(No Model.)

4 Sheets—Sheet 1.

A. VERNAZ.

MUSIC BOX.

No. 557,349. Patented Mar. 31, 1896.

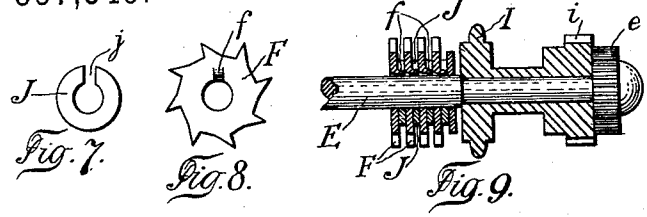

Fig. 7. Fig. 8. Fig. 9.

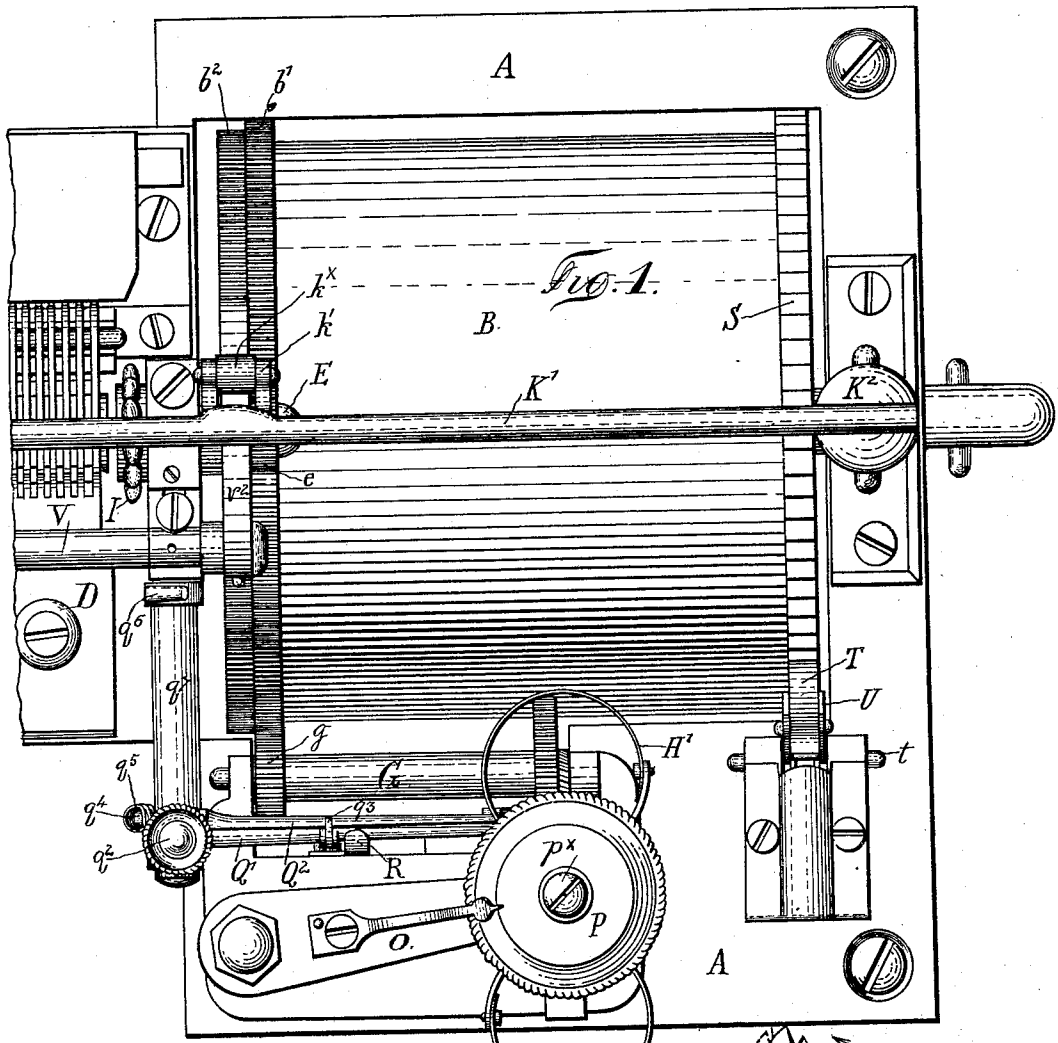

Fig. 1.

