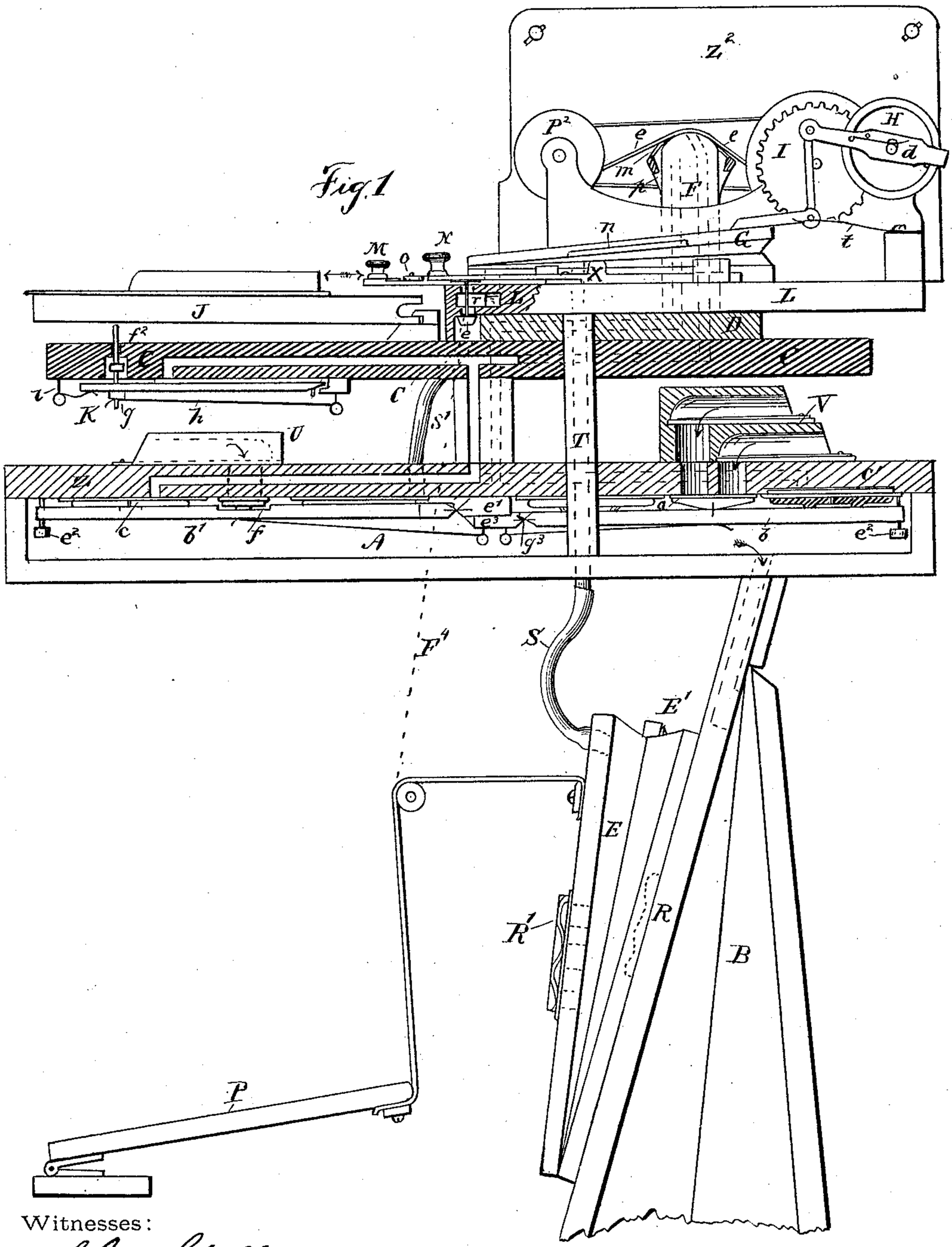
(No Model.) 3 Sheets—Sheet 1.

