

(No Model.)

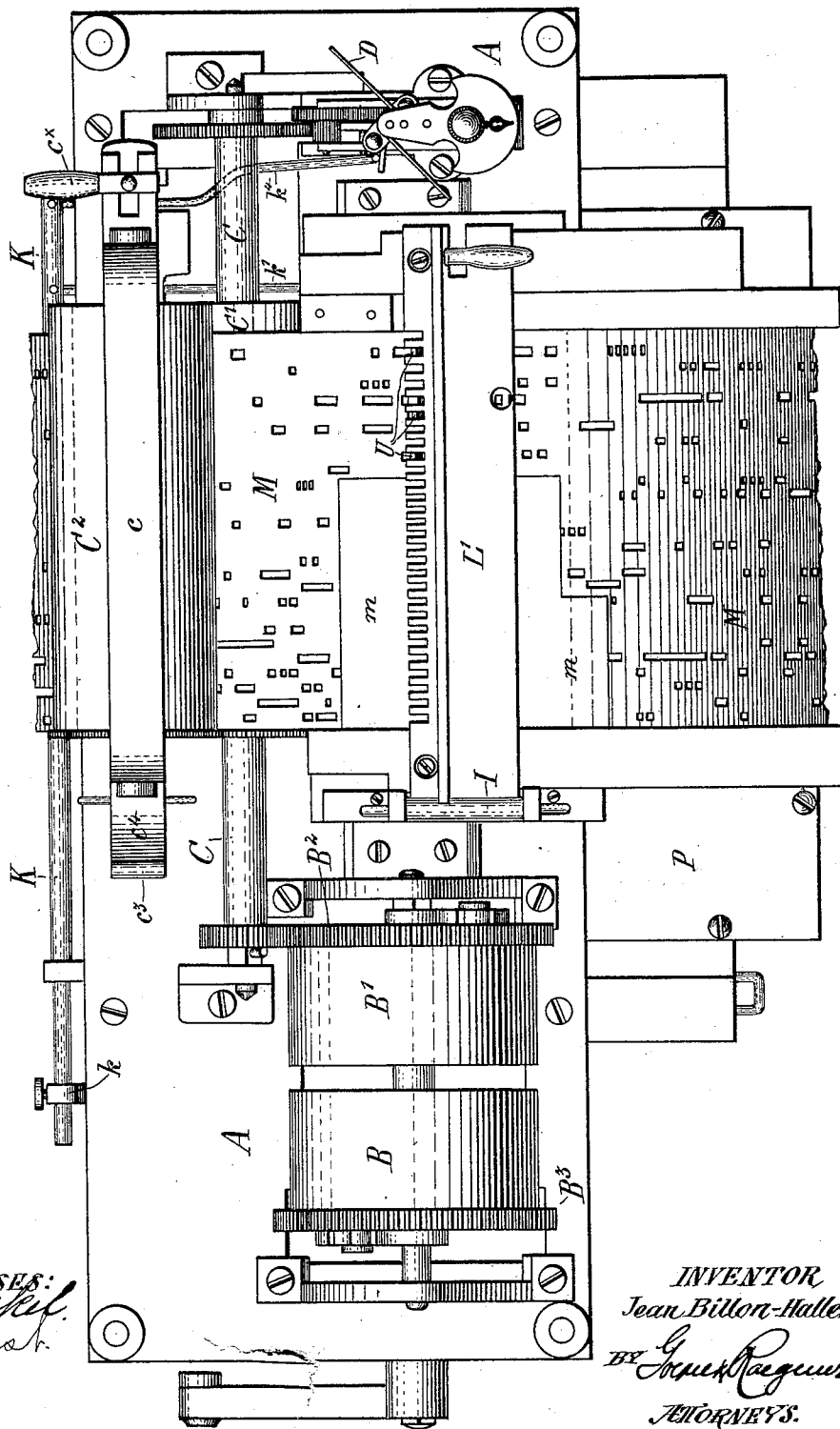
5 Sheets—Sheet 1.

