(No Model.) 2 Sheets—Sheet 1.

M. GALLY.

MECHANICAL MUSICAL INSTRUMENT.

No. 305,806. Patented Sept. 30, 1884.

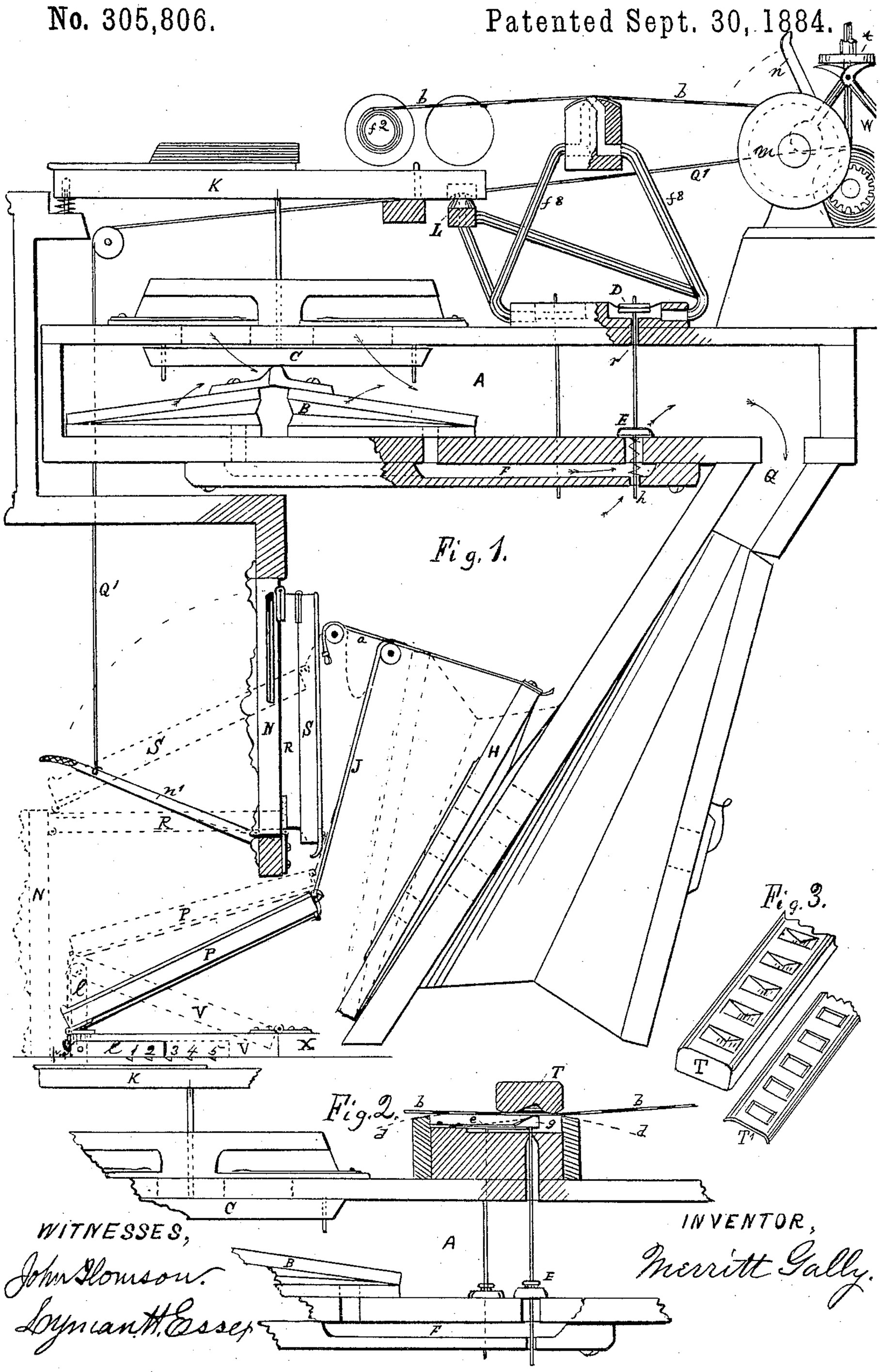

Fig. 1.

Fig. 3.

Fig. 2.

WITNESSES,

John Glomson.

