application filed July 9, 1873.

To all whom it may concern:

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

I have simplified the construction and made more compact an instrument, in which steel tongues with percussion action are operated by the same keys which control the speaking of the reeds. And I have made important modifications in the parts containing the reeds, and inducing the motion of the air to operate them; and, also, in the jacks and adjacent parts for striking the vibrators.

My improvements make it practicable to give the fullest volume of sound, succeeding instantaneously to a faint or whispering sound, without any sudden shock in the transition, and to allow all the music produced by the reeds to reach the ear while controlled perfectly in force, and allowing every variety of expression without the use of swell-lids.

The following is a description of what I consider the best means of carrying out the invention, it being understood throughout that the parts relating to the reeds not here fully described correspond to the ordinary long approved American instrument operated by the exhaust-bellows inhaling air through the reeds.

The accompanying drawings form a part of this specification.

Figure 1 is a vertical section through the wind-chest and adjacent parts in the plane of one of the keys. Fig. 2 is an end elevation with the end board removed. It is partly in section showing certain valves. Fig. 3 is a plan view of a portion of the interior immediately above the wind-chest. The two parts show the work at and near each end. Fig. 4 is a longitudinal section, showing the wind-passages in the form of one long and one short trunk at each end.

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

At each end of my instrument is provided a long and short trunk, I I', for air communication between the exhaust K, reservoir L, and wind-chest B, the arrangement of these parts at each end being counterparts one of the other. The long trunk I reaches from the under side of the wind-chest B to the upper face

of the exhaust-board K'. The short trunk I' stands between the wind-chest B and the reservoir support-board L' in the same manner. Through the lower board of the wind-chest B are made openings *i i* communicating with the trunks I I'. At the base of each trunk I are made openings through the support-board K' to the exhaust K. At the base of each trunk I' are openings into the reservoir L. An ordinary valve, *v*², preserves the vacuum in the wind-chest B, produced by each downward movement of the exhaust K. Over the holes *i i* are mounted valves W W. Over each valve W, and on the upper face of the wind-chest B, are mounted small cuckoo-bellows W¹ W², about the same size as the valves W. A connection is made between these bellows W¹ W² and the valves W by links *w*. On the heel of each cuckoo-bellows is a bracket-lever, *w*². Opposite each and near the back of the instrument is a round-faced lever, *v*², working on a fulcrum-block, *v*, and having affixed three metallic springs, *v*¹, of different lengths. The longest spring in each set is connected to the corresponding bracket-lever *w*² by a wire rod, *w*³. A single wire rod, *w*⁴, reaches forward from the other end of the right-hand lever *v*², Fig. 3, to the upper end of the long fish-lever V¹, which is pivoted on the wind-chest. There are regulating nuts on each end of the wires *w*³ *w*⁴. In front of the fish-lever V¹ is a bracket-lever, V², which is centered on the case. Between this bracket-lever V² and the knee-board V is a connecting-rod, V³, so secured that it will not drop out of place. I term all these parts together my "knee-expression apparatus." They are shown in Figs. 2, 3, and 4, in their normal position.

The function performed by each part is as follows: The wire rods *w*³ are so adjusted by the regulating-nuts that the tension of the longest spring in each set of three springs, *v*¹, pulls wide open its corresponding cuckoo-bellows W¹ W². It is important that the normal tension of each spring should be sufficient not only to raise the cuckoo-bellows W¹ W² and the valves W, but should also be strong enough to resist some of the suction power produced by the main bellows. When the player "blows" or works the exhausting-bellows gently, the valves W will remain wide open, but as the movement of the feet on the

