

(No Model.)

2 Sheets—Sheet 1.

R. W. PAIN.

MECHANICAL MUSICAL INSTRUMENT.

No. 356,599.

Patented Jan. 25, 1887.

Fig. 1.

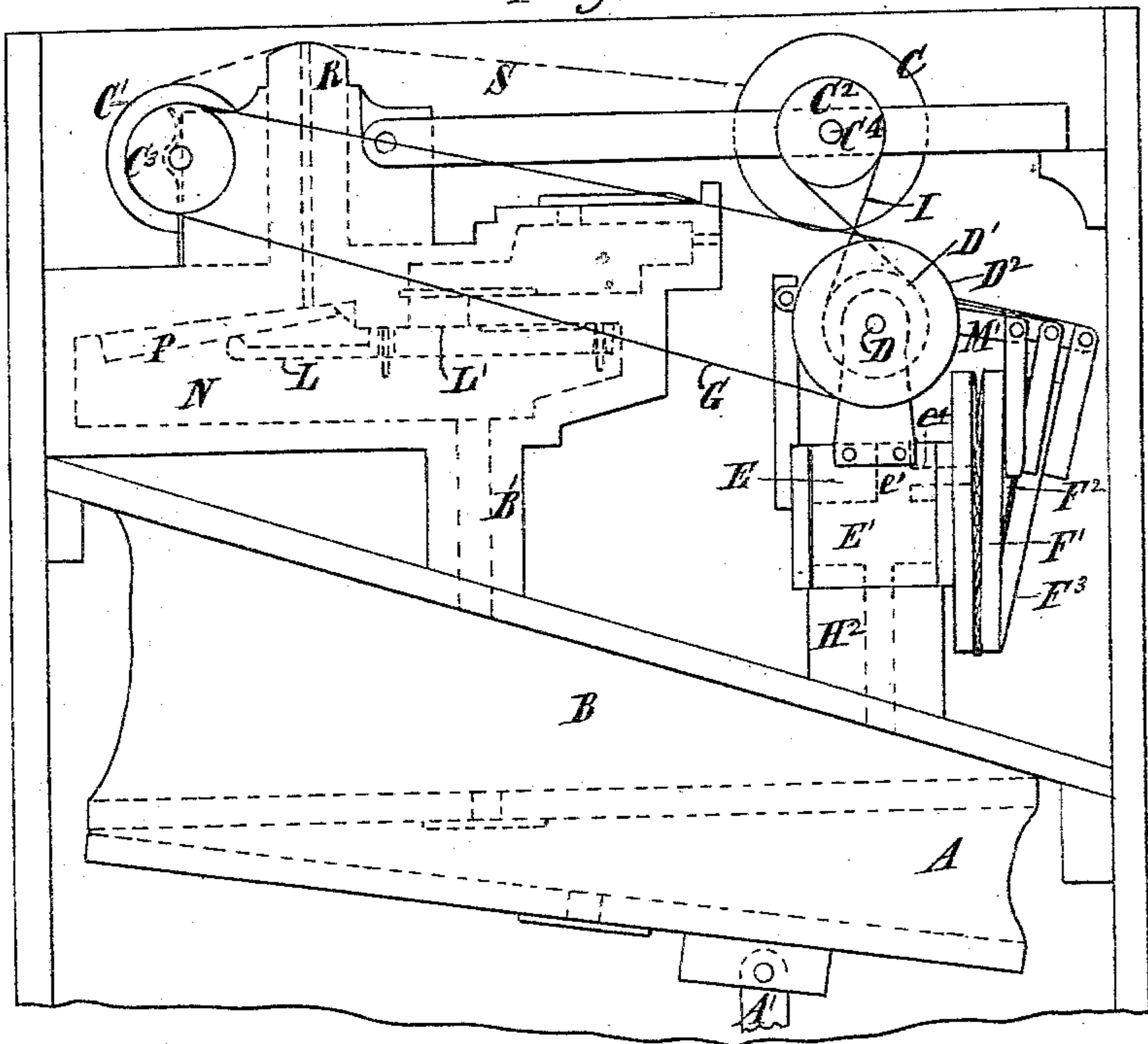
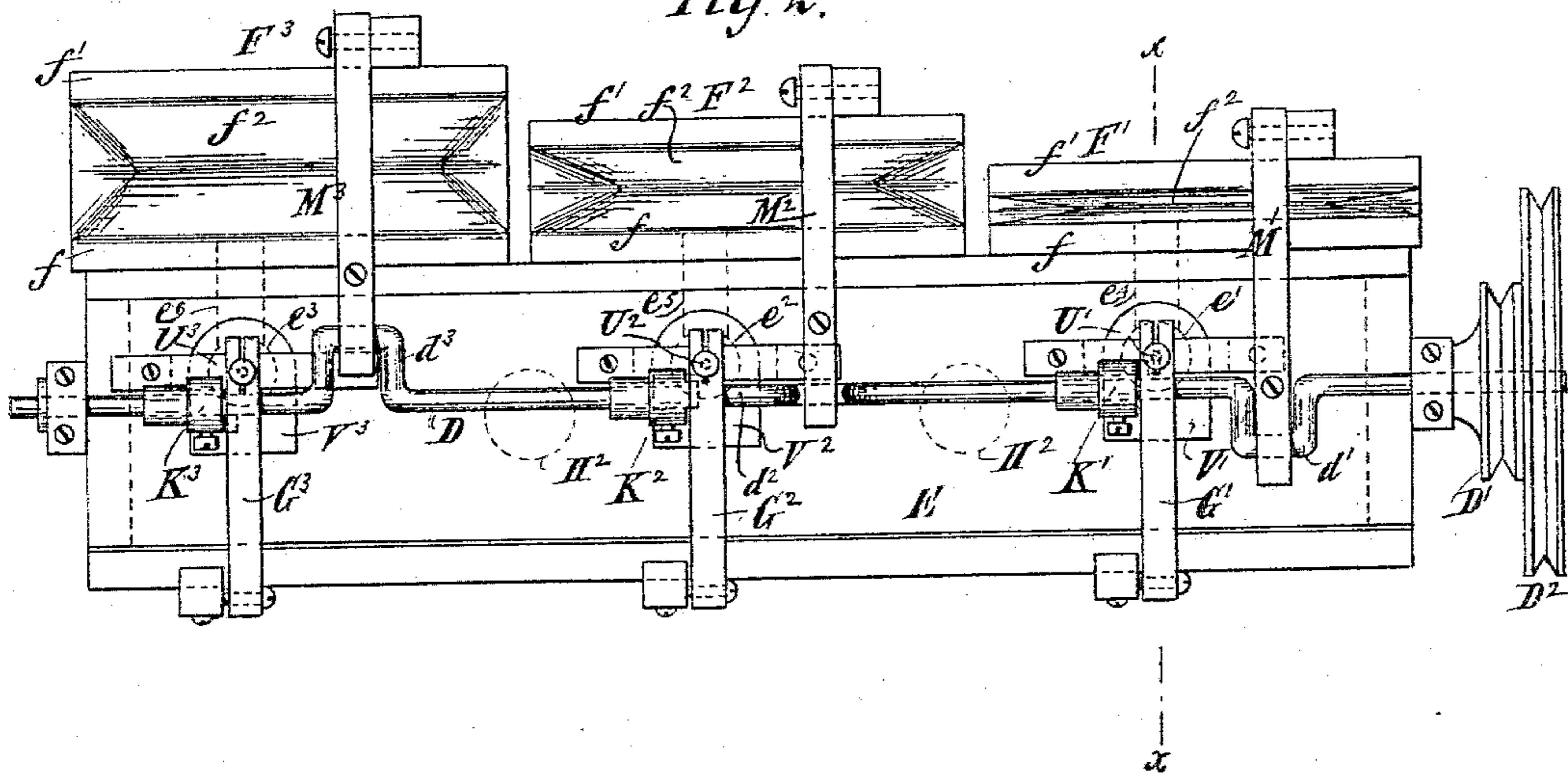