J. BILLON-HALLER.
MUSICAL BOX.

No. 564,775.

Patented July 28, 1896.

Fig. 1.



WITNESSES:
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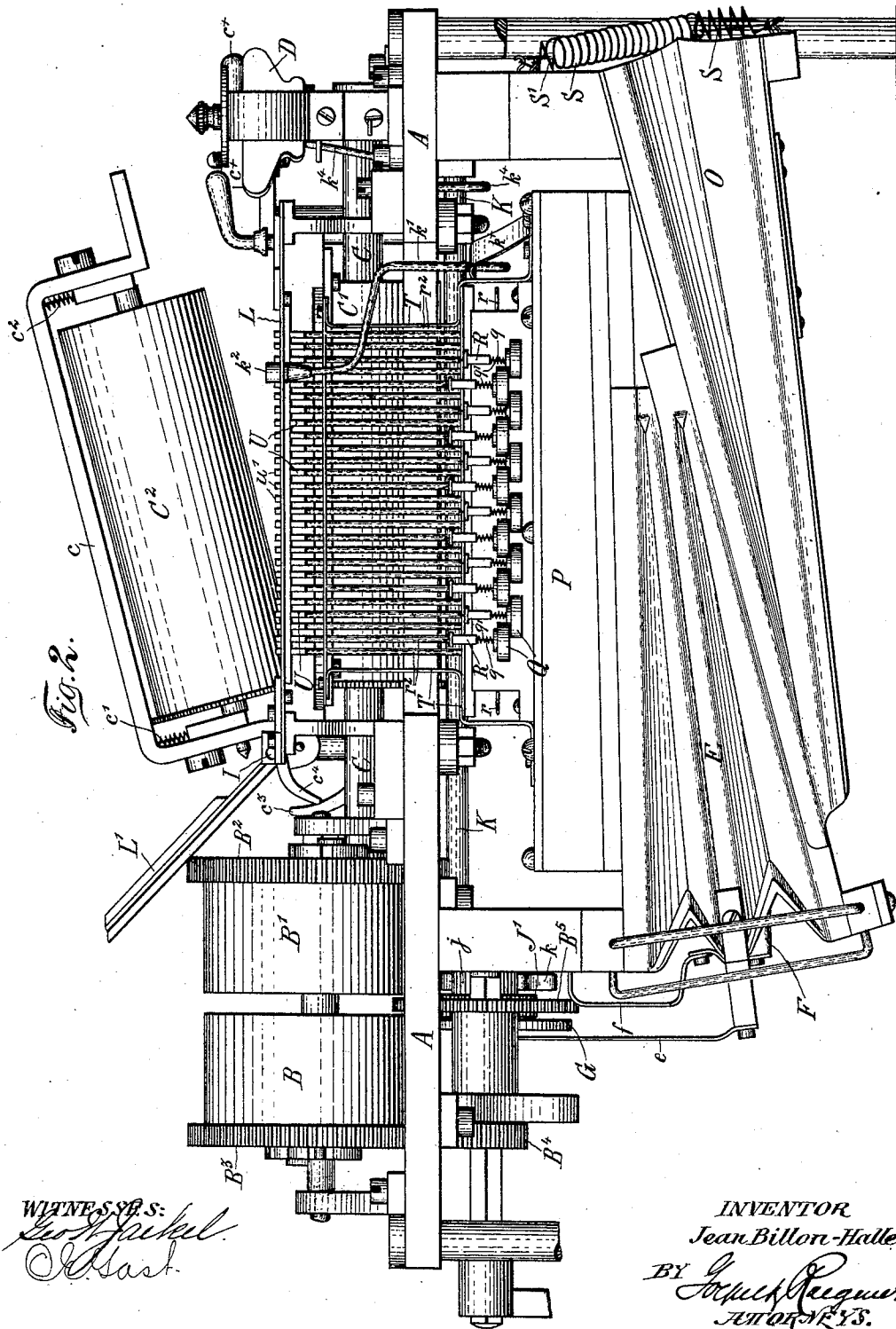
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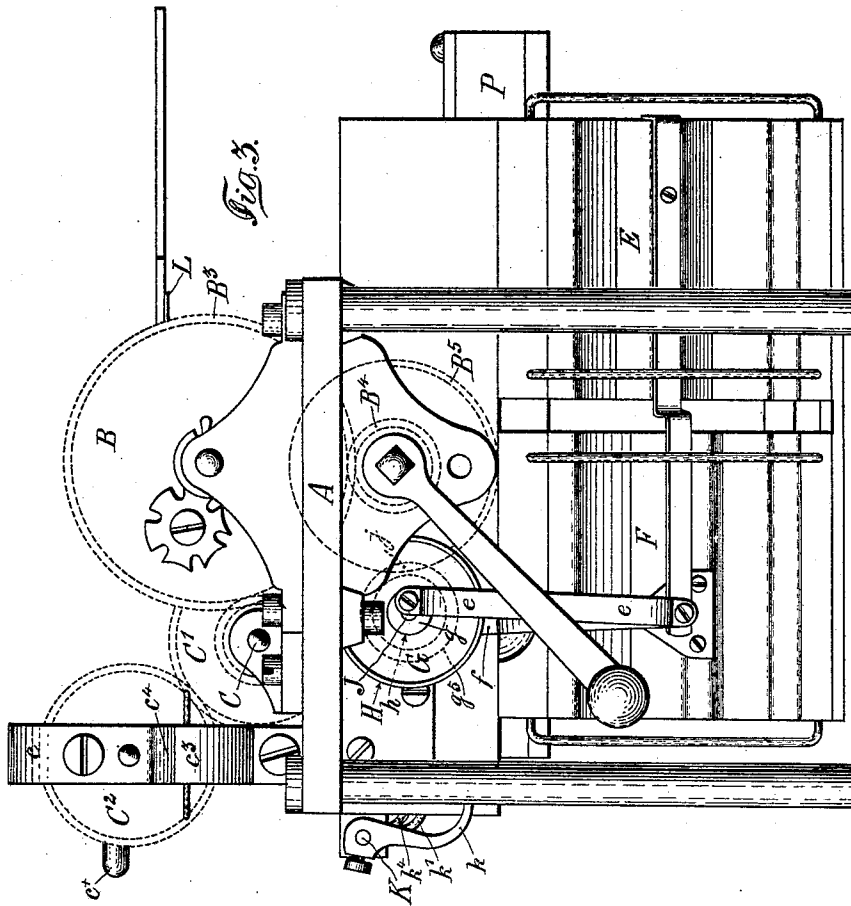
(No Model.)

