

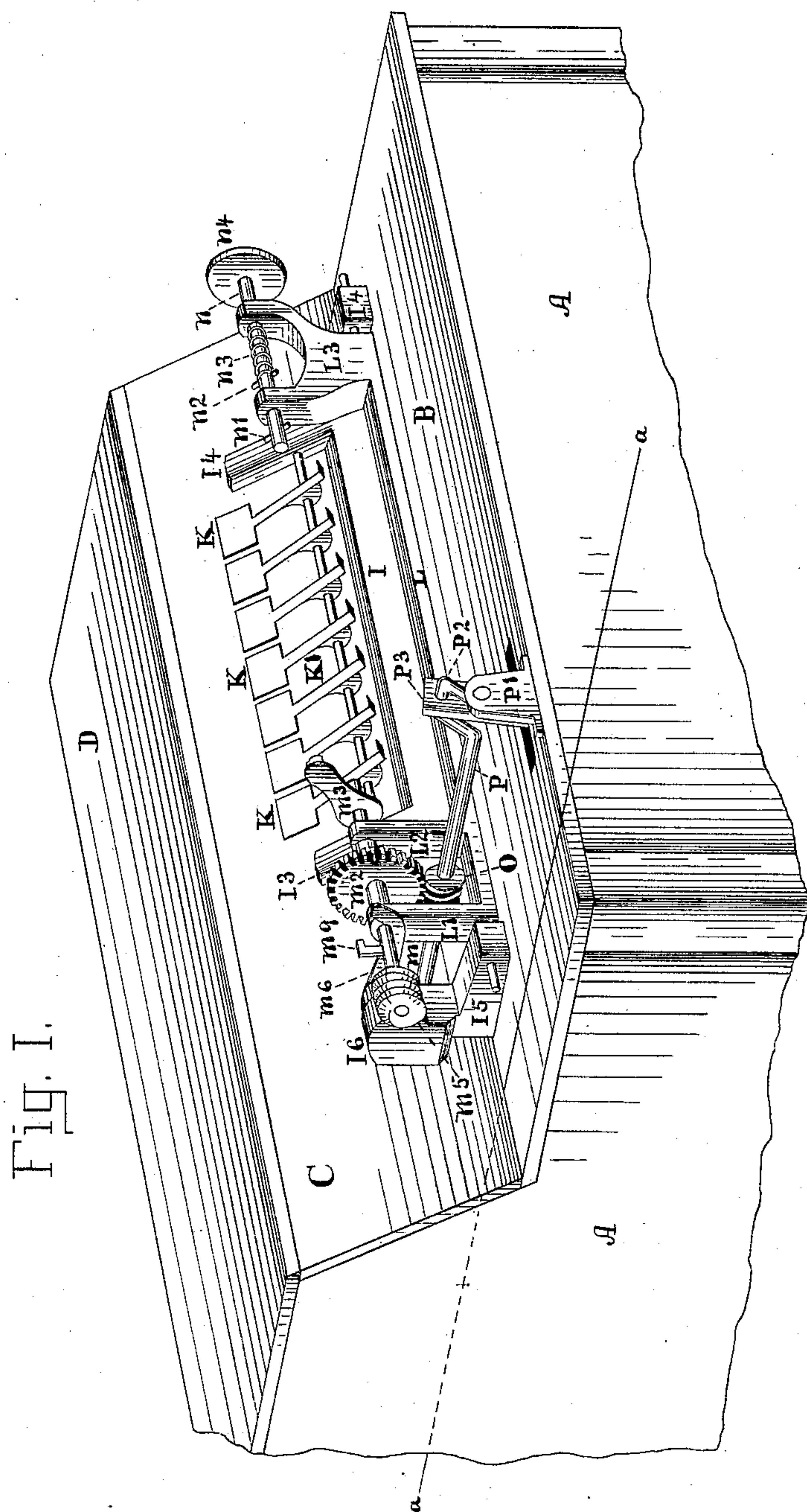
(No Model.)

3 Sheets—Sheet 1.

H. B. MORRIS, S. R. TISDEL & F. LABAR.
MECHANICAL MUSICAL INSTRUMENT.

No. 363,841.

Patented May 31, 1887.



WITNESSES
W. D. Clinton.
W. D. Hurlbut.

INVENTORS
Henry B. Morris
Samuel R. Tisdell
Fred. Labar

(No Model.)