Fig. 2.



Witnesses:
Geo. Wadman
Richard J. body

Inventor
Robert W. Pain,
by his attorneys,
Gifford & Brown.

(No Model.)

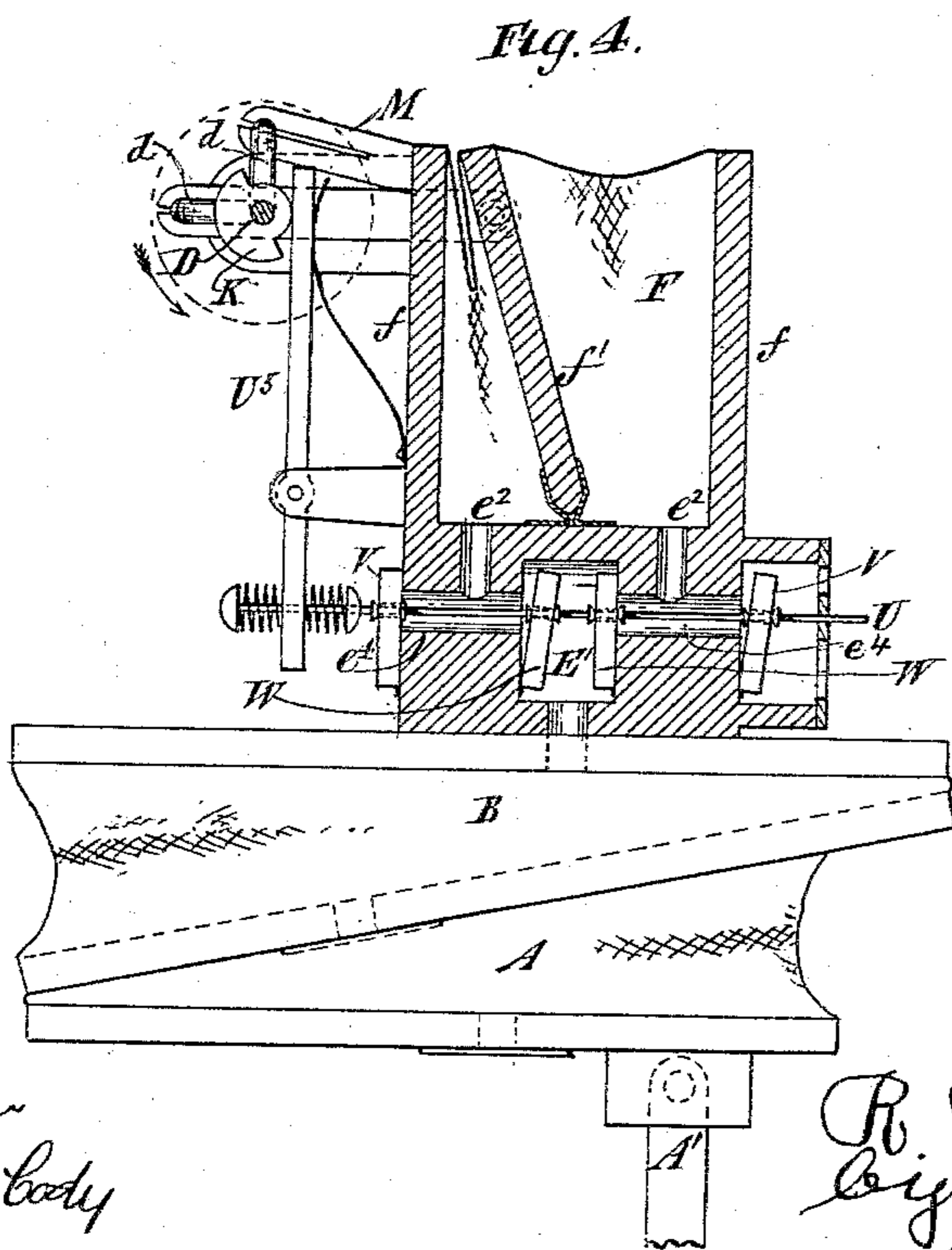
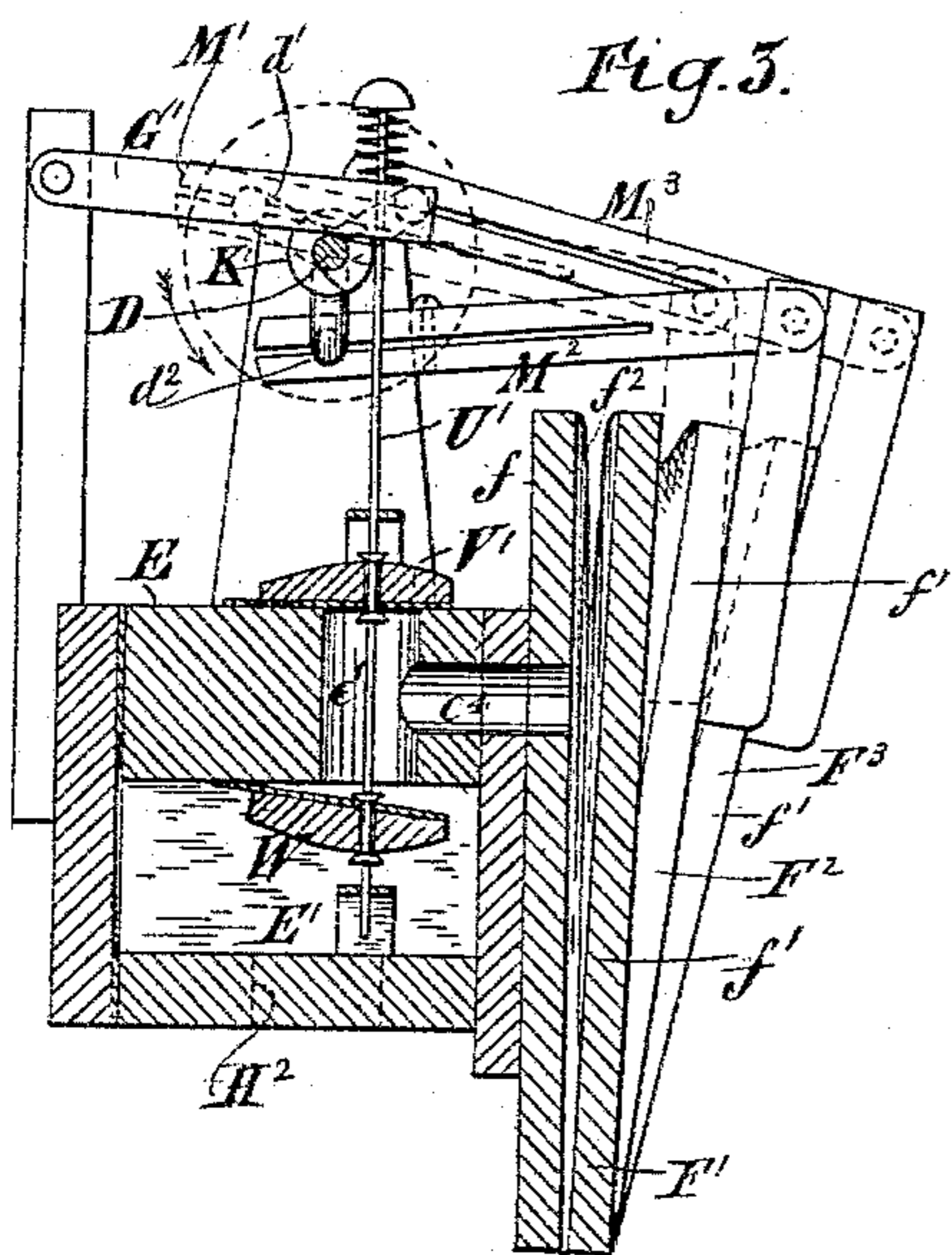
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UNITED STATES PATENT OFFICE.

