(No Model.) 4 Sheets—Sheet 1.

F. STONE.

MECHANICAL MUSICAL INSTRUMENT.

No. 326,172. Patented Sept. 15, 1885.

FIG. 1

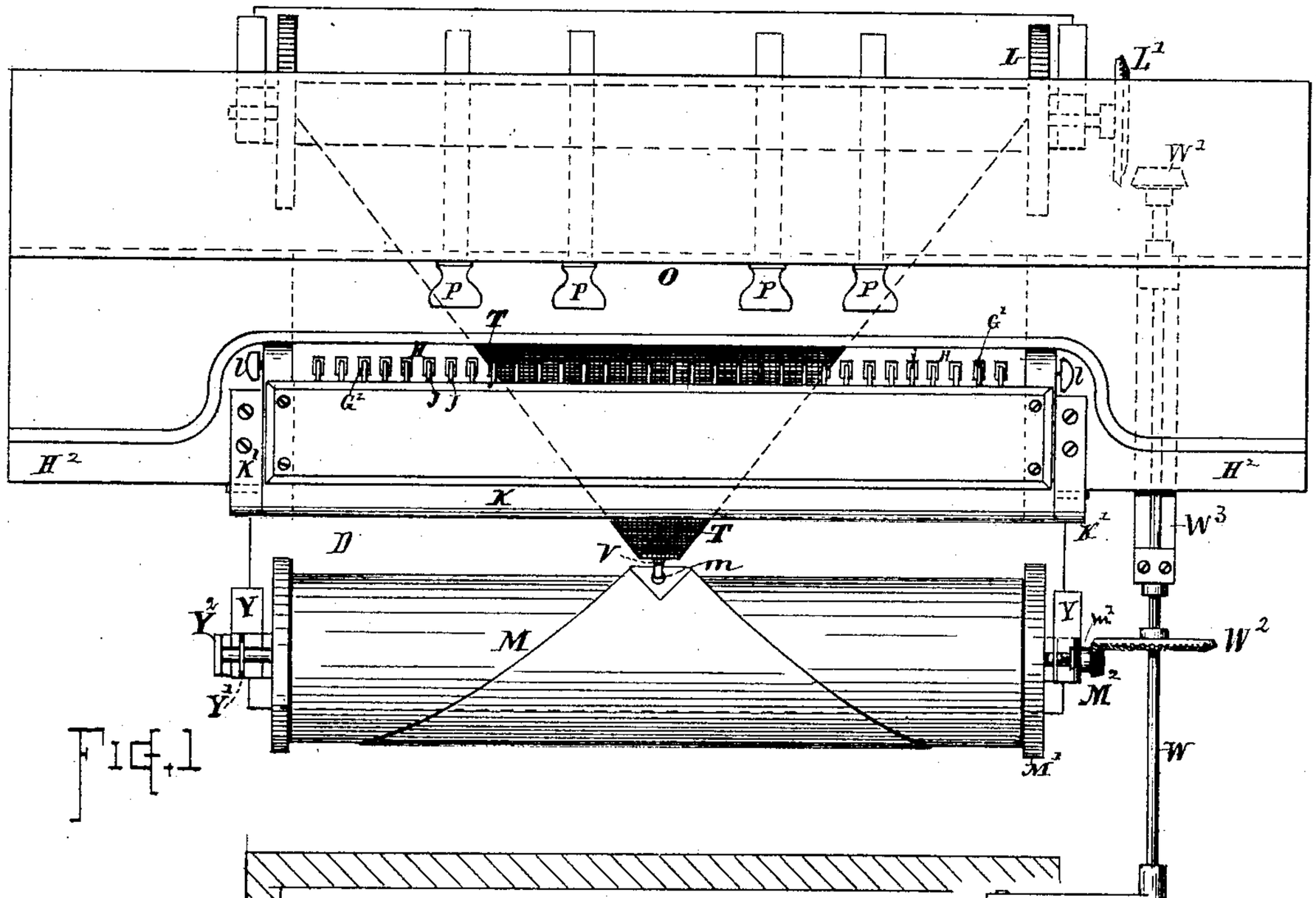
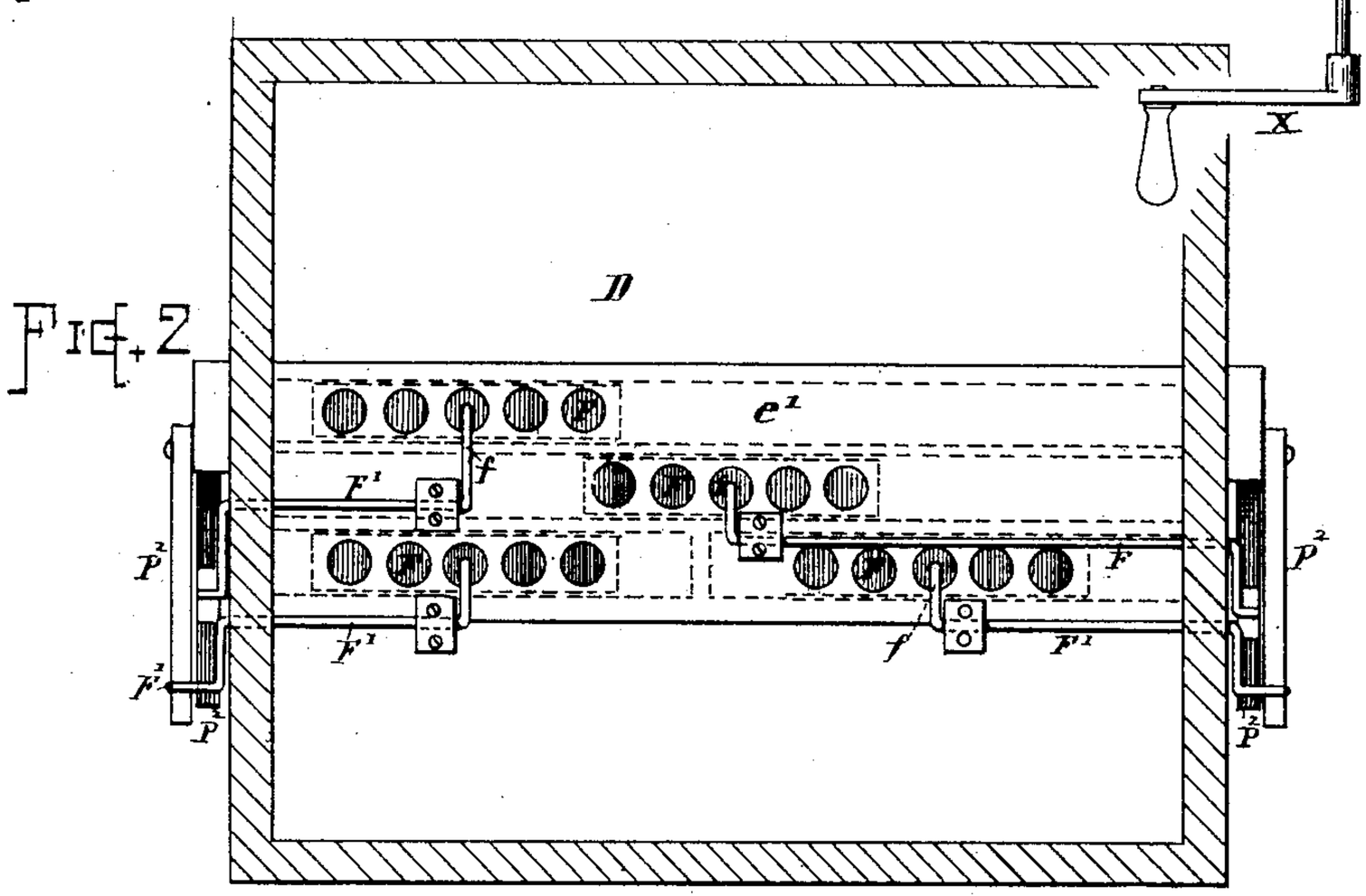