Lyman H. Essex

INVENTOR,

Merritt Gally.

(No Model.) 2 Sheets—Sheet 2.

M. GALLY.

MECHANICAL MUSICAL INSTRUMENT.

No. 305,806. Patented Sept. 30, 1884.

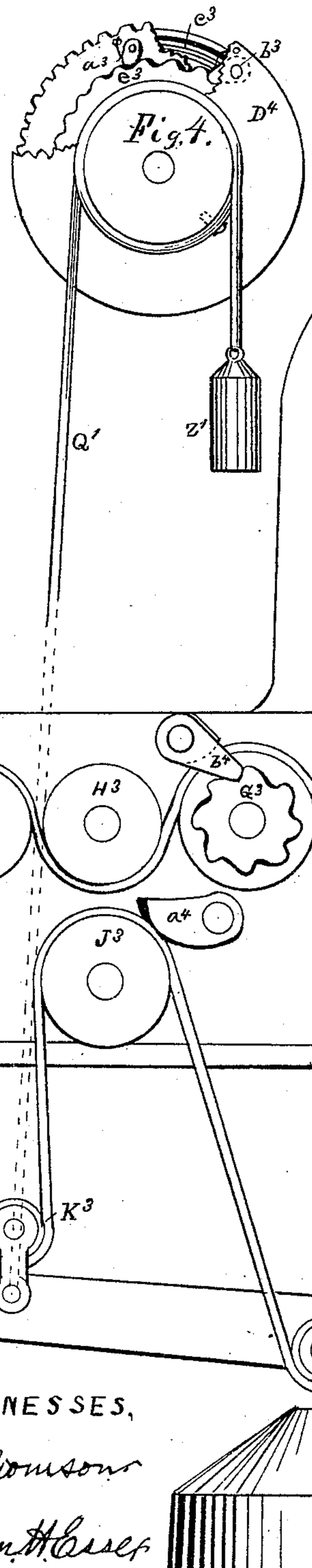

Fig. 4.

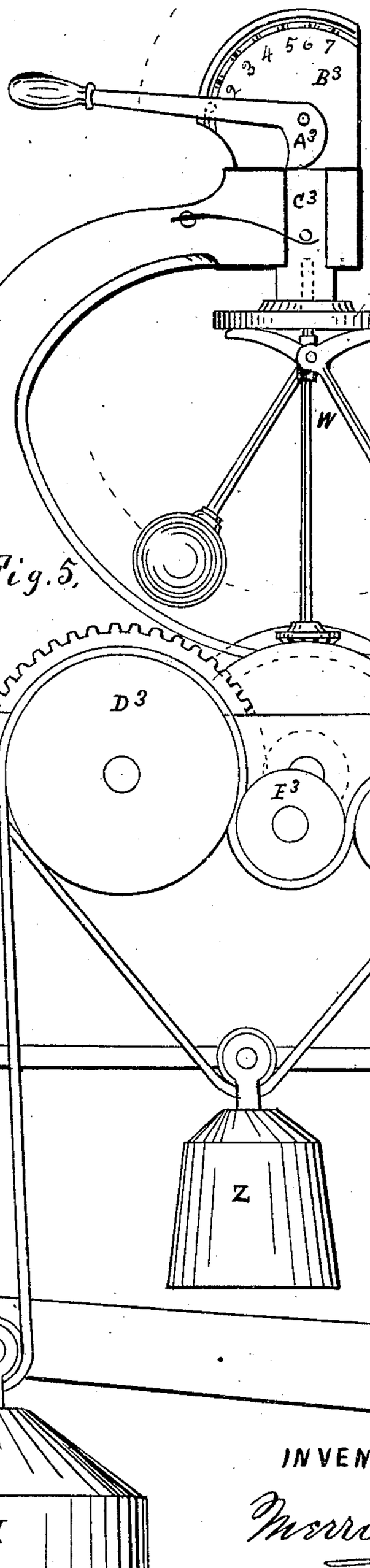

Fig. 5.

Fig. 6.

WITNESSES,

John Thomson

Lyman H. Esser

INVENTOR,

Merritt Gally

UNITED STATES PATENT OFFICE.

MERRITT GALLY, OF NEW YORK, N. Y.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 305,806, dated September 30, 1884.