ROBERT W. PAIN, OF NEW YORK, N. Y., ASSIGNOR TO THE MECHANICAL
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MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 356,599, dated January 25, 1887.

Application filed December 3, 1885. Serial No. 184,583. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. PAIN, of New York, county and State of New York, have invented a new and useful Improvement in Mechanical Musical Instruments, of which the following is a specification.

My improvement relates to musical instruments the playing of which is controlled by traveling music sheets, cards, or tablets which are propelled by motors operated by wind produced through the action of bellows or analogous contrivances.

The object of my improvement is to produce for such an instrument a motor simple in construction, powerful in action, and comparatively noiseless.

I will describe a motor embodying my improvement and such parts of a musical instrument in which it is to be used as may be necessary to a thorough understanding of the motor, and then I will point out the various features of my improvement in claims.

In the accompanying drawings, Figure 1 is a vertical section of a mechanical musical instrument embodying the improvement, certain parts, which are immaterial so far as my improvement is concerned, being omitted. Fig. 2 is a top view of a motor which is comprised in said instrument. Fig. 3 is a transverse vertical section of the motor, taken at the plane of the dotted line *x x*, Fig. 2. Fig. 4 is a transverse vertical section of a motor modified in form.

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

A designates the bellows of the musical instrument. Any suitable number of them may be employed, and they may be of ordinary construction. In the present example of my improvement they are represented as being of the kind known as suction-bellows. They may be operated in any appropriate manner—as, for instance, by means of a treadle connected with them through the agency of a pitman, A'. The bellows communicate with an equalizer, B, which is of similar construction to the bellows. The equalizer communicates by means of a trunk, B', with a wind-chest, N. In this wind-chest are pneumatic motors P, which serve to operate levers L, provided with

valves L', whereby the operation of the sound-producing devices is controlled.