FIG. 2



Witnesses.
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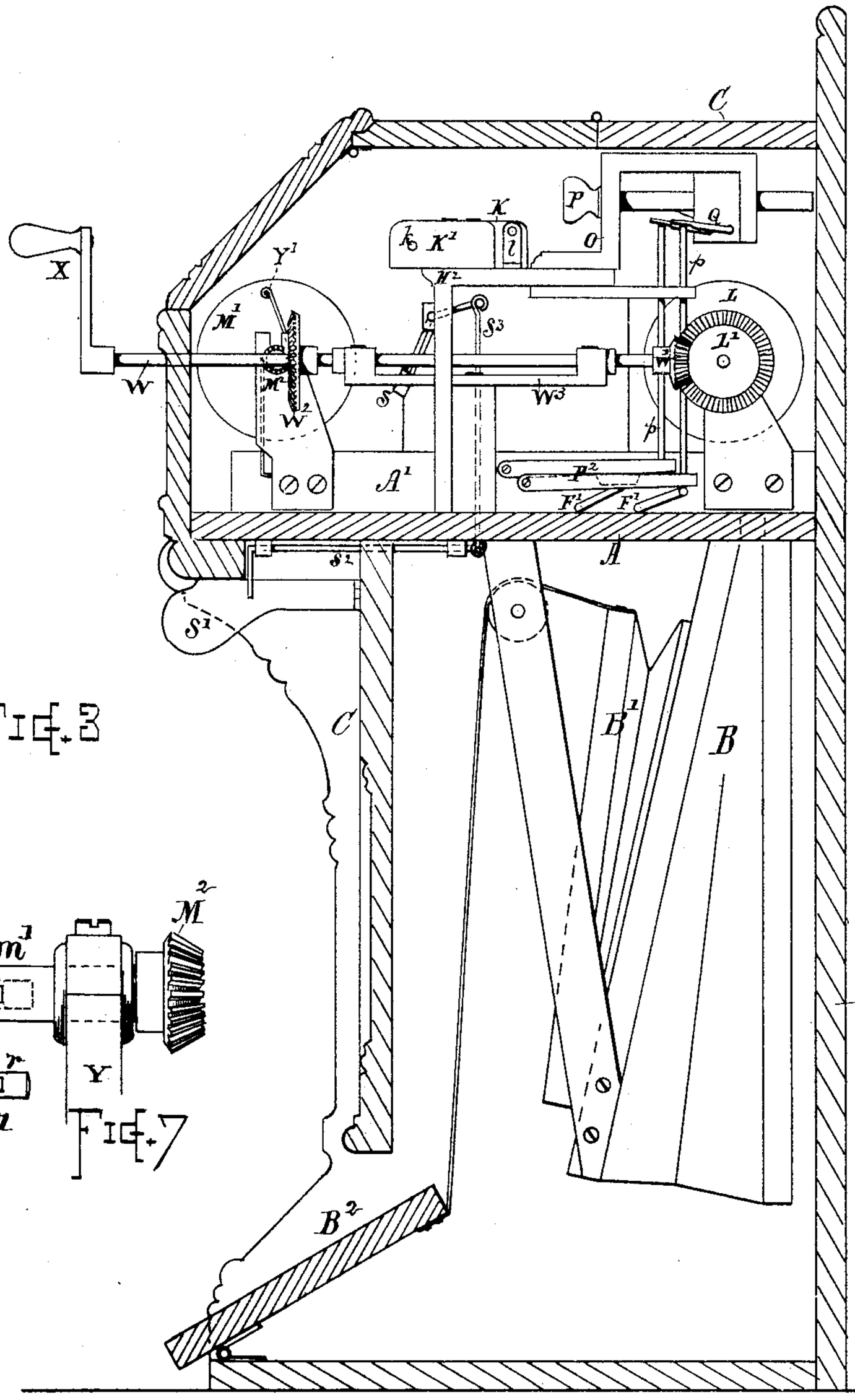