M. GALLY.

MUSICAL INSTRUMENT.

No. 364,813. Patented June 14, 1887.

Fig. 1



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Robt. A. Gally.

Merritt Gally.

Inventor.

(No Model.) 3 Sheets—Sheet 2.

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MUSICAL INSTRUMENT.

No. 364,813. Patented June 14, 1887.

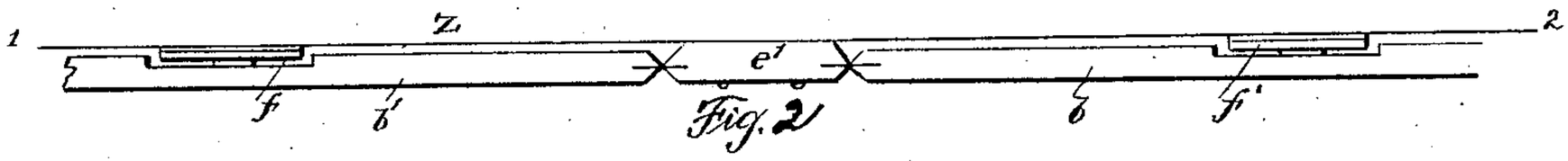

Fig. 2

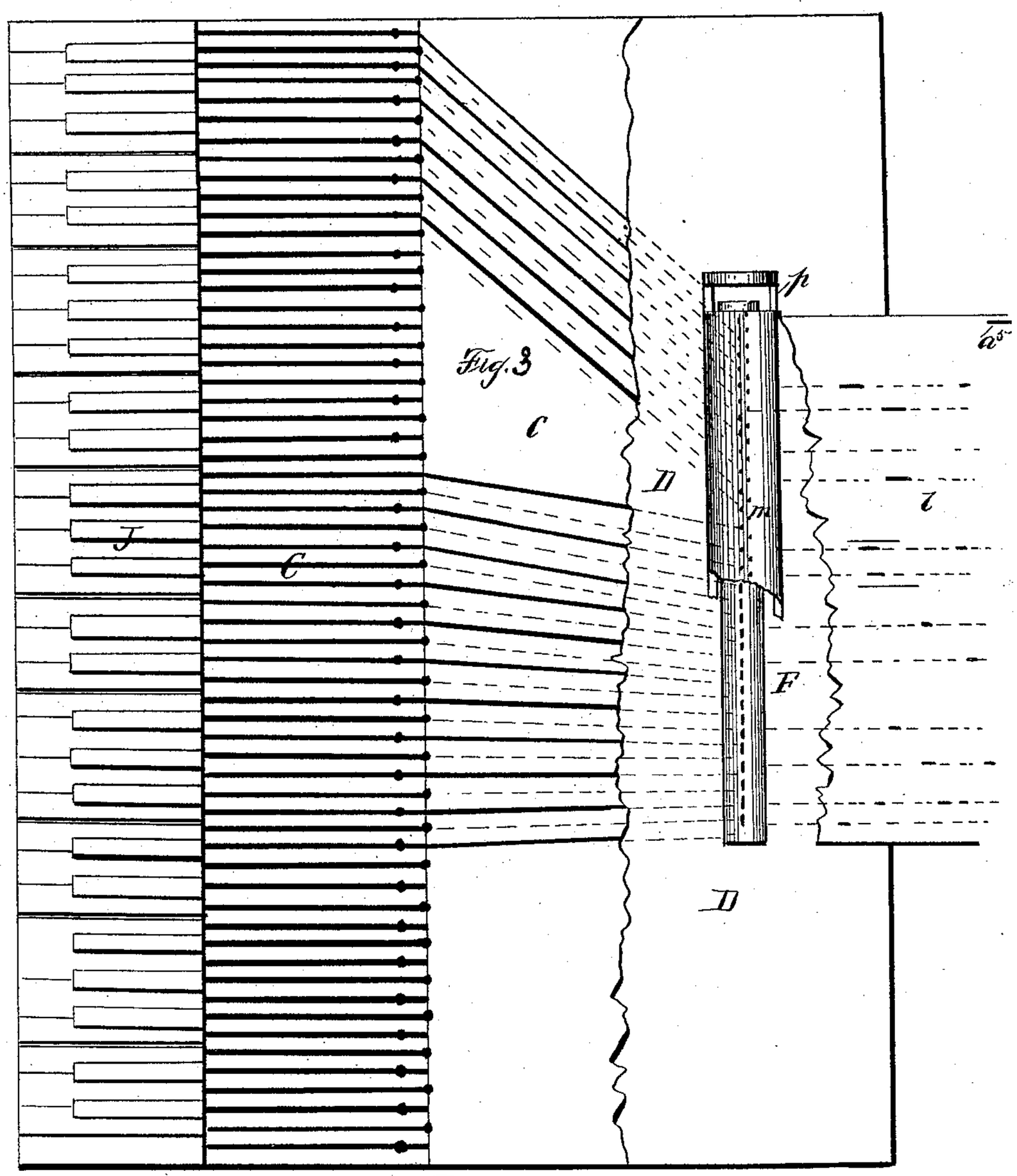

Fig. 3

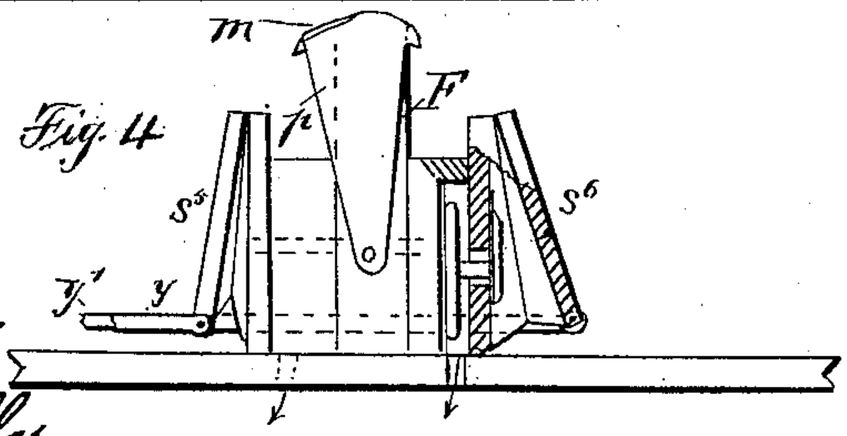

Fig. 4

Witnesses:
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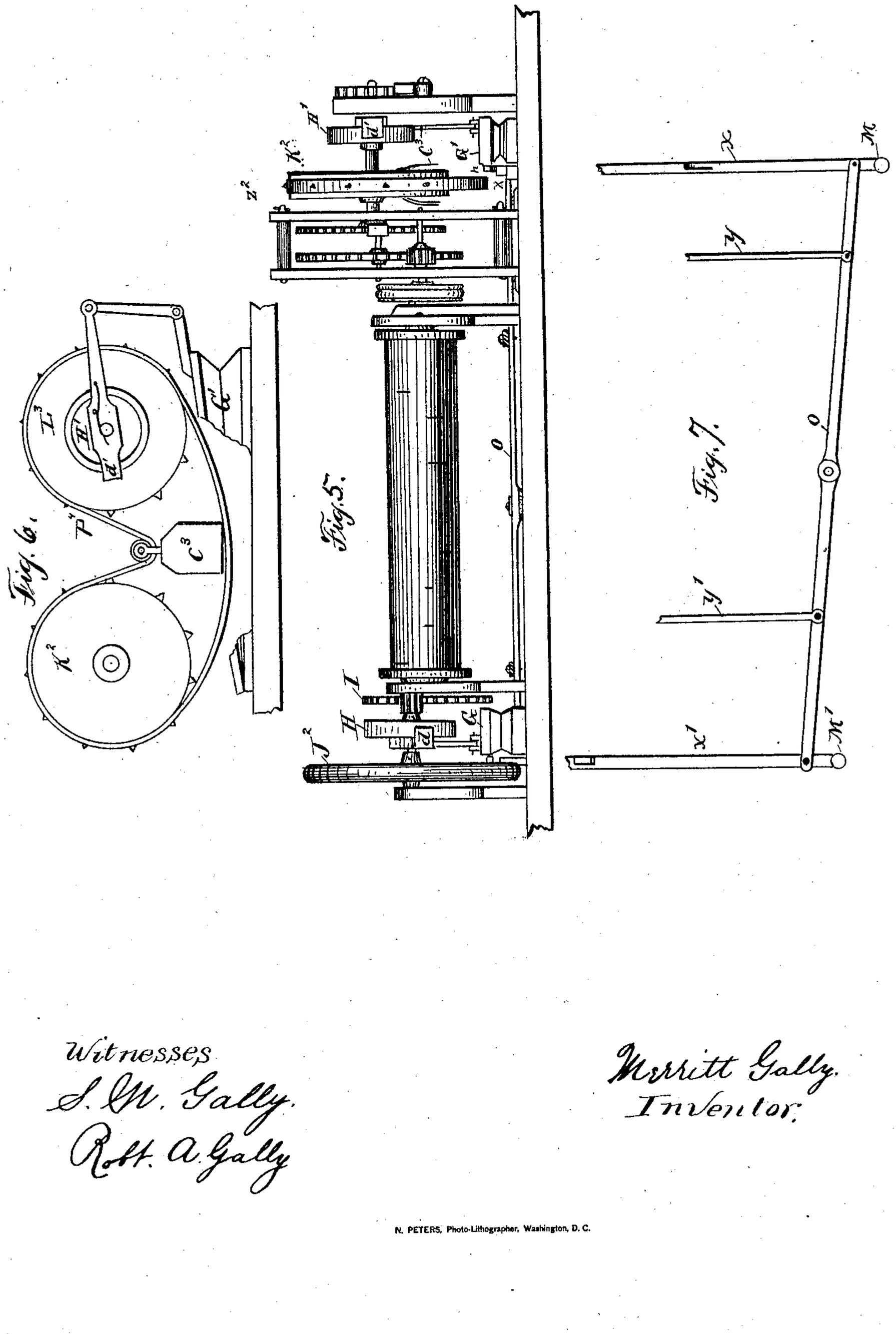
MUSICAL INSTRUMENT.

No. 364,813. Patented June 14, 1887.



Witnesses
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UNITED STATES PATENT OFFICE.

MERRITT GALLY, OF NEW YORK, N. Y.

MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 364,813, dated June 14, 1887.

Application filed January 23, 1886. Serial No. 189,519. (No model.)

To all whom it may concern:

Be it known that I, MERRITT GALLY, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

In the accompanying drawings, Figure 1 is a transverse sectional view of the "action," showing also an end view of the bellows and music-sheet-winding apparatus. Fig. 2 is a side view of a pair of the parchment valve-levers. Fig. 3 is a plan of the pneumatic groove-board, showing, also, the manual-keys, automatic music-sheet tracker-range, and the shifting-register. Fig. 4 is an end view, partly sectional, of the automatic mechanism for changing the direction of movement of music-sheet. Fig. 5 is a rear view of the winding and rewinding mechanism for music-sheet. Fig. 6 is an end view of windlass for motor-weight; and Fig. 7 is a plan view of the shifting and regulating device, with connections partly cut away.

The instrument shown in the drawings is constructed with both a manual key-board and an operating mechanism having a mechanical music-sheet, so that it may be played either manually or mechanically. The sounding devices of the instrument are operated by pneumatic action.