The pneumatic motors P connect with ducts in a rest, R, over which passes a traveling music-sheet, S, which is perforated and controls the passage of air through the ducts to the pneumatic motors, and consequently controls the speaking of the sound-producing devices in order to produce tunes.

The music-sheet is fastened at one end to a roller, C, and at the other end to a roller, C'. It is unrolled from the roller C' to the roller C in order to produce a tune, and afterward it is rolled back from the roller C onto the roller C', it being kept normally wound upon the latter. The roller C' is consequently termed a "music-roller." It is arranged in open bearings, so that it may be taken away and be replaced by another. The roller C is usually termed the "take-up" roller.

The sound-producing devices which I have shown consist of reeds which are arranged in cells communicating with the wind-chest under control of the valves L'.

The rollers C C' are operated by the motor to which I have previously referred. This motor has a main shaft, D, on which are fixed pulleys D' D², of different sizes. The pulley D' connects through a crossed belt, I, with a pulley, C², on a shaft, C⁴, that transmits motion to the roller C. The pulley D² receives a belt, G, that is passed around a pulley, C³, on a shaft that engages with the roller C'.

Mechanism is provided whereby the shaft C⁴ may be disengaged temporarily from the roller C, and the shaft C² may be disengaged from the roller C'. This mechanism is to operate so that when either roller is engaged with its shaft the other roller will be disengaged from the shaft which is employed to transmit motion to it. As this mechanism does not form part of my present improvement, I have not illustrated it.

My improvement comprises a number of bellows-like chambers or pneumatics, F' F² F³. I have only shown it in Fig. 2 as having three such chambers; but the number may be increased. These chambers consist of stationary boards *f*, movable boards *f'*, which are adapted to have a swinging motion, like the

movable boards of ordinary bellows, and flexible connections f^2 between the boards, consisting of india-rubber cloth or like material. These chambers, as shown in Fig. 2, are arranged side by side in a line. Their stationary boards are fixed to a block or case, E, that has air-passages e' e^2 e^3 extending vertically through it, and passages e^4 e^5 e^6 extending horizontally from the passages e' e^2 e^3 to holes in the stationary boards f of the chambers F' F^2 F^3 , and thus communicating with the interior of these chambers. The passages e' e^2 e^3 communicate with a trunk, E' , which, as here shown, is arranged immediately below the block E, and communicates, by means of suitable conduits, H^2 , with the equalizer B. The block E has arranged above it valves V' V^2 V^3 and below it valves W. One pair of valves is employed for each of the passages e' e^2 e^3 . The valves V' V^2 V^3 control the communication between the upper ends of the passages e' e^2 e^3 and the atmosphere. The valves W control communication between the lower ends of said passages and the wind-chest. Although I may use any suitable kind of valves, I prefer to make these valves of strips of wood faced with sheep-skin or similar material, and secured in place at one end by hinges consisting of like flexible material. The valves of each pair are connected by rods which pass through the passages e' e^2 e^3 and extend considerably above the block E. The valves V' W are connected by a rod, U' , and the valves V^2 W are connected by a rod, U^2 , and the valves V^3 W are connected by a rod, U^3 .

The shaft D is provided with cranks d' d^2 d^3 , which are set at different angles at about corresponding distances apart circumferentially of the circle in which they revolve. They are connected, by pitmen M' M^2 M^3 , with projections from the movable boards f' of the chambers F' F^2 F^3 . Cams K' K^2 K^3 are fixed to the shaft D. Their operative faces occupy different positions circumferentially of the shaft, in order that they may impart motion to the valves V' V^2 V^3 W, controlling the chambers F' F^2 F^3 at different times.

Levers G' G^2 G^3 , fulcrumed at one end to fixed supports, and connected at the other end to the rods U' U^2 U^3 , extend over the cams K' K^2 K^3 , so as to derive motion from the latter and impart it, through the rods U' U^2 U^3 , to the valves V' V^2 V^3 W.

Whenever a valve V' or V^2 or V^3 is closed upon its seat and the corresponding valve, W, is opened, the chamber F' F^2 F^3 controlled by such pair of valves will be in communication with the equalizer B, and the atmospheric pressure upon its movable board will cause the latter to swing into proximity with the fixed board. The force with which the movable board swings inward is transmitted to the shaft D. When the pair of valves is reversed, the chamber will be put in communication with the atmosphere, and by the rotation of the shaft D the movable board of such chamber will be swung to its outermost po-

sition again. The chambers all operate in this way at different times, so as to successively act upon the shaft D.