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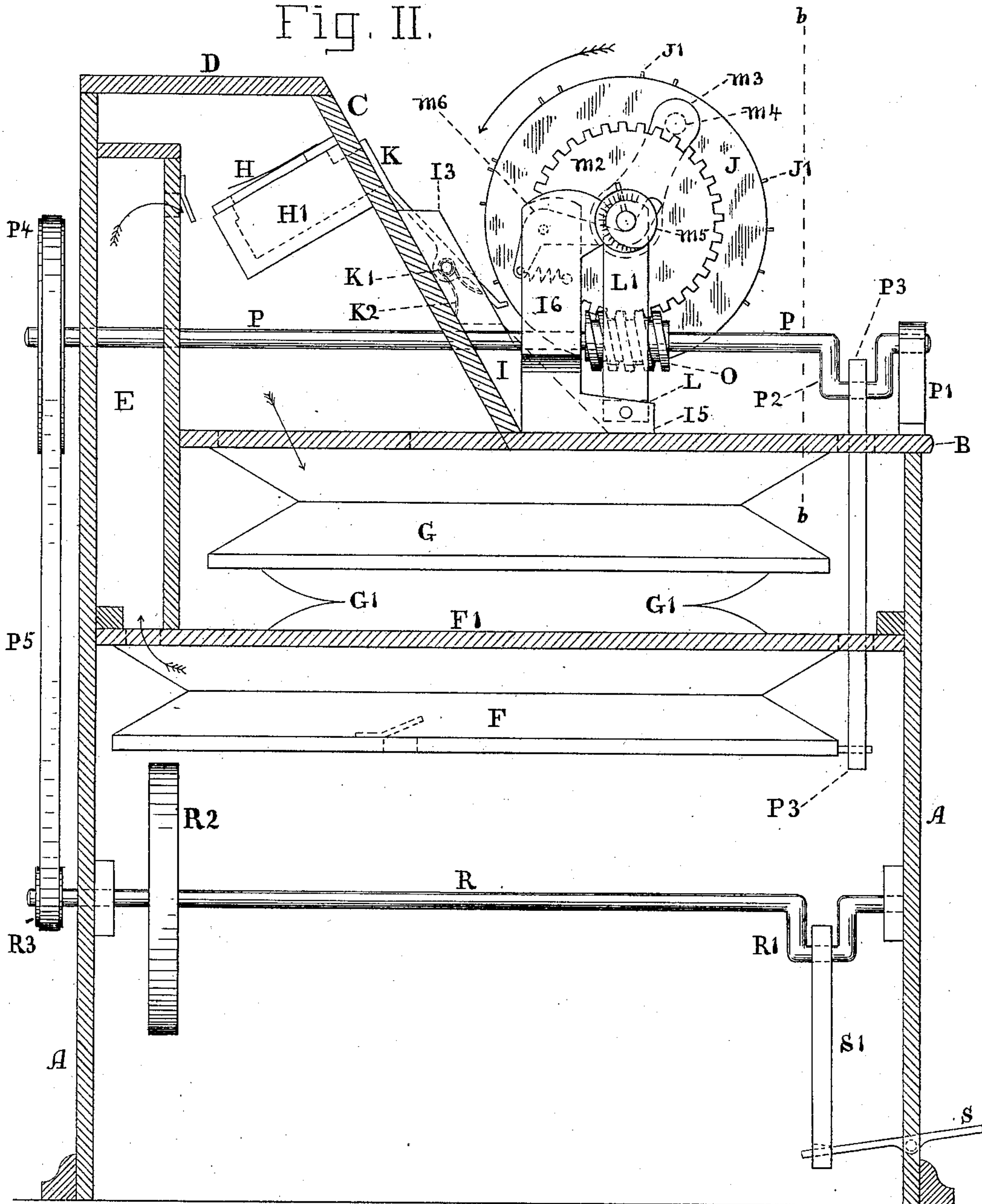
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Fig. II.



WITNESSES

W. D. Clinton.
H. D. Harbut.

INVENTORS

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Fred. Labar.

(No Model.)

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Fig. III.