At the right hand of the central line of the action, Fig. 1, there are two lines of reeds, one above the other, operated by pneumatic levers *b b'*. To the lever *b* is attached the valve *a*, which covers the ports of two reeds. This valve is attached to the lever by means of a parchment hinge formed of a piece of parchment inserted in a slit made transversely across both the valve and valve-lever. This allows the valve to be self-adjusting as to the two valve-ports, and at the same time prevents the valve from being turned out of the line of the lever.

It is desirable that the movement of the pneumatic lever be direct and certain, and at the same time sensitive and quick in its action, and it is therefore necessary that it be firmly hinged at g^3, but with as little friction as possible. To secure this, I attach the lever *b* to its support e^3 with a parchment hinge. This hinge is perfectly elastic, and at the same time holds the lever firmly in line and prevents any chafing on the guide-pin e^2. This is desirable, also, as being a cheap, simple, and durable construction. As the construction and manner of attaching the valve *a* to the lever *b* removes the lever only a little from the valve-seat, the lever is allowed to be in direct contact or attachment to the pneumatic presser *c'*. In order that the lever shall not shut off the small vent-duct in the center of the presser, a recess is made in the presser a little greater in diameter than the width of the lever, thus allowing free vent while the lever and presser are in contact.

When a valve, as *f*, is used for a single port, I place the lever, as *b'*, still nearer the valve-seat, cutting the lever away slightly to accommodate the valve, as shown. The lever *b'* is also shown as slightly cut away at the center of its pneumatic presser to accommodate the vent instead of recessing the presser. When two valve-levers lie directly opposite each other, I hinge both to a single support, *e'*, as shown in Fig. 3.

Above the wind-chest and pneumatic action, Fig. 1, is a board, C C, which forms the base for the music-sheet mechanism and for the finger-keys. In the board C C are inclosed grooves leading from the valves K, operated by the finger-keys J, and also leading from music-sheet tracker-range F to the pneumatic action in the wind-chest below. A plan of the grooved board C C is shown in Fig. 4.

The key-board J, Fig. 4, is shown as of full organ-range in five octaves. Any complete manual range may be used. The pneumatic grooves lead from the valves of all the finger-keys, as shown, for operating the entire range. A less number of grooves connect with the mechanical tracker-range F, as shown by the alternating black and dotted lines.

The several ranges of reeds are divided into distinct sets for the lower and the upper part of the register, beginning on different octaves. as is common in reed-organs, the division of the scale being shown in the present case at the "F" below middle "C." In the line of grooves, Fig. 4, which lead to the mechanical tracker-range, there is a break at the point where the scale is divided, an octave being omitted, as shown. There is also an omission

in the line for the tracker-range of a number of letters of the higher notes of the manual range. The mechanical tracker-range and its music-sheet, however, are caused to play the entire range of the organ in the following manner: The grooves from the tracker-range lead to pneumatic motors, which operate the valves of two or more sets of reeds, differing an octave in pitch. The octave of grooves at the bass end of the instrument represents, therefore, not only the octave of reeds lowest in pitch, but also an octave of reeds corresponding in pitch to the next octave above in the organ-range, which is shown blank without grooves from the tracker-range. By alternately opening and closing the stops for the two sets the range of two octaves of reeds is played with one octave of grooves. The grooves leading to the treble part of the scale are in like manner caused to operate the higher notes of the scale, so that the number of grooves shown are sufficient for mechanically operating the entire range of the organ.

The valves K, Fig. 1, which connect with the keys J of the manual key-board, are operated by means of push-pins f^2. The push-pin f^2 passes loosely through the valve K. Two collars, one above and one below the valve, are made fast to the push-pin, and such a distance from each other that the push-pin will have a certain distance of movement without moving the valve. The valve-spring *h* bears against the collar of the push-pin under the valve, pressing it upward against the valve and holding the valve to its seat. An additional light spring, *i*, bears directly on the valve, to hold it in place during the movement of the push-pin f^2 until the upper collar strikes the valve. Any further movement of the push-pin forces the valve from its seat. The object of this construction is to allow a short distance of movement of the finger-key before the valve is moved, and to secure the closing of the valve before the finger-key has entirely returned to place. This prevents mistakes in playing which might otherwise occur by slight accidental movement of the keys, and also secures the opening and closing of the valves at the proper end of the stroke.