FIG. 3

FIG. 7

Witnesses

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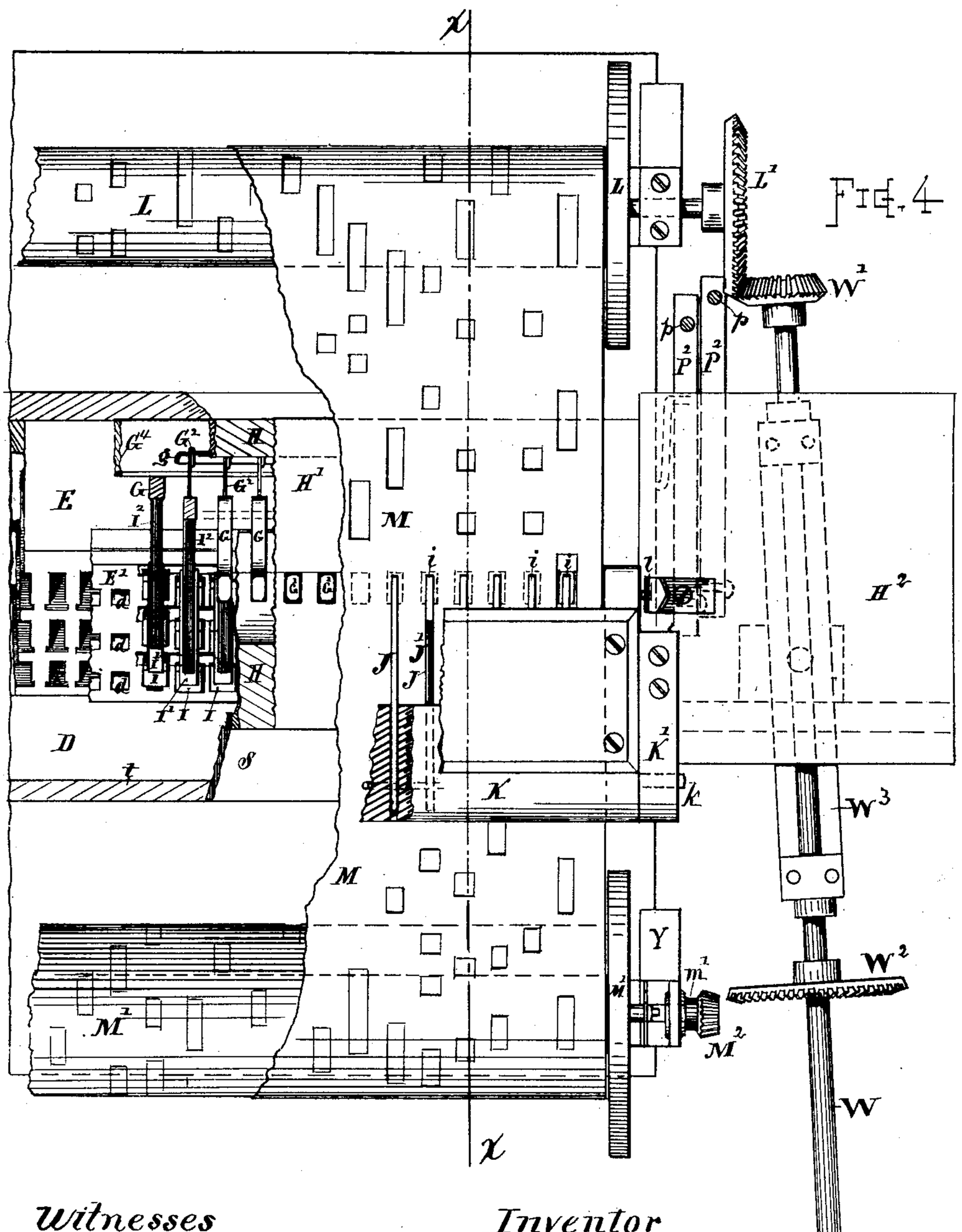
FIG. 4