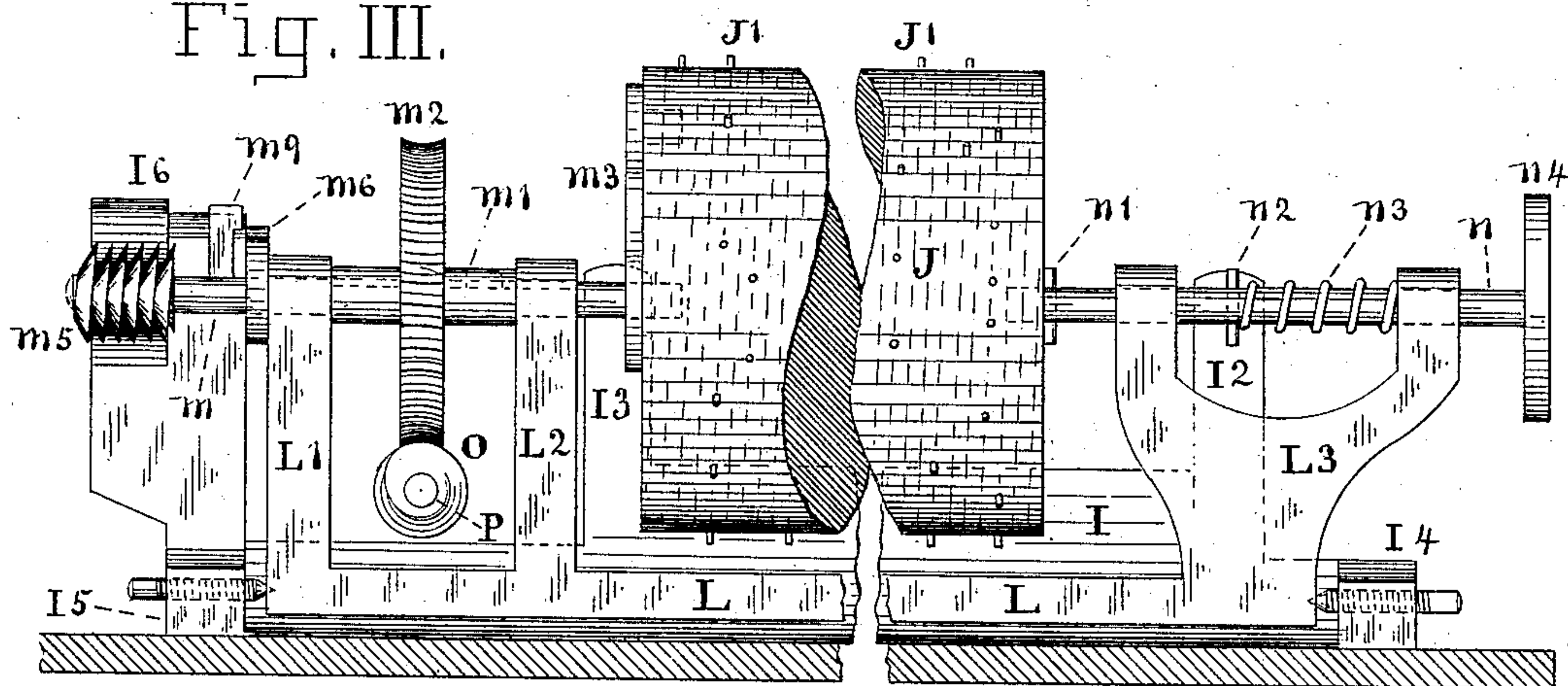


Fig. IV.