5 Sheets—Sheet 3.

J. BILLON-HALLER.
MUSICAL BOX.

No. 564,775.

Patented July 28, 1896.



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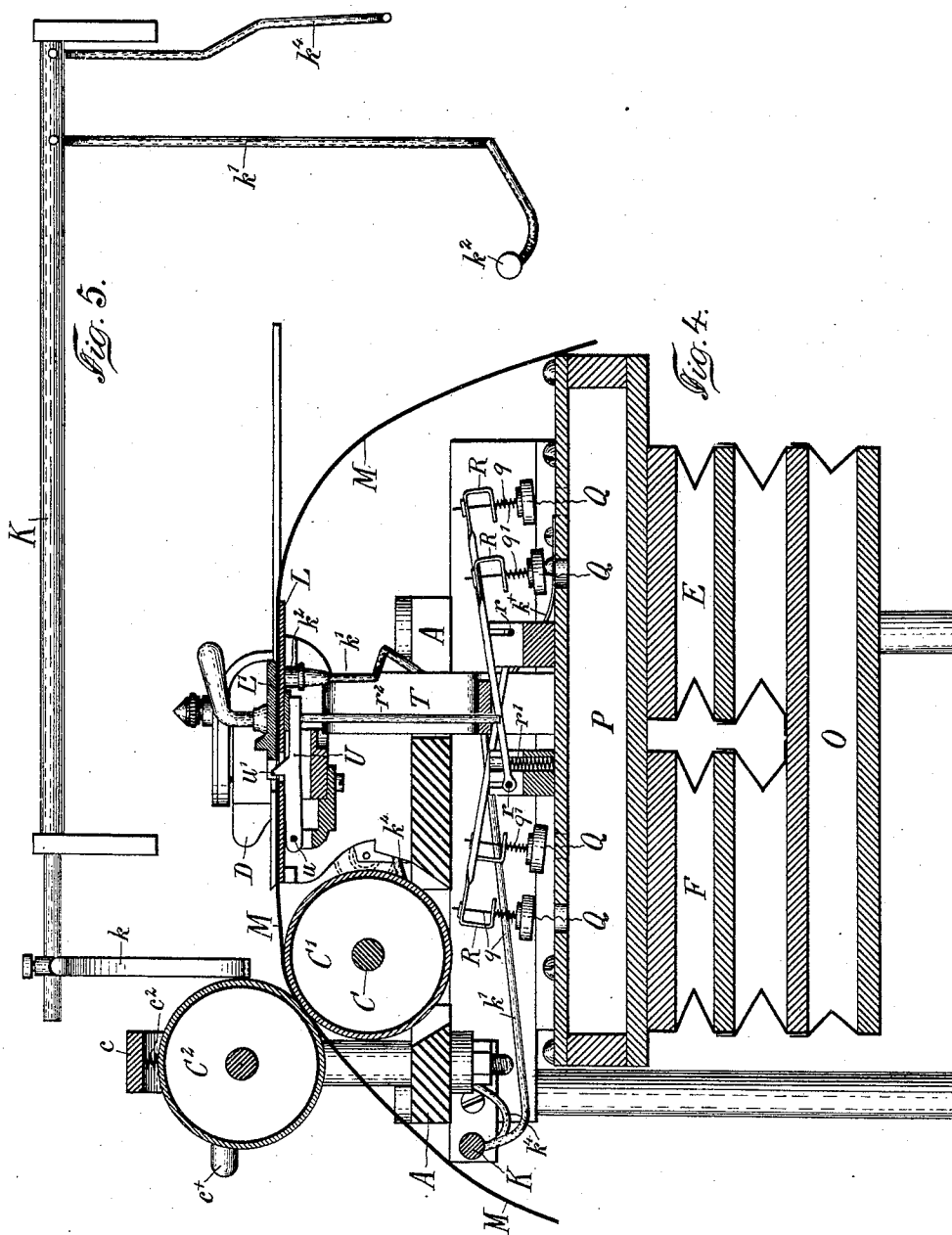
(No Model.)

5 Sheets—Sheet 4.

J. BILLON-HALLER.
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No. 564,775.

Patented July 28, 1896.



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(No Model.)