Application filed March 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, MERRITT GALLY, residing at New York, in the county and State of New York, have invented a new and useful Improvement in Musical Instruments, of which the following is a specification.

In the accompanying drawings, Figure 1 is a sectional view showing a number of the working parts of an organ embodying several features of the invention. Fig. 2 is a sectional view of a part of Fig. 1, showing a modified connection of the valve with the music-sheet. Fig. 3 is a perspective of a portion of the indented or perforated bearing for the music-sheet. Fig. 4 is a side view of the ratchet movement of the music-sheet motor. Fig. 5 is a side view of the chronometric governor of music-sheet motor. Fig. 6 represents a portion of the music-sheet, showing the indicating-figures to which the governor is to be set.

My invention relates to that class of musical instruments which are mechanically, or mechanically and manually, operated, and the object of the first part of the invention is to provide a simple and effective means for operating the reed-valves of an organ with a pneumatic apparatus connected with the exhaust-bellows which operates the reeds.

In my patent of October 7, 1879, is described and broadly claimed a valve for opening or closing the air-passage to or from a sounding-pipe or reed, which valve is held to its seat while closed by a pneumatic device. The first part of my present invention consists in an improved construction and arrangement of the parts. Instead of placing the pneumatic motors above the reed-chest and drawing the valves upward to their seats, I place the motors B, Fig. 1, within the ordinary exhaust-chamber of the organ and support the valves by means of them from underneath, instead of by means of the ordinary valve-springs. The surface of the pneumatics B is sufficiently larger than the air-surface of the valves C to hold the valves to their seats, and however much the air-tension of the exhaust in the chamber A may vary the relative power and resistance of pneumatic and valve correspond, so that the valve remains tight under the varying tension. This is a great advantage over the ordinary method of operating pneumatic motors against spring-tension. The position of the pneumatics B, supporting the valves within the air-chest A, allows the use of the air from the ordinary exhaust-bellows, G, for operating both reeds and pneumatics with no inconvenience from variable tension.

As shown in the drawings, the pneumatics B are vented by a small constant vent at *h*, which is sufficient for their perfect operation; but a valve may be used to close and open the vent, if desired. To free the reed-valve C from its support, and thus sound the reed, it is only necessary to open the air-passage F into the air-chamber A with a larger opening than the small vent *h*, and the pneumatic being overpowered by the exhaust upon valve C, the valve is instantly opened and the reed or reeds of that valve are sounded. The pneumatics B act as air-springs, and operate, instead of ordinary valve-springs, when the manual keys are used. The manual keys operate either pneumatically or with ordinary push-pins, as shown.

To operate the mechanism in connection with a mechanical music-sheet, I use a diaphragm-valve, D E, Fig. 1, or the pushing-jacks *g*, Fig. 2. As shown in Fig. 1, the valve is held down by the power of the exhaust under its diaphragm D, except when relieved by a current of air admitted through the music-sheet tube f^3, at which time the exhaust in chamber A draws valve E upward. If not convenient to make the valve E light and buoyant, a small spring may be used to aid its prompt action, as shown. In Fig. 2 the music-sheet *b* is shown acting more directly upon valve E through the jacks *g*. The jacks are pressed down by the music-sheet and rise through it when perforations or embossed portions of the sheet meet their faces. Music-cylinders may be used to operate the jacks, if desired.

As different methods of operating jacks in mechanical musical instruments are common, I will describe particularly the novel feature in the jack movement, as shown. In using a perforated music-sheet to operate jacks it is common to employ a grooved roller or a grooved board above the sheet as a bearing for the sheet. The defect in such construction is,

that when thin or flexible material is used for the sheet, the jacks, having bent the material into the grooves at any point, cause the sheet to be drawn together from side to side, moving the several lines of perforations out of place. In Fig. 3 I show a bearing, T, which is inverted to exhibit the surface which comes in contact with the sheet. This bearing is not grooved, but is indented only to receive the points of the jacks having a continuous bearing entirely around the indentations, which preserves the surface of the sheet which is held against it by its direction of draft, as shown in Fig. 2. A still simpler method of constructing the bearing is shown T', Fig. 3, which is a perforated plate curved at its edges, and also at the edges of the perforations to prevent the sheet from catching in its movement.