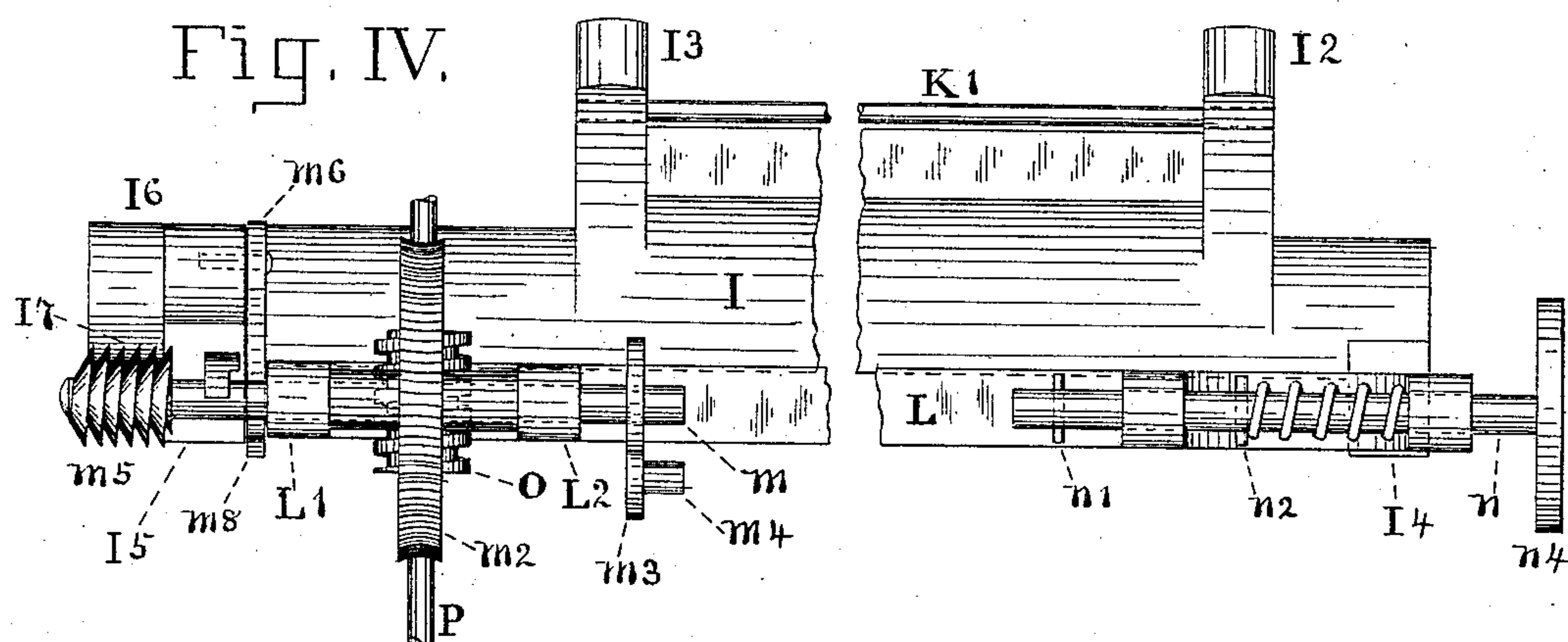
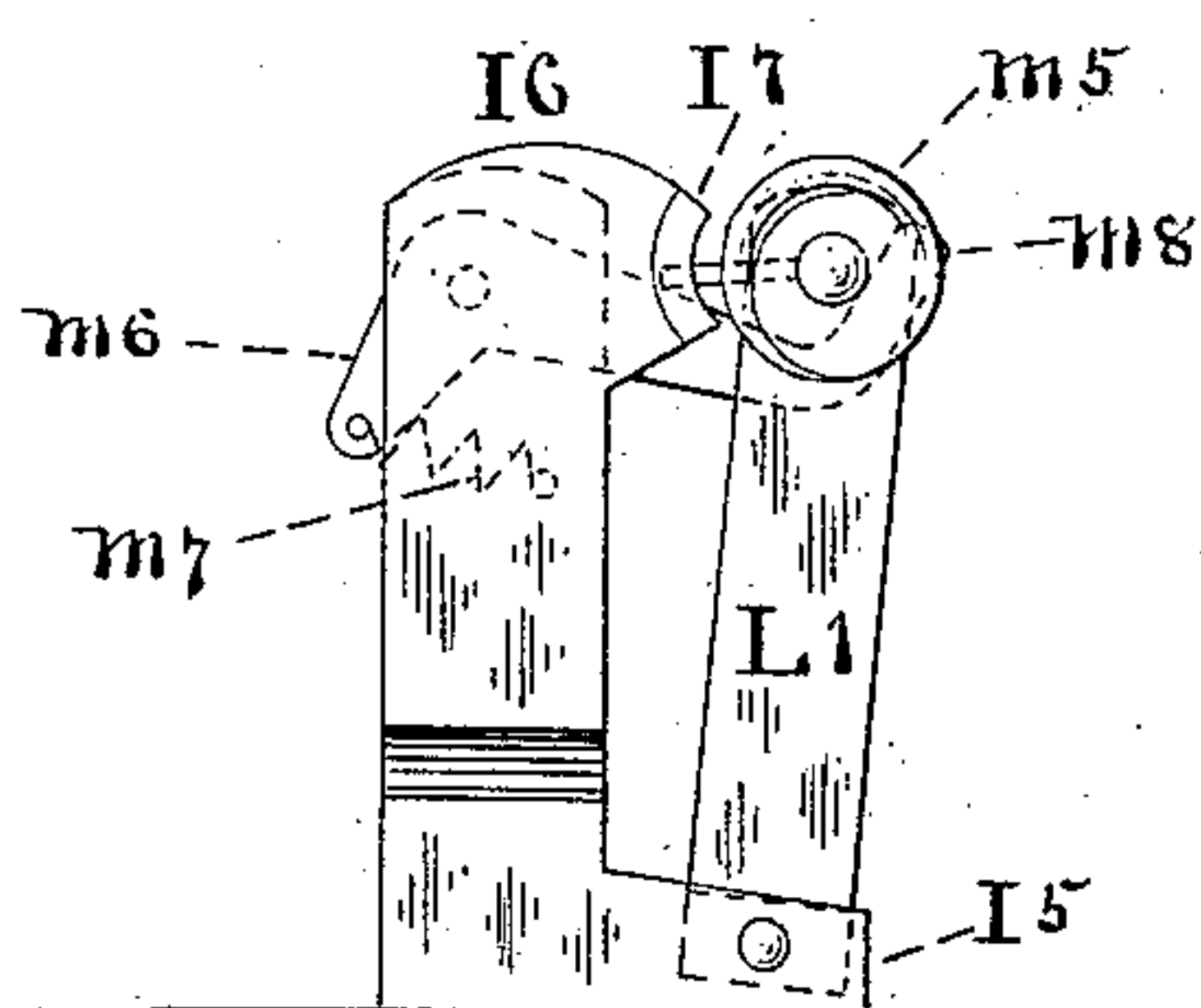