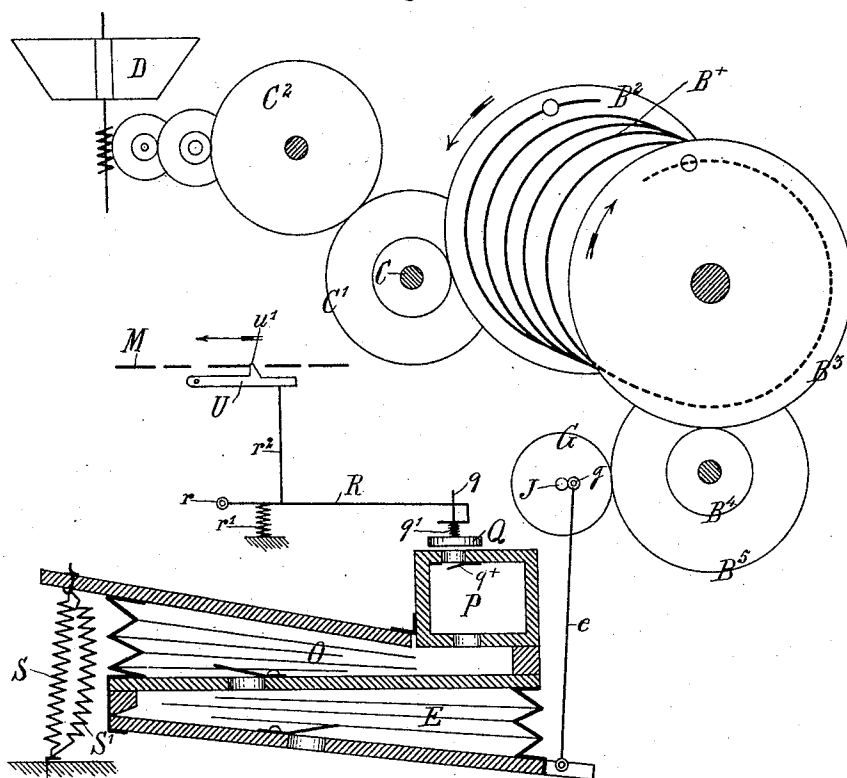
5 Sheets—Sheet 5.

J. BILLON-HALLER.
MUSICAL BOX.

No. 564,775.

Patented July 28, 1896.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JEAN BILLON-HALLER, OF GENEVA, SWITZERLAND.

MUSICAL BOX.

SPECIFICATION forming part of Letters Patent No. 564,775, dated July 28, 1896.

Application filed December 21, 1895. Serial No. 572,834. (No model.) Patented in Switzerland July 5, 1895, No. 10,494.

To all whom it may concern:

Be it known that I, JEAN BILLON-HALLER, manufacturer, a citizen of the Republic of Switzerland, residing in Geneva, Switzerland, have invented certain new and useful improvements in and Relating to Musical Boxes, (for which Letters Patent were granted to me in Switzerland, No. 10,494, dated July 5, 1895,) of which the following is a specification.

The invention consists of an improved air musical box comprising a new mechanism intended to regulate the workings of the bellows, in order to proportion continually the motive power applied on the said bellows for their working with the quantity of air required to produce the sounds which are determined by the sheet of notes which acts upon the keys.

The main feature of the invention resides in the combination of a note-sheet, a motor-spring, a suitable mechanism connected with one end of the latter and acting on the former, a speed-regulator for the note-sheet, one or more air-compressing bellows, a storage-bellows into which the air is compressed from the compressing-bellows and which is provided with discharge-ports which are controlled by the tune-valves, the opening of which is in turn controlled by the note-sheet, and a suitable mechanism connected with the other end of the motor-spring and acting on the air-compressing bellows. The storage of compressed air in the store-bellows will of course only take place as long as the reaction of the compressed air will not poise the action of the motive power, and when this has happened the motor will be stopped as long as no compressed air is allowed to escape from the said store-bellows; but if by opening one or more of the tune-valves part of the said compressed air is allowed to escape for sounding the corresponding notes the motor will again begin to act upon the compressing-bellows until the reaction of the compressed air compressed in the store-bellows again stops the said motor.

The accompanying drawings show, by way of example, a musical box of my improved construction in which the notes are acted upon by means of a perforated sheet.