treadles becomes more rapid and vigorous the top board of the cuckoo-bellows $W^1 W^2$ will be drawn downward, and each valve W will be closed almost to its bed. The valves W should not close under these conditions with absolute tightness, but should leak enough out of the wind-chest to maintain a gentle exhaust condition therein. Provision is thus made so that no matter how much vacuum power may be accumulated in the main bellows and reservoir, it is not felt in the wind-chest B , and consequently cannot spend itself except in measured quantities on the reeds in operation, but is held in reserve and under the control of the performer. When swell or expression effects are required the knee-board is pressed to the right. This movement affects the rod V^3 , bracket-lever V^2 , long fish-lever V^1 , wire rod w^4 , round-faced levers v^2 , springs v^1 , and wire rods w^3 , so that the cuckoo-bellows $W^1 W^2$ are forced open against the exhaust power of the charged bellows. The three springs v^1 are so adjusted, and the round-faced levers v^2 so shaped, as to secure a gradual and smooth effect in the rapid transition from the softest to the loudest tone. The corresponding bellows W^2 , and connected parts on the left side of the instrument, are operated by a connection from the right side, as follows: A rod, r^3 , with two arms reaching upward, works in the journal-blocks X . The tracker-rod r^4 reaches from the tail of the right lever r^2 to one of the arms, and is held in place by a pin at each end. Through the other arm of the rod r^3 , and through the tail of the left lever v^2 , extends a wire rod with regulating nuts on each end. This arrangement provides for the action of each cuckoo-bellows to occur simultaneously by the movement of but one knee-board. On the under side of the main wind-chest B is mounted a reed-chest or reed-pan, S , carrying a tube-board, S' . The air is drawn in through the mouth of the tube in the ordinary way. The tube-board S' , attached to the pan S , constituting a complete reed-chest, is constructed to contain one set of reeds, and is so connected to the wind-chest that it will rise and sink for coupling and uncoupling purposes. The air communication between this chest and the main wind-chest is controlled by the valves s^1 attached to levers s . The springs s^2 keep the valves s^1 pressed to their seats. When the pan S sinks, the connections to the pallets B^1 are not effected. When the pan S rises, either by suction or by any other provisions for lifting it, the reed-actions are again coupled. Below the wind-chest B is mounted, on a metal casting, G^1 , a set of steel tongues or vibrators, G . The metal casting G^1 is screwed to a sound-board G^2 . This sound-board G^2 is narrow and thick at the treble end, and is wide and thin at the bass end. It rests on and is screwed to three blocks, one long block at the treble end, one shorter one at about the middle length in the back, and one short one at the bass end near the front. The wide and thin end is left free, excepting at the part screwed to the block to-

ward the front. It is important that the edges should not come in contact with any of the surroundings. The percussion action to operate the tongues G consists of hammers b^2 , hammer-butts b , hammer hinge-pieces a , long support-strip a^1 , grooved rail a^2 , hoppers $J J'$, springs j , the escapement-shoulders j' , and regulators b^1 and a^5 . The damper-action consists of levers d , hinged rail d^1 , fork-hinged pieces d^2 , and regulator d^3 . The grooved rail a^2 extends through the compass of the tongues G . There are cut in the rail a^2 as many vertical grooves as there are hoppers or jacks $J J'$. Each groove is properly lined with cloth. The front of the entire series of grooves is covered by the support-strip a^1 , which is faced with two strips of cloth, one toward the top edge, and the other toward the bottom edge. The bodies J of the jacks or hoppers consist of thin flat strips of wood, which, working in these grooves, are guided in their upward and downward movement, and prevented from turning sidewise. The head J' of each jack consists of a tapering or wedge-shaped piece of wood, narrow at the top and wide at the bottom. The body J of each jack is pivoted to one side of the head J' at its widest part. The other side of the head J' projects beyond the body J , and forms a seat for the spring j , which latter serves the double purpose of raising the parts and holding the head J' against the regulator a^5 . Each regulator, a^5 and b^1 , consists of a screwed wire, with a nut on one end and an eye on the other end, and regulates the percussion-power of the action. Each regulator a^5 passes through the projecting part of the grooved rail a^2 . The hammers may be covered with felt, like piano-forte hammers, and overbalanced by leads in the butts b . The parts a^2 and a^3 are rails, to which the percussion action is attached, and which connect the whole with the main wind-chest B .

The dotted lines at the front end of the key C represent the projections from the sharps or black keys. Each white or natural key is grooved to receive this projection.

Fig. 5 shows an arrangement of the hammer-action, which is preferable to that above described by reason of its occupying less depth in the front of the instrument below the keys. The wind-chest B is narrowed by sacrificing a strip along its front. In other words, the front edge of the wind-chest is placed farther back than usual, the jacks are shortened, and the hammers are so mounted as to obtain their necessary play up and down in the space usually occupied by that portion of the wind-chest. Both the bodies and heads of the jacks are a little shorter than with the construction first described. I consider the arrangement just described, and illustrated in Fig. 5, as an equivalent and advantageous modification of the arrangement shown in Fig. 1. The drawing, Fig. 1, shows the other parts of the invention in their best form. Fig. 5 shows the preferable arrangement of the percussion action.

Many modifications of some of the parts may

be made at will, and many of the parts may be used with good effect without the others.

Thus, the knee expression-action may be applied to any reed-organ with single or double trunks, or trunks and parts of trunks, and may be located in other parts of the instrument than those described.

Each cuckoo-bellows, and the action connected therewith, may be operated by a separate knee-board, and the wind-chest can be divided into bass and treble compartments; or a single knee-lever may be mounted so as to be operated by the left knee instead of the right knee.

In cases where the ordinary vertical bellows are used, the sound-board G^2 may be attached to blocks reaching from the under side of the wind-chest B. In this case it would be necessary to lower the rail which carries the rollers over which the straps to bellows work.

The grooved rail a^2 may be so constructed that the projection on it reaching upward may stand at such a distance from the jack-heads J' as to allow of a movable piece passing between them, which, being operated by a stop, will throw the hopper-heads J away from the shoulders j' , and thus effect uncoupling.

There may be five or a less number of octaves of the vibratory tongues.

The reed-pan S, with the tube-board and its several other attachments, as represented, may be hinged at its back edge, and provided with a wide flexible connection of leather or analogous material, allowing its front edge to rise and sink instead of its back edge, if preferred. Such a change will evidently increase the extent of the change in the relation of the parts when the pan rises or sinks. When hinged at the front, as shown in Fig. 1, the rising of the pan makes but a slight change in the relation of the levers s to the ordinary pallets.

By means of a board, B^2 , with its thin front edge extending along above the entire series of hammers, and its back edge hinged to the

under side of the wind-chest by means of arms extending back at each end, so that the hinges stand some distance back in the instrument, suitable levers and connections, not represented, communicate motion to this board from an ordinary stop-draw at the top of the instrument. But it may be worked by a stop-action from any other part, if preferred.

I claim as my invention—

1. The trunks I and half-trunks I' , arranged relatively to wind-chest B, reservoir L, and exhausts K, as and for the purpose specified.

2. The combined tube-board S' and reed-pan S, suspended flexibly from the wind-chest B, as herein specified.

3. The escapement-shoulders j' on the under side of the keys C, in connection with the jacks J J' and the adjacent parts, substantially as herein set forth.

4. The spring j , arranged as shown, relatively to the jacks J J' so as to perform the double function, as herein set forth.

5. The grooved rail a^2 , in combination with the jacks J J' , as specified.

6. The hammer-support strip a^1 , arranged as shown, relatively to the jacks and hammer hinge-pieces a , so as to perform the double function of holding the jacks in their grooves, and forming firm supports for the said hammer hinge-pieces, as specified.

7. The hammers b^2 and their connections, arranged in the plane of the narrowed wind-chest, as described and shown in Fig. 5 of the drawings, for the purposes specified.

8. The stop-board B^2 , arranged relatively to the hammers b^2 and dampers d^3 , as herein specified.

In testimony whereof I have hereunto set my hand this 7th day of July, 1873, in the presence of two subscribing witnesses.

MASON J. MATTHEWS.

Witnesses:

WM. C. DEY,

ARNOLD HÖRMANN.