Fig. V.



WITNESSES

W. D. Clinton.
H. D. Hurlbut.

INVENTORS

Henry B. Morris
Samuel R. Tisdell
Fred. Labar

UNITED STATES PATENT OFFICE.

HENRY B. MORRIS, SAMUEL R. TISDEL, AND FRED. LABAR, OF ITHACA, NEW YORK, ASSIGNORS TO THE AUTOPHONE COMPANY, OF SAME PLACE.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 363,841, dated May 31, 1887.

Application filed September 21, 1886. Serial No. 214,152. (No model.)

To all whom it may concern:

Be it known that we, HENRY B. MORRIS, SAMUEL R. TISDEL, and FRED. LABAR, all citizens of the United States, residing at Ithaca, Tompkins county, in the State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to construct and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to that class of mechanical musical instruments in which the music is produced by projections upon the surface of a slowly-turning cylinder, which projections, in revolving, actuate, in the case of wind-instruments, the keys or valves controlling the passage of air through the reeds or pipes, and in musical boxes the sonorous tongues.

The object of our invention is to provide means for causing such an instrument to repeat its music without readjustment by the operator and also to enable it to be played with the feet by means of a pedal. The first-named object is effected by the employment of a music-cylinder upon which the projections are spirally arranged, the cylinder being made to move spirally as the tune is played by means of a male screw, which screw is afterward released from engagement with its corresponding female, and then acts as a cam to force the cylinder away from the music-keys during its return to the place of beginning. The performer is enabled to play the instrument with the feet by means of a treadle and balance-wheel connected through the medium of a revolving shaft with a worm and worm-wheel by which the cylinder is revolved.

Referring to the drawings, Figure I is a general view of the upper part of our improved instrument, the music-cylinder being removed, the better to exhibit the working parts. Fig. II is a sectional side elevation of the whole instrument, the section being taken upon the dotted line *a a*, Fig. I. Fig. III is a front elevation, partly in section, of the mechanism for operating the music-cylinder, the section being taken on the dotted line *b b*, Fig. II.

Fig. IV is a plan of the same parts of the instrument, the music-cylinder being removed; and Fig. V is a detail in side elevation, showing the position of the male screw during the return of the music-cylinder.

The various working-parts of the instrument are mounted in and upon a case, A, whose horizontal section is rectangular. The top of said case is partly covered by the horizontal board B, which we call the "action-board." The remaining portion of the top of the case is covered by the key-board C, which is inclined at an angle of about thirty degrees from a vertical plane, and by the horizontal top board, D. The ends of the case are made to conform in shape to the position of the boards B, C, and D.

Within the case, at the back side thereof, is situated a wind-trunk, E, by which the wind is conveyed from the pumping-bellows F to the receiving-bellows G. Said receiving-bellows is attached partly to the under side of the action-board B and partly to cleats fixed upon the inside of the case. The receiving-bellows expands downwardly, the pressure of air being regulated by springs G'. The pumping-bellows F is attached to the lower side of the stationary horizontal board F'. The music-reeds H are mounted in a reed-board, H', attached to the rear side of the key-board C, which is pierced with holes corresponding with the chambers in the reed-board.