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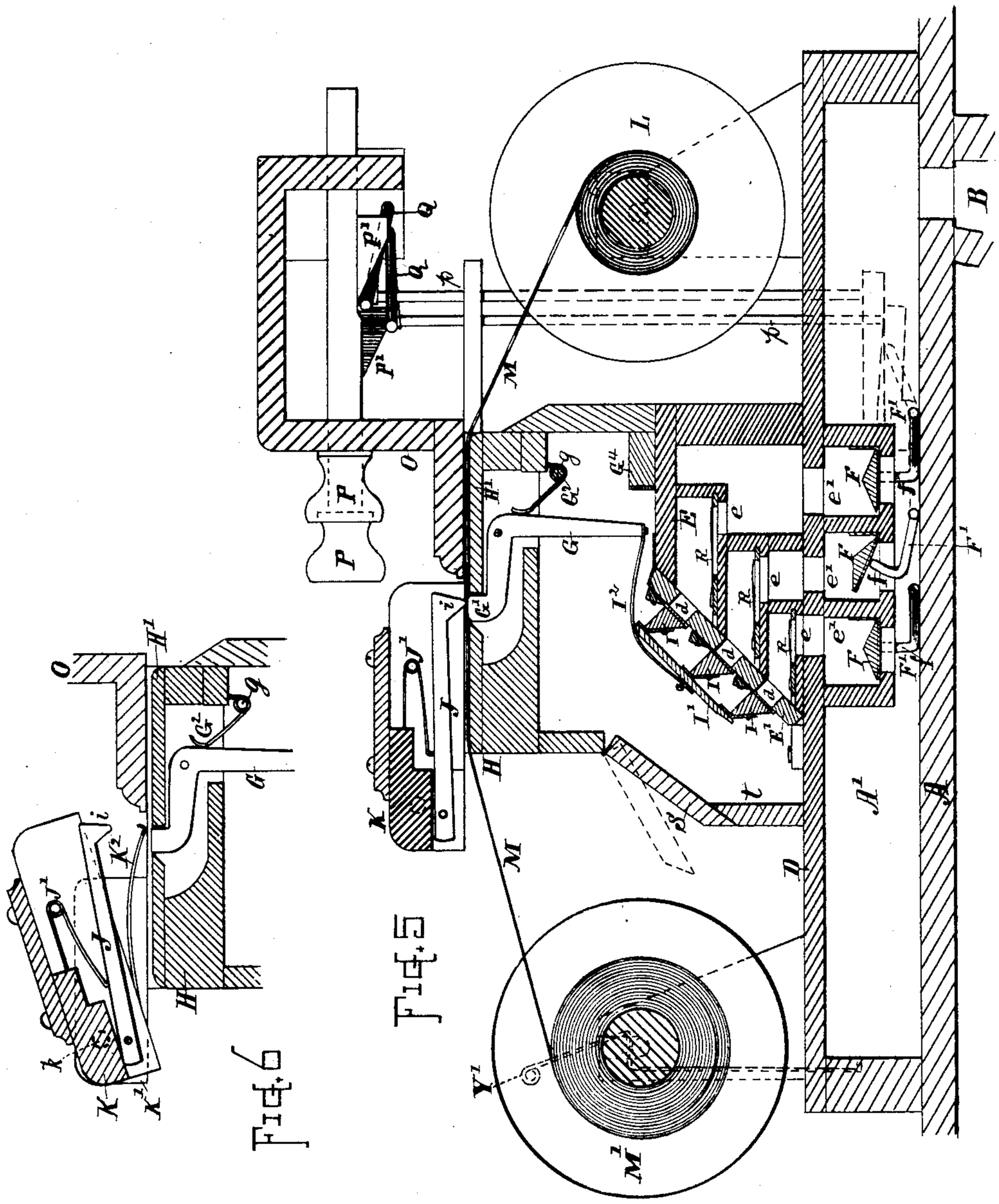

Witnesses

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Frank Stone

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Atty.

UNITED STATES PATENT OFFICE.

FRANK STONE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE MUNROE ORGAN REED COMPANY, OF SAME PLACE.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 326,172, dated September 15, 1885.

Application filed April 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, FRANK STONE, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Musical Instruments; and I declare the following to be a description of my said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The objects of my present invention are, first, to provide an efficient automatically-playing instrument adapted for performing music of extensive range, and for giving variety of expression to the music; second, to afford a convenient means for connecting the music-sheet to the winding spool or roller, and obviate the necessity of threading it through the raceway or inserting its ends beneath the finger-rail; third, to provide a simple and convenient operating mechanism for winding and rewinding the music-sheet as desired; fourth, to perfect, locate, and adjust the several parts of the mechanism in such manner and form as will make a neat, serviceable, convenient, and desirable instrument adapted for cabinet-cases and for household or other purposes where a strong full-toned instrument is required. These objects I attain by mechanism constructed and organized for operation substantially as illustrated in the drawings and hereinafter described, the particular subject-matter claimed being definitely specified.

In the drawings, Figure 1 is a plan view of my improved instrument without the case. Fig. 2 is a bottom view of the sounding-board and stop-action devices. Fig. 3 is a vertical section through the case, showing an end view of the action mechanism. Fig. 4 is a sectional plan on larger scale, showing one end of the action mechanism, the upper portions being shown as broken away to reveal parts beneath. Fig. 5 is a transverse vertical section through the action mechanism. Fig. 6 is a similar section of the race and finger-rail, showing the latter as in elevated position. Fig. 7 illustrates the manner of connecting the music-spool to its driving-gear.