Attached to a vibrating frame, *p*, Figs. 1 and 4, is a piece of thin sheet material, *m*, which covers the tracker-range. This cover is perforated with two lines of holes placed alternately in their order, so that by vibrating the frame *p* from side to side either one of the lines of holes is made to register with the openings of the tracker. The music-sheet *l* is perforated with two sets of perforations, represented by the dark and light notes in the drawings. The dark notes represent a tune, or part of a tune, to be played with the music sheet moving in one direction, and the light notes lying between the lines of the dark notes represent a tune, or part of a tune, to be played with the music-sheet moving in the opposite direction. The friction of the music-sheet when the sheet is impelled toward the right hand, as shown, vibrates frame *p* to the right hand and brings the holes in the cover *m* which are in line with the dark notes of the sheet over the openings in the tracker-range, and the tune or part of tune represented by the dark notes on the sheet is played on the instrument. When the direction of movement of the sheet is reversed, the frame *p* is moved to the left, and the other set of holes in cover *m* being brought to register with the tracker-range, the tune represented by the light notes of the music-sheet is played on the instrument. This allows of the use of a comparatively short music-sheet. A single tune may be divided in two parts, and the sheet be only one-half the length of the entire tune. One-half the tune can then be played by the sheet moving in one direction, and the other half by a reversed movement of the sheet, and the tune repeated any number of times without interruption.

In an instrument in which the movement of the sheet is produced by means of a hand-crank the reversed movement of the sheet may be produced by simply reversing the motion of the crank or reversing its gear. The motion may, however, be reversed automatically, as shown in the drawings.

In Figs. 1 and 6 two motors are shown, I and Z^2, one at each end of the music-sheet rollers. One of these motors moves the music-sheet in one direction and the other in the opposite direction.

In Fig. 5 two pneumatic motors, S^5 and S^6, are shown, which connect with and are operated by means of perforations in the music-sheet *l* through the tracker-range F. The pneumatics S^5 and S^6 operate the connecting-rods *y y'*, which operate the shifting-bar O, Figs. 6 and 8, which reverses the movement of the sheet by stopping one of the music-sheet motors and starting the other.

The music-sheet motor Z^2 is a clock-work propelled by the weight C^3. The weight C^3 is hung with a pulley on an endless perforated belt or chain, P^4. The belt or chain P^4 is held from slipping on the two wheels K^2 and L^3 by means of pins in the periphery of the wheels, as shown in Fig. 7. The wheel K^2 drives the music-sheet motor Z^2, and the wheel L^3 acts as a windlass for winding up the belt or chain P^4, to keep the weight constantly drawing on wheel K^2. The motor-weight is wound up by means of a grip-clutch, *d'* H', acting on the shaft of wheel L^3. The grip-clutch is operated by the hand of the performer by means of the pneumatic lever G', worked by the button-key lever N, provided with pneumatic valves *r e*, Fig. 1. An alternating opening and closing of these pneumatic valves by the hand operates the lever *d* of the clutch, Fig. 7, and keeps the clock-work constantly wound. A similar pneumatic lever and hand-key operates the clutch *d* H, Fig. 1, operating directly the motor I, as shown in Fig. 6, the movement being kept constant by means of fly-wheel J^2.

When the hands are otherwise employed, the pneumatic levers G G' may either of

them be operated by means of a direct connection of the valves with a foot-pedal, producing a movement for each movement of the foot, as shown by dotted line F^4, or may be connected with a sub-pneumatic, E, operated by the foot. This pneumatic E may be one of the pumps of the bellows and produce a movement of lever G or G′ through tube S T with each movement of the foot while operating treadle P. In this case, however, there is no connection between bellows B and pneumatic lever G, and each acts independently of the other, the pneumatic lever G following only the movement of the foot, and is in no respect automatic.