The object of the second part of my invention is to secure an accurately-timed movement to the music-sheet, and by aid of a chronometric governor to set the motor to any named time for music, or to change from one indicated time to another while the music is being performed without stopping the progress of the performance. It is very difficult, either by means of hand-crank or treadle, to preserve accurate musical time, beside requiring a knowledge of the time appropriate for every part of the musical composition. In music-boxes and orchestrians, which are entirely mechanical, clock-motors are used for operating the entire instrument. These require very expensive springs or very heavy weights. The motors of these instruments must be stopped by any person wishing to change their time. Furthermore, the ordinary use of fans cannot be accurate. In my invention I employ a clock-work only for the movement of the music-sheet or a small portion of the instrument, while the pumping of the bellows is attended by the performer, who may pump only as required. I also use a comparatively light weight or short inexpensive spring, which may be readily wound up by the performer at intervals. I also use a chronometric governor, which may be set to any given time, or may be changed to any desired time during the performance of a piece of music. I also place figures or signs upon the music-sheet to indicate how to set the governor at the beginning of a piece, or to change the time during its progress. The motor with governor is partially shown in Fig. 1, with a hand-lever, n, for winding the weight or spring of the motor, and also a cord leading to a foot-lever, n', for winding, if desired. The governor is fully shown in Fig. 5. To the upright shaft W are pivoted ordinary governor-balls similar to those of the governor of a steam-engine. The rods of the balls are terminated in rectangular bearing-levers, which bear upon the under surface of a resisting friction-plate, t. The plate t is attached to a vertical slide, C^3, which moves up and down in the supporting framework of the governor. This slide is set to any given position by means of the cam-lever A^3 or other suitable device. The hand-lever A^3 is provided with a catch, which will hold it on any point of the graduated arc over which it is moved. It is well known that the speed of the governor-balls will be determined by the height of their rise in the arc of their movement. Now, if they be allowed to rise to any given height, the speed at that point will fix the time of the motor. By setting the hand-lever to a desirable position on the arc B^3 the plate t will be fixed at a definite plane. The balls will rise until the pressing-levers come in contact with the plate t, and at that instant the motor will be at the rate of speed required for the musical time as set by the lever A^3. The time of movement cannot now increase, although the spring or weight of the motor has sufficient power to increase it, as any further rise of the governor-balls, except that which produces mere contact of the levers with plate t, produces frictional resistance which immediately brings down the governor-balls to mere contact of their levers with plate t, which action determines the speed at that point. To increase the speed of the motor the hand-lever A^3 is raised on the arc, and to decrease the time it is lowered. The figures on the arc B^3 in the drawings do not represent any particular mathematical ratio, although such a scale may be computed and employed, if desired. The figures shown are merely signs to correspond with signs placed on the music-sheet to indicate where and to what point the time is to be changed or set. A portion of the music-sheet is shown in Fig. 6 with the time-figures marked thereon. It is desirable to make the ratchet for winding the spring or weight of the music-sheet motor as noiseless as possible, and for this purpose I use an eccentric for the pawl in connection with a wheel having curved teeth, as shown, e^3, Fig. 4. The spring may be wound with the ordinary ratchet-lever handle n, as shown in Fig. 1, or by means of cord Q', attached to the lever n', as shown in Fig. 4. The latter is necessary when the motor occupies a position in the instrument out of reach of the performer, or when it is preferable to use the foot instead of the hand for the purpose. In Fig. 4 the cord Q' passes around a wheel attached to a disk, D^4, which turns loosely upon the motor-shaft. To the disk is attached the eccentric pawl b^3, which acts upon the ratchet-wheel e^3. The ratchet-wheel is thick enough to allow pawls a^3 and b^3 to pass each other in their movement. A return weight or spring, Z', is attached to the end of the cord Q'. It will be seen that the wheel e^3 may be turned for winding the motor-spring by successive movements of cord Q' up and down. When it is preferable to use a weight instead of spring for the motor, the construction is shown in Fig. 5. The heavy weight Y is the motor-

weight hung by a pulley upon an endless cord, Q. The cord passes over the motor-driving wheel D^3; thence under wheel E^3, over wheel F^3; thence through the pulley of small tightening-weight, Z; thence over ratchet-wheel G^3, under wheel H^3, over wheel I^3, through lever-pulley K^3, and over wheel with eccentric J^3. The wheels E^3 F^3 H^3 I^3 turn upon studs which are fixed in the frame-work. These wheels are used simply as tighteners for the cord, to prevent it from slipping upon without turning the motor-wheel. In the descent of weight Y the eccentric a^4 prevents the cord from being drawn, except from the motor side. To wind up the weight, the lever n' is thrust downward, and the pawl b^4 prevents the cord being drawn, except to draw up the weight Y.