Figure 1 is a plan view of the musical box with the notes-sheet in its place. Fig. 2 is a front elevation after the removal of the notes-

sheet. Fig. 3 is an end elevation, left hand of Fig. 2. Fig. 4 is a central cross-section of Fig. 2. Fig. 5 shows separately the bar and the stop-levers. Fig. 6 is a schematical view showing the combination of the spring-motor, the gearing, and the connection of the bellows. With a view to having the device clearly shown this figure refers to only one air-compressing bellows E and to only one crank-wheel G, while in the construction shown in the other figures two air-compressing bellows E and F and two crank-wheels G and H are provided, but the function of the bellows F and of the crank-wheel H being quite similar to that of the bellows E and crank-wheel G this figure illustrates, nevertheless, the main feature of the invention as claimed.

The plate A bears a spring-motor composed, for instance, of the well-known combination of two coupled barrels B B', which work just like a single barrel of greater dimensions, their combination having no other aim than to condense in a reduced space a relatively great motive power.

In my improved musical box one of the ends of the motive spring B⁺ acts, by means of a teeth-range B², upon a shaft C, which is intended both for moving along the notes-sheet and for transmitting the rotation of the barrel to the usual gear-wheel of the speed-regulator D, and the other end of the said motive spring bears upon a wheel B³, which acts upon the air-compressing bellows E and F by means of suitable intermediate gearings acting upon one or more crank-wheels, as for instance G and H, the knobs *g* and *h* of which are connected with the said bellows E and F by means of rods *e* and *f*. The said crank-wheels G and H are fixed upon a shaft J, which bears a cog-wheel *g*⁵, engaging a wheel B³, the pinion B⁴ of which is in gear with the teeth-range B³ of the mainspring-barrel B. The said axis J bears a cog-wheel *j*, in which the arm *k* of the stop-bar K may be engaged when the work is to be stopped. The stop-bar K is provided with an arm *k'*, bearing a piston *k*², which is caused, by means of a spring *k*⁺, to project vertically through the table L, Fig. 2, intended to receive the perforated sheet. The click *k* is arranged so as to engage the teeth-range of the wheel *j* when the piston *k*² is free

to take the position indicated in Fig. 2 and to stand out of reach of the said wheel j when the piston k^2 is depressed by means of the pressure of the notes-sheet. The bar K is moreover provided with an arm k^4 , arranged so as to stop the speed-regulator D when the piston k^2 is raised and to liberate said regulator as soon as the piston k^2 is depressed by means of the pressure of the notes-sheet.

The shaft C is provided with a driving-roller C' , intended to move along the notes-sheet M , and over the said roller C' a roller C^2 is arranged, which is pivoted to a frame c , hinged to the framework. Both the rollers C' and C^2 are covered over with leather, and springs c' and c^2 press the roller C^2 against the roller C' in order to have the notes-sheet, which is placed between them, surely moved along. As shown in Fig. 2, the frame c , bearing the roller C^2 , may be raised, so as to facilitate the introduction of the notes-sheet. A bolt c^+ keeps the frame c down when the sheet is secured in its place, while on the contrary a spring c^3 , against which bears the tail c^4 of the frame c , supports the latter while in its raised position until the notes-sheet is in its place. Said notes-sheet is applied on the table L , as indicated in Figs. 1 and 4. A guide L' , pivoted at l to the table L and shaped like a comb, permits the noses u' of the key-levers U to freely rise between the teeth and in rising to be sure of taking into the perforations of the note-sheet, and further when the noses u' do not meet with openings of the note-sheet they hold the latter firmly down over the key-levers.

The bellows E and F , which are intended to compress the air into the store-bellows O , are connected by means of suitable valves, on the one hand with the open air, in order to provide an air supply, and on the other hand with the store-bellows O , which is in communication with the box P , provided with a series of suitable ports and sounding-tongues ("voices") q^+ , each of which is normally closed by one of the valves Q when all the corresponding levers are depressed by a full portion of the notes-sheet M . The compressing-bellows could also be connected with two separate store-bellows, each of which would provide, by means of inner regulating-valves, different pressures in different parts of the keyboard of the notes.