We will now describe the mechanism immediately connected with the music-cylinder. To the action-board B and key-board C is rigidly attached a piece of metal, I, to be known as the "key-frame." The middle portion of said key-frame is straight, its lower sides conforming to the boards B and C. Two arms, I² I³, are formed upon the key-frame at a convenient distance apart, projecting upwardly at the same angle as the key-board C, upon which said arms rest. The key-frame I is bent horizontally at its ends at right angles, thus forming two horizontal arms, I⁴ I⁵, which arms rest upon the action-board B. Upon the horizontal arm I⁵ is formed a projection, I⁶, which extends upwardly, and will be further described.

K K are the music-keys, formed of metal. The upper portion of each key is arranged to cover a corresponding reed-hole in the key-

board, and the opposite ends of the keys are formed into narrow tongues, bent upwardly, so as to be acted upon by the projections upon the music-cylinder. The keys are pivoted 5 near their centers upon a straight rod, K', whose ends are supported by passing through holes in the arms L² L³ of the key-frame. Said keys are kept normally closed by means of springs K².

10 The music-cylinder J is supported upon a part of the instrument which we call the "cylinder-frame." Said cylinder-frame consists of a straight bar of metal, L, upon which are formed, at or near one end, two similar parallel 15 upright projections, L' L². At the opposite end of said bar is formed an upright bifurcated projection, L³. The cylinder-frame is pivoted horizontally at the ends of the bar L, between the arms L⁴ and L⁵ of the key-frame, so that 20 said cylinder-frame may be oscillated upon its pivotal bearings.

M is a shaft journaled horizontally in the upper part of the projections L' L² of the cylinder-frame. Between said parts L' and L² a 25 sleeve, M', is mounted upon the shaft M, said sleeve being provided with a feather, which engages with a longitudinal groove in said shaft, so that the sleeve will revolve with the shaft, at the same time leaving the shaft free 30 to move longitudinally to and fro through the sleeve and through its bearings in L' and L². A worm-wheel, M², is rigidly attached to sleeve M'. A driving-arm, M³, is rigidly attached to the shaft M, near the end of said shaft adjoining 35 the bearing in L². Said driving-arm is provided with a short projecting pin, M⁴, parallel with shaft M.

In the two upper parts of the bifurcated projection L³ of the cylinder-frame is journaled 40 a shaft, N, opposite to and in line with the shaft M just described. Said shaft N is provided with two short pins, N' N², which pass through it, projecting at each side, the pin N' being placed near the inner end of the shaft and N² 45 between the bearings. A coiled spring, N³, encircles the shaft, pressing against pin N² and the outer bearing-piece, so as to force the shaft N longitudinally toward the shaft M. A disk, N⁴, or other equivalent device, is attached to 50 the outer end of shaft N, whereby it may be pulled backward against the pressure of the spring N³.

The music-cylinder J is pierced with two central holes in its ends and a single eccentric 55 hole in one end corresponding with the eccentric position of the pin M⁴. When a cylinder is to be placed in the instrument, the shaft N is retracted and the holes in one end of the cylinder placed upon the pin M⁴ and 60 the projecting end of the shaft M. Then the shaft N, being released, enters the central hole in the end of the cylinder adjoining it, pressing said cylinder through the medium of the pin N', toward the shaft M.

65 From the above description it is plain that the music-cylinder, supported upon the shafts M and N, can be readily moved laterally to-

ward and from the keys K by the oscillation of the cylinder-frame upon its pivots. Said cylinder and said shafts can be revolved and can 70 also move longitudinally for a short distance.