In the reference to parts of the drawings, A denotes the action-bed or support-piece, which serves as a foundation for the various parts of the mechanism.

B indicates the bellows apparatus, connected with said action-bed and located within the lower part of the case C, in a manner similar to an ordinary reed-organ bellows, the exhausters B′ being connected to foot-pedals B^2, and the bellows operated for exhausting the air from the wind-chamber A′ by the depression of said pedals in the usual manner.

D indicates the sounding-board, forming the top of wind-chamber A′, and supporting the tube-board E, which latter is constructed with a series of reed-sets arranged in overlying offset courses, with their downward-extending air-passages *e*, communicating with auxiliary chambers *e′*, in which are located mutes or valves, F, for isolating or stopping off the several sets of reeds as desired. The front of the tube-board is made with an inclined face, the mouths or inlets being covered by a seat-piece, E′, having air-ducts *d* formed through it and covering the whole front of the tube-board, as shown. Tip-up or rolling valves I are arranged for closing the air-ducts *d*. Said valves I are independently hinged to the seat-piece and connected in series of two, three, or more to operating-bars I′, and said bars are in turn connected by flexible straps I^2 to the angle-levers G, located beneath the raceway over which the music-sheet is made to travel.

The tube-board E, reeds R, and valve devices I and F are constructed and arranged substantially as described and claimed in my application for separate Letters Patent of even date herewith, No. 56,996.

H indicates the table or race over which the perforated music-sheet M passes as it is drawn from the spool M′ to the winding-roll L. The race-bar H is formed of several pieces joined and arranged in the manner indicated. It has an open central space for the play of the levers G, and the top portion H′ is removable to allow access to the levers G. Wing-pieces H^2

extend from the ends of the raceway H to the sides of the case to fill the space and form a neat finish. The actuating-levers G have their fulcrum or pivot support on the race-bar H, and said levers are located at intervals along the width of the race corresponding with the lateral location of the valves I or the reed-tubes. The forward arms of said levers G are provided with heads G′ that extend upward through proper openings in the raceway and stand with their faces flush, or nearly so, with the top surface of the race-bar or in contact with the under side of the music-sheet. Springs G^2 are provided for retaining said levers with their ends G′ in elevated position. Said springs are in the present instance formed of wire, and are secured to a strip attached along the back of the race-bar H, with their ends arranged to press on the levers at a position just below the fulcrum-bearings, so as to give a quick sensitive action. A rod, *g*, extends through the coils of the several springs for supporting and retaining them in proper relative position. A buffer-bar, G^4, is fixed in rear of the lower ends of the levers G, having a suitable felt or cushioned surface against which said levers are stopped when the valves are opened and the movement of the valves, levers, and fingers thereby limited as required.

Immediately above the raceway and extending across the forward part of the instrument is a finger-bar, K, supporting a series of levers or fingers, J, corresponding in number with the levers G, and having their forward ends pivoted within said bar K in the manner shown. The fingers J have downward projecting rear ends, *i*, properly formed to run into and out of the openings of the music-sheet M, said points being in positions to engage with the heads G′ of the valve-actuating levers G when depression of the finger occurs. Springs J′, arranged above the fingers J in the manner indicated, serve to press the ends *i* of said fingers J against the surfaces of the music-sheet, and to respectively depress the levers G and actuate the valves connected therewith whenever a perforation or opening of the music-sheet M is brought beneath the end of the finger, so as to permit of its passing through and effecting action.

The finger-bar K is pivoted at its ends to suitable brackets or projections, K′, fixed on the side pieces of the raceway H, the pivot, studs *k* being near the forward edge of said bar to permit of its rear edge swinging upward in the manner illustrated in Fig. 6, in order to raise the working ends *i* of the fingers J clear from the paper when rewinding the music-sheet M. Flat springs K^2 are arranged beneath the ends of the bar K for retaining it elevated, and it is held down when in horizontal position by suitable catches *l* or equivalent locking devices.