Preferably the levers G' G^2 G^3 have not a rigid connection with the rods U' U^2 U^3 , but are slotted to embrace the rods, and have springs interposed between them and heads which are fixed to the rods. Thus any undue strain on the valves will be obviated.

Obviously the motor which I have described could be operated through the agency of force-bellows instead of suction-bellows. Then the pressure of air inside the chambers would force the movable boards of the chambers outward to impart motion to the shaft. No modification of the motor would be necessary for it to operate in conjunction with force-bellows.

In the example of motor previously described each of the collapsible chambers F' , F^2 , or F^3 is single acting. In other words, each chamber exerts power upon the shaft D only while the movable board, and consequently the pitman connecting the movable board with the said shaft, moves in one direction.

In Fig. 4 I have illustrated a modified form of motor which has double-acting chambers F . Any suitable number of these double-acting chambers may be employed. There should, however, be at least two of them. Each chamber has two fixed boards, f , and an intermediate swinging board, f' . This swinging board f' is hinged at the lower edge to the bottom of the chamber. Flexible material f^2 —such, for instance, as india-rubber cloth—is connected with the bottom of the chamber, the fixed boards f thereof, and the swinging board f' . The swinging board is arranged midway between the two fixed boards of the chamber and divides the chamber into two compartments. When it swings in one direction, it collapses or reduces the compartment which is formed between it and the fixed board toward which it moves, and correspondingly expands or enlarges the other compartment. This expanded compartment is reduced or collapsed and the other compartment enlarged when the swinging board moves in the reverse direction. The chamber communicates at each side of the swinging board f' with a port, e^2 , extending from the bottom of the chamber vertically to a horizontal port, e^4 . Both the horizontal ports e^4 lead at the outer ends to the external atmosphere, and at the inner ends to a trunk, E' . Valves W control the communication between the inner ends of the ports e^4 and the trunk E' , and valves V control the communication between the outer ends of the ports e^4 and the external atmosphere. The valves V W are connected by a rod, U, in such relation to each other that when the valve-rod is shifted in one direction one of the compartments of the chamber will be cut off from communication with the trunk E' and put into communication with the external atmosphere, and the other compartment will be put into

communication with the trunk E' and cut off from the communication with the external atmosphere. The trunk E' communicates with the equalizer B.

5 The valve-rod U is connected with a lever, U³, shown as fulcrumed to one of the fixed boards of the chamber. The valve-rod passes through this lever, and has around it helical springs, one on each side of the lever, and between the latter and a shoulder or collar on the rod. When the lever is rocked, it will shift the valve-rod; but, owing to the presence of the springs, it will operate the valve-rod with a yielding action, and consequently
15 bring the valves which are to be closed to their seats without straining. The lever U⁵ of each chamber is operated by a cam, K, on the shaft D of the motor. When the motor consists of two chambers F, the shaft D will
20 have two cranks d set at right angles to each other and connected by pitman-rods M with the movable boards f' of the chambers F.

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

5 1. A motor for mechanical musical instruments, consisting of a case having air-passages leading to a wind-chest, a number of collapsible and expansible pneumatics or bellows communicating with said passages, a rotary
10 shaft, connections between the shaft and the pneumatics, valves controlling the passages in the case, and cams or eccentrics on the rotary shaft for operating the valves, substantially as specified.

5 2. A motor for mechanical musical instru-

ments having, in combination, a block, a number of collapsible and expansible chambers arranged in line and communicating with passages in the block, a rotary shaft provided with cranks, connections between the rotary
40 shaft and the said chambers, valves controlling the passages in the block aforesaid, and cams on the rotary shaft for operating the valves, substantially as specified.

3. In a motor for a mechanical musical instrument, the combination of the cranked rotary shaft D, the chambers F' F² F³, connected with the cranks of the said shaft, the block E, provided with passages e' e² e³ e⁴ e⁵ e⁶, the valves V' V² V³ W, and cams upon the shaft
50 D for operating the valves, substantially as specified.

4. The combination of the rods, as U' U² U³, levers, as G' G² G³, having slotted ends embracing the said rods, and springs interposed
55 between said levers, and heads fixed to the said rods, substantially as specified.

5. In a mechanical musical instrument, the combination, with a wind-inducing apparatus, of a motor-chamber having a swinging board
60 dividing it into compartments, ports for establishing communication between the compartments of the motor and the atmosphere, and wind-inducing apparatus, and valves for controlling the ports, substantially as specified.
65

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Witnesses:

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