Upon the outer end of the shaft M is rigidly mounted a left-hand ratchet-thread male screw, M⁵, which engages with a corresponding mutilated female screw, L¹, formed upon the up- 75 per portion of the projecting standard L⁶ of the key-frame. Said male and female screws are so arranged that when the male screw M⁵ is brought into engagement with the female by oscillating the cylinder-frame the music-cyl- 80 nder shall be at the proper distance from the keys for playing upon them. The music-cylinder is retained in this position while a tune is being played by means of a hook, M⁶, formed of a flat piece of metal pivoted at its rear end 85 to the upper part of the projection L⁶ and arranged to oscillate vertically below the shaft M. Said hook is caused to press upwardly by means of a coiled spring, M⁷, attached to the hook and to the standard L⁶. The inner curved 90 portion of the hook M⁶ is fitted to the shaft M, which it normally embraces. When said hook is depressed, said shaft is released from it, and the cylinder-frame may then be oscillated, as above described. The outer extremity, 95 M⁸, of the hook is prolonged upwardly, preferably at an angle of about thirty degrees from a vertical line, so that when said hook has been depressed and shaft M released the hook shall draw itself by its upward pressure into gear 100 again with said shaft M, the inclined prolonged portion M⁸ of said hook operating to draw shaft M back to its normal position. M⁹ is a pin rigidly attached to the shaft M, and projecting radially therefrom. The outer portion 105 of said pin is bent at a right angle, the bent portion being parallel with shaft M. Said pin M⁹ is employed to depress the hook M⁶ at the proper time, as will be hereinafter described.

A rotary motion is imparted to the shaft M 110 by means of a worm, O, fixed upon the horizontal revolving shaft P, said worm engaging with the worm-wheel M². Said shaft P is disposed perpendicularly to the shaft M, and is journaled in a standard, P', mounted upon the 115 action-board B. A crank, P², is formed in shaft P, whereby the pumping-bellows F is operated through the medium of the connecting-rod P³.

The shaft P passes through the wind-chest 120 of the instrument, being suitably packed to prevent the escape of air, and is prolonged beyond the rear side of the case, in which it is journaled. Said shaft is actuated by a pulley, P⁴, attached thereto at the back side of the 125 case, and driven, through the medium of a band, P⁵, by a pulley, R³, attached to a horizontal shaft, R, situated in the lower part of the case of the instrument. Said shaft R is parallel with shaft P, and is actuated by the treadle S 130 through the medium of a connecting-rod, S', and crank R'. A fly-wheel, R², is mounted upon the shaft R to insure continuous rotary motion.

The music-cylinder J is provided with radial projections J' for actuating the keys K, said projections being disposed along the convolutions of a spiral line. The pitch of said spiral is the same as that of the screw M⁵.

When a music-cylinder is placed in the instrument and the working parts are operated, a rotary motion is imparted to the shaft M and music-cylinder by the means above described, said shaft M being embraced by the hook M⁶, so that the music-cylinder is thereby retained at the proper distance from the keys K and the ratchet-screw M⁵ is retained in engagement with its corresponding mutilated female screw I'. The operation of said screw M⁵ results in a spiral movement of the music-cylinder, and since the projections J' upon the surface of said cylinder are arranged upon a spiral line of the same pitch as screw M⁵, said projections J' are kept in proper longitudinal position for operating their appropriate keys. In this way the cylinder may be made to perform any predetermined number of spiral revolutions during the playing of the music arranged upon it, the keys K being separated from one another by a distance equal to the pitch of the screw M⁵ multiplied by the number of revolutions that the cylinder is arranged to make.

When the music-cylinder has completed its last revolution, the bent pin M⁹, having been advanced spirally toward the hook M⁶, strikes the upper side of said hook near its fulcrum, thereby depressing said hook far enough to release the shaft M. The cylinder-frame L is now free to oscillate, and the spring-pressure of the shaft N against the music-cylinder causes said cylinder, and with it the shaft M, to retreat longitudinally to their original position. It is very important that when the music-cylinder retreats the projections J' upon its surface shall not strike the keys K. The music-cylinder is therefore withdrawn laterally out of reach of said keys by the oscillation of the cylinder-frame L. This oscillating movement is effected by the action of the inclined flanks of the threads of the ratchet-screw M⁵ upon the corresponding inclined flanks of the stationary female threads I', said threads in disengaging acting upon one another as cams or inclined planes, to impart a lateral movement to the shaft M and its connections at the beginning of its retreat.

The music-cylinder is prevented from retreating too far by the driving-arm M³ striking the projection L² of the cylinder-frame.

As soon as the retreat of the music-cylinder, above described, has been effected, said cylinder and its connections are immediately returned to their normal position by the upward pressure of the hook M⁶, which, by means of its inclined surface M⁸, gathers the shaft M into re engagement with said hook. In this manner, as will be readily seen, the tune may be repeated and the performance continued as long as desired without any readjustment of the working parts by the operator. When a change

of tune is desired, the music-cylinder is removed and another substituted in its place.