In my application for patent, filed March 5, 1881, I describe and claim foot-pedals which fold into the case of the instrument out of the way of the ordinary foot-pedals, to be let down and used by children or persons with short limbs. In my present application I show an improved construction of the ordinary pedal for adjustment and the folding pedal, the same not being herein claimed. In Fig. 1 the base V of the ordinary pedal, P, is hinged at and to the body of the case, the base resting upon a sub-base, in which are notches or stop-blocks 1 2 3 4 5 for rests for the support *l*. Support *l* is pivoted to hinged base V. The base may be lifted, as shown by the dotted lines, with the support *l* upright, or to a less degree by resting the support against any one of the several stops 1 2 3 4 5. The strap J from the bellows is not attached to the pedal, but passes through a loop at the point of ordinary attachment; thence along the under side of the pedal through another loop at its hinged end, and fastens to the sub-base at *p*, which makes the strap self-adjusting as to its length for any position of the pedal. The described adjustment will meet all ordinary requirements; but if the instrument is to be used by very small children, or it is desirable not to use the ordinary pedal, the folding pedal N R S may be used. Instead of using the panel N for the pedal, as described in former application referred to, I use the panel as the support, the hinged piece R as base, and the hinged piece S as the pedal, all folding together within the case, as shown folded, and also shown let down for use by the dotted lines.

What I claim as my invention is—

1. In a reed-organ in which the reeds are sounded by means of exhaust-bellows, the combination, with the valves controlling the sounding apparatus, of the pneumatic springs, said springs consisting of pneumatic motors B, the valve and the spring both placed within the exhaust-chamber.

2. In a reed-organ in which the reeds are sounded by means of exhaust-bellows, the combination, with valves controlling the sounding apparatus and a pneumatic bellows acting as a spring, both placed within the exhaust-chamber, of a valve for connecting the exhaust-chamber with the atmospheric chamber of the spring, to overcome the atmospheric pressure and allow the valves controlling the sounding apparatus to operate, substantially as described.

3. In a mechanical musical instrument, the combination, with the sheet-winding mechanism, of a chronometric governor, mechanism, substantially as described, whereby the speed of said governor may be adjusted, and an index to denote the position of the governor.

4. The combination, with the music-sheet and jacks operated thereby, of the indented or perforated bearing, the indentations or perforations corresponding not only in width, but also in length, with the dimensions of the noses of the jacks which enter them, to prevent creasing or distorting the sheet.

5. The bearing for the music-sheet, having the indentations or openings for receiving the noses of the jacks, made beveled at their ends, for the purpose specified.

6. In a mechanical musical instrument, the combination, with the music-sheet roller or feed mechanism which gives motion to the sheet, of a chronometric governor and mechanism, substantially as described, by which the same may be adjusted to different kinds of musical time during the performance of a piece of music.

7. In a mechanical musical instrument, the combination, with the music-sheet roller or mechanism which gives motion to the sheet, of a governor consisting of a revolving pendulum or governor-balls, and a friction device for limiting the rise of the balls.

8. In a mechanical musical instrument, the combination, with the music-sheet roller or mechanism which gives motion to the sheet, of a governor consisting of a revolving pendulum or governor-balls, a friction device for limiting the rise of the balls, and an adjusting device for adjusting the movement to musical or metronome time.

9. In a mechanical musical instrument, the combination, with the music-sheet roller or mechanism which gives motion to the sheet, and a governor having an adjuster for adjusting the same to different kinds of musical time, of an index for setting the governor, and a music-sheet having characters marked thereon corresponding with the character of the index.

MERRITT GALLY.

Witnesses:
JOHN THOMSON,
LYMAN H. ESSEX.