My present instrument is made with a scale of thirty-two levers and series of valves, and the tube-board E has three sets of thirty-two reeds, each making a total of ninety-six reeds, as herein shown. The number of reeds may, however, be indefinitely increased by adding other courses of tubes and reeds to the tube-board in the order shown, and more valves I, in connection with the actuating-bars I′, this, too, without materially increasing the strain and wear of the parts or the pressure of the fingers upon the paper of the music-sheets.

Over the rear part of the race is arranged a suitable brace-board, O, and frame containing the stop-pulls P, provided with inclines P′, for operating the rocker-wires Q, which extend to the ends of the action, where they engage the pitmen *p p*, which in turn actuate the levers P^2 P^2, for transmitting movement to the lower rocker-wires, F′. These latter wires extend into the wind-chamber, and are provided with upward-turned ends *f*, that press against the faces of the mute valves F when the stops P are drawn out, and thereby raise the valves from their seats, thereby permitting the different sets of reeds R to sound according as the respective stops P are drawn. The tube-board is inclosed within a suitable compartment, of which the race-bar H forms the top, and at the front side thereof is arranged a hinged strip or swell, S, that is connected for action with the knee-lever S′ by the wire links and rods S^2 S^3, so arranged that the swell can be opened by knee-pressure when required.

The movable valve-seat piece E′ is hinged to open or swing upward from the face of the tube-board E, and the swell-piece S opens at a position in front of the same, with the removable strip *t* beneath it, so that by raising both the swell and the valve-seat piece and removing the strip *t* and music-spool M′ convenient access may be had to any reed in the entire sets of reeds R from the front of the instrument without derangement of any other of its parts, thus permitting the ready withdrawal and return of any reed that may become clogged with dust or from any cause fail to properly sound.

The winding spool or roll L is supported in suitable bearings at the back of the instrument, and said roll is provided with a thin flexible apron or connecting-piece, T, (see Fig. 1,) preferably of triangular shape, of suitable length when unwound from the roll to reach to the front of the raceway and finger-bar, and provided at its extremity with a flattened hook or stud, V, adapted to lock into an opening, *m*, in the end of the music-sheet M, and thus establish connection between the spools M′ and L without the trouble or inconvenience of threading or inserting the end of the music-sheet through the raceway beneath the fingers J and brace O every time the music is changed.

The rear edge of the apron or connecting-piece T is permanently attached to the spool L by any suitable means, and its form is such as to draw the music-sheet squarely through the race and onto the winding-spool when said spool is revolved. Said apron may be made of cloth, leather, rubber cloth, or other light

flexible fabric, and can, if desired, be shaped to suit the fancy or the requirements of any particular instrument.

The end of the music-sheet may be provided with a re-enforce and metal eyelet or ring at the opening *m* for the hook V.

The shaft of spool L is fitted with a beveled gear, L′, and in one of the bearings of the music-spool is mounted a socket-stud, *m′*, carrying a beveled pinion, M^2. This gear L′ and pinion M^2 are respectively operated by means of the pinion W′ and gear W^2, fixed on the crank-shaft W, which is arranged in horizontal position across the end of the instrument and mounted in bearings on a swinging support or frame, W^3, pivoted in such manner that the shaft can be swung back and forth for meshing and unmeshing the respective gears and pinions for effecting the operation of either the music-spool M′ or the winding-spool L. Fig. 4 shows the shaft W in position for operating the winding-spool, as when playing the instrument, and Fig. 1 shows it in position for working the spool M′, or for rewinding the music-sheet.

A suitable catch or locking device may be attached to the case or action-frame for retaining the shaft at either position of adjustment.

The shaft W is provided with a hand-crank, X, by means of which the mechanism can be operated.

The axle-stud or journal at the right-hand end of the music-spool is made with a reduced end, *r*, to fit into the socket-stud *m′* of the driving-gear M^2, (see Fig. 7,) where it is held from turning by a lug, *n*, and recess *n′*, so that the spool will be turned by the rotation of the gear-pinion M^2. The opposite journal of the spool is supported in the bearing Y, which is provided with a spring-latch, Y′, that passes over the journal to hold it down to place, and with a guard, Y^2, for supporting the longitudinal thrust and retaining the opposite end in the socket *m′*. When inserting and removing the spools M′ the guard Y^2 is drawn back, allowing sufficient motion of the spool endwise to clear the reduced end *r* of axle-journal from the hollow stud *m′* of the gear M^2.

In the operation of my improved instrument the operator sits in front of the case, places his feet on pedals B^2 for actuating the bellows, with the right hand operates the crank X, and with the left hand manipulates the stops P, as required. The music-spool is placed in its bearings Y, and the end of the sheet M hooked onto the flexible apron T. The shaft W is adjusted so that the pinion W′ and gear L′ intermesh with each other. Then by turning the crank the winding roll or spool L is operated to draw the music-sheet over the raceway H, and as the perforations or openings pass beneath the ends of the fingers J said fingers are forced down by their springs J′ onto the heads G′ of the levers G, which latter are thereby actuated to open the valves I and admit air to the reeds R in accordance with the "cut" or perforation of the music-sheet. One or more of the sets of reeds can be made to act at a time, according as the stops are drawn for opening the mutes F, and these sets can be changed as desired while the instrument is in operation without affecting the operation of the valve mechanism. When the music-sheet is run through and wound onto the roll L, the shaft W is adjusted to intermesh the gear W^2 with the pinion M^2, and the catches *l* are released to raise the finger-bar K and fingers J clear of the paper. Then by turning the crank the motion is imparted to the spool M′ in reverse direction, and the music-sheet is rapidly rewound upon said spool M′. At the finish of the rewinding operation the end of the flexible apron or connecting-band T follows through to the front, where it is in position to be detached from the present music-sheet and attached to another, the spools M′ being interchanged for the various pieces as necessary.

The flexible apron T, attached to the winding-roll and adapted to pass through the race for attachment to the music-sheet in a convenient manner at the front of the finger-bar or action mechanism, may be employed in mechanical musical instruments of other construction from that herein shown with beneficial results.

I am aware that fingers working through the openings of the perforated music-sheet and engaging with devices arranged at the opposite side of the sheet have heretofore been employed in musical instruments for actuating a valve mechanism, and I do not therefore herein make claim, broadly, to such feature.

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

1. In a mechanical musical instrument, the combination, with the winding spool or roll, of a flexible apron or connecting-strip permanently attached thereto and adapted to extend through the raceway to a convenient position for attachment to the music-sheet at the front of the instrument, substantially as hereinbefore set forth.

2. The combination, with the music-race H, of the finger-rail K, for supporting the fingers J, and springs J′, pivoted or hinged, as at *k*, for swinging action, and provided with springs K^2, for elevating its fingers from the music-sheet, for the purpose set forth.

3. The combination of the series of tipping-valves I, connected to the bar I′, the flexible strap I^2, the angle-levers G, and the fingers J, provided with actuating-springs J′, arranged for action in connection with the music-sheet substantially as and for the purposes set forth.

4. In a mechanical musical instrument, the combination, as shown and described, of the race-bar H, containing the angle-levers G, with exposed heads G′, the finger-rail K, supported above the race and containing the actuating-springs J′, and vibrating fingers J, with triangular heads *i*, for engaging said angle-levers,

and the stop or cushion-rail G^4 at the back of said levers, said parts being organized and arranged for operation in connection with a traveling perforated sheet substantially as set forth.

5. The combination, with the music-race H, the tube-board E with reeds R, and the removable valve-seat piece E′, of the hinged swell S and removable strip *t*, beneath said swell, whereby ready access to the reeds is obtained from the front of the instrument, as shown and described.

6. In a mechanical musical instrument, the combination of the tube-board E, having reeds R, arranged as shown, the subjacent chambers *e′* with mute valves F, the rocker-wires F′, levers P^2, pitmen *p*, rockers Q, and pulls P with the music-sheet, winding spools, and valve operating mechanism, substantially as herein shown and described.

7. The combination, with the music-sheet M, its spool M′, and its supporting-bearings Y, of the gear-pinion M^2, mounted on a socketed stud, *m′*. the spool-journal *r*, fitted and locked thereto by lug *n* and recess *n′*, and the adjustable guard-piece Y^2 and spring-latch Y′, for the purposes set forth.

Witness my hand this 25th day of March, A. D. 1882.

FRANK STONE.

Witnesses:
CHAS. H. BURLEIGH,
GEO. M. RICE.