The ratchet-shaped threads of the screw M⁵ have one flank inclined at about the usual angle of V-threads, the opposite flank being like that of a square thread. The object of this construction is to make the threads as deep as possible, thereby causing a greater oscillation of the cylinder-frame than would be the case if threads of equal pitch were used of the ordinary V shape, since the latter would be only one-half the depth of a ratchet-shaped thread of the same inclination and pitch.

In most musical instruments which are played by projections upon a revolving cylinder, said cylinder is made to revolve in a plane, and periodically moved lengthwise by a cam or other equivalent device. This arrangement makes it necessary to leave a blank space upon that portion of the cylinder which adjoins the keys when the lengthwise movement is made. Consequently, it is necessary in such instruments, that the tunes shall be very short, embracing only one turn of the cylinder, because there must be an interruption of the music while the cylinder is moved lengthwise. In instruments played by a spirally-revolving cylinder these frequent interruptions do not occur, since the music is continuous through several revolutions; but in all spirally-playing instruments heretofore made the music-cylinder advances and retreats in the same axial line. It is therefore necessary to move all the keys themselves out of reach of the cylinder during its retreat by levers or other devices requiring special manipulation. It will readily be seen that both the disadvantages above named are overcome by our improved construction, which results in automatically moving the cylinder laterally out of reach of the keys during its retreat.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a mechanical musical instrument, in combination with the music-keys of said instrument, a spirally-revolving music-cylinder, said music-cylinder being arranged to operate said keys during its spiral advance and to be moved laterally away from said keys during its retreat, substantially as and for the purposes set forth.

2. In a mechanical musical instrument, in combination with the oscillating cylinder-frame L, the shafts M N, said shafts being journaled upon said cylinder-frame and arranged to operate substantially as and for the purposes described.

3. In a mechanical musical instrument, in combination with the shaft M, the sleeve M' and worm-wheel M², constructed and arranged to operate substantially as set forth.

4. In a mechanical musical instrument, in combination with the oscillating cylinder-frame L, shaft M, journaled upon said cylinder-frame, sleeve M', and worm-wheel M², the worm

O and shaft P, constructed and arranged to operate substantially as and for the purposes set forth.

5 5. In a mechanical musical instrument, in combination with the shaft M, journaled upon the oscillating cylinder-frame L, the screw M⁵, rigidly attached to said shaft, substantially as described.

10 6. In a mechanical musical instrument, in combination with the shaft M, journaled upon the oscillating cylinder-frame L, and screw M⁵, rigidly attached to said shaft, the stationary mutilated female screw I⁷, said parts being constructed and arranged to operate substantially as and for the purposes set forth.

15 7. In a mechanical musical instrument, the combination, substantially as before set forth, of the oscillating cylinder-frame L, shafts M and N, journaled upon said cylinder-frame, screw M⁵, and mutilated female screw I⁷, with the music-cylinder J, projections J' upon the surface of said music-cylinder, and keys K, said parts being constructed and arranged with reference to each other substantially as and for the purposes described.

25 8. In a mechanical musical instrument, in combination with the oscillating cylinder-frame L, shaft M, journaled upon said cylinder-frame, screw M⁵, and mutilated female screw I⁷, the hook M⁶, constructed and arranged to operate substantially as and for the purposes set forth.

9. In a mechanical musical instrument, in combination with the oscillating cylinder-frame L, shaft M, journaled upon said cylinder-frame, screw M⁵, mutilated female screw I⁷, and hook M⁶, the pin M⁹, rigidly attached to the shaft M, said parts being arranged with reference to each other substantially as and for the purposes described. 35

40 10. In a mechanical musical instrument, in combination with the oscillating cylinder-frame L, shafts M and N, journaled upon said cylinder-frame, spring N³, screw M⁵, mutilated female screw I⁷, and hook M⁶, the music-cylinder J, projections J' upon said music-cylinder, and keys K, said parts being arranged with reference to each other substantially as and for the purposes described. 45

50 11. In a mechanical musical instrument, in combination with the music-cylinder J, driver-arm M³, shaft M, worm-wheel M², worm O, and shaft P, the shaft R, fly-wheel R², crank R', connecting-rod S', treadle S, and means, actuated by said shaft R, for imparting motion to said shaft P, substantially as and for the purposes described. 55

HENRY B. MORRIS.
SAMUEL R. TISDEL.
FRED. LABAR.

Witnesses:

W. D. CLINTON,
W. D. HURLBUT.