Two springs S S' , one of which only works when the bellows O is wide open, are provided with a view of driving the air contained in the said store-bellows into the box P . If all the valves Q are closed, the air thus driven in the box P cannot escape therefrom. When the inner pressure thus produced will have attained a certain degree of force, it will no longer be possible for the motive spring, acting upon the bellows E and F , to overcome it, and the crank-wheels H and G , or, in other words, the mainspring-barrels B B' , will consequently be stopped, said inner pressure thus acting in some degree as a point of support

for one of the ends of the motive spring instead of the usual fix click device. The other end of the spring acting upon the driving-roller C' , the notes-sheet will move on the table L and its openings enable one or more of the valves Q to be opened by means of the device described below, so that the box P will allow more or less of the compressed air contained therein to escape. The point of support of the crank-wheels H and G will then be missing, and the spring-motor will again act upon the said cranks and pump or compress air into the store-bellows O and into the box P until the equilibrium is again established. Thus the force of the motive spring is only spent in proportion to the escapement of air through the voices q^+ , while in the musical boxes constructed until now the bellows act in a constant and regular way, the compressed air which does not escape through the tunes or voices q^+ being allowed to escape through a discharge-valve into the open air—that is to say, quite useless.

My improved device offers the great advantage of proportioning the storing of compressed air to the extent required by the play of the music-work, so that it is liable to produce, with a relatively weak motor, powerful chords by means of the direct action of the compressing-bellows at the right moment, while on the other hand it is also liable to produce very soft pianos by means of a slackening in the working or of a momentary stopping of the said compressing-bellows when only a small number of the voices is acted upon.

The valves Q are hung on shafts q , located in the U -shaped end of one of the levers R , a small spring q' being intercalated between the said valve and the lever. The levers R are pivoted at r to a suitable bearing in which springs r' are located, which tend to raise the levers R , as indicated in Fig. 4. The forked end of a shank r^2 , located in a bearing T , bears upon each lever R , and the upper end of every shank r^2 bears upon a lever U , pivoted at u to the under part of the table L . Each lever U is provided with a nose u' , which passes through an aperture of the table L and which is depressed by means of the notes-sheet M' to the level of said table L as long as the latter does not offer one of its apertures opposite the nose u' . When the latter is lowered, the corresponding valve Q is applied on the aperture of the box P which it is intended to close, and as soon as the nose u' engages an opening of the notes-sheet the corresponding valve Q opens and remains open for a more or less long time, according as the said opening is more or less long.

In order to produce stifled sounds, I combine the sheet M with a suitable sheet of paper m , applied on those parts of the surface where the openings are correspondent to notes which are to be soft. The noses u' will then be unable to reach beyond the sheet M , although they may pass through the thickness

of said sheet, and the corresponding valve Q will thus be only half opened instead of being wide open. The piston k^2 , bearing against the lower surface of the notes-sheet M, will be depressed as soon as the guide L' is depressed, and it will immediately start the spring-motor, the first operation of which consists in filling the tank O with air and in compressing the same, which is done very rapidly. A special hole provided in the sheet M produces the mechanical stop when the play is ended. This stopping will moreover take place as soon as one raises the guide L', even in the midst of an air.

The guide L' and cylinder C² may be combined, so as to be raised and lowered simultaneously and by means of a single operation.

The musical box as described may be completed by adding to it clock-bells and drums acted upon by the usual levers bearing against the notes-sheet.

Having thus described my invention, I claim—

In pneumatic music-boxes, the combination of a note-sheet, a motor-spring, a suitable mechanism connected with one end of the motor-spring and acting on the note-sheet, a speed-regulator for the note-sheet, one or more air-compressing bellows, a storage-bellows into which the air is compressed from the compressing-bellows and which is provided with discharge-ports, which are controlled by the tune-valves, the opening of which is controlled in turn by the note-sheet, and a suitable mechanism connected with the other end of the motor-spring and acting on the air-compressing bellows, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JEAN BILLON-HALLER.

Witnesses:

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BENJ. H. RIDGELY.