The distance of movement of the pneumatic lever G, Fig. 1, is adjusted at will by means of a sliding stop, X, operated by means of handle M. On the side of the pneumatic lever G is a projecting flange, *n*, under which the stop X is made to slide. The flange *n*, striking the stop X, limits the movement of lever G. When the stop X is drawn backward to its farthest limit, the lever G has no movement, as stop X and flange *n* are in continual contact. Both pneumatic levers G and G′ are shown in Fig. 6 provided with a sliding stop and flange.

The lever grip-clutch *d* H, Fig. 1, turns the shaft of wheel H on the downward movement of lever G, but slips without affecting the shaft on the return movement. On wheel H is a flange, which passes between two lips or lugs on the lever *d*, or through a gain cut in the lever. A hole is bored through lever *d* for the passage of the driving-shaft on which wheel H is firmly fixed, the hole being in such relative position to the lugs of the lever that the flange of the wheel H will pass freely without binding. The hole of the lever is then elongated to one side of the center sufficiently to cause the lugs to act as jaws on the flange of the wheel when the shaft is in position in the slot out of the center of the original hole. A spring, as shown, sufficiently strong to sustain the weight of lever *d* keeps the lever in central position as to its pivot on the shaft when no force is applied to the lever or during the upward movement of pneumatic lever G. On the downward movement of the pneumatic lever the spring of lever *d* yields, and the shaft, having position in the upper end of the slot, causes the lugs of the lever *d* to clamp the flange of wheel H, acting as a grip, which turns the wheel with its motor-shaft.

I am aware that a music-sheet has been patented in England in which were two sets of perforations for music running in opposite directions.

What I claim is—

1. The combination, with the pneumatic motor, of the valve-lever in contact with said motor and a parchment hinge connecting said lever with its support.

2. The combination, with the tracker-range, of a music-sheet having two sets of music-perforations and a shifting-piece in contact with said sheet, by which connection is made from the tracker-range to one or the other sets of perforations by the movement of the sheet.

3. The valve-lever placed near to the valve-seat, a part of the body of the lever being cut away to receive the valve loosely attached to the lever.

4. The combination, with the perforated-diaphragm pneumatic motor, of the valve-lever in contact with said motor, a vent-recess being provided between the lever and motor opposite the perforation in the diaphragm, substantially as described.

5. The combination, with the tracker-range, of a shifting-piece pivoted thereto, said piece having a double set of perforations, either one of which may be brought into operative relation with the range as the piece is shifted, substantially as described.

6. The pneumatic valve of the manual, its finger-key and connection, constructed to allow a partial movement of the key without movement of the valve.

7. The combination, with an actuating-valve constructed to be operated manually, of a pneumatic lever for repeating with greater force the actuating movements of the hand, the lever being attached to and to operate the music-sheet-winding apparatus.

8. The combination, with the clock-work for operating the music-sheet-winding apparatus, of a pneumatic lever for winding the clock-work.

9. The combination, with the motor for the music-sheet-winding mechanism, of a pneumatic lever connected with a foot-pedal by means of a pneumatic connection constructed to cause the pneumatic lever to repeat the successive movements of the foot, substantially as specified.

10. The combination, with the clock-work for operating the music-sheet-winding apparatus, of the motor-wheel K^2, the winch-wheel L^2, and endless perforated belt or chain provided with the weight, substantially as and for the purpose specified.

11. The combination, with the perforated music-sheet having two sets of lines of perforations, arranged substantially as specified, of additional perforations in the music-sheet for pneumatically operating on the music-sheet-winding mechanism for changing the direction of movement of the sheet.

12. The combination, with the sheet-winding mechanism, of the grip-clutch H *d*, constructed and to operate substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

MERRITT GALLY.

Witnesses:
BERNARD J. KELLY,
S. M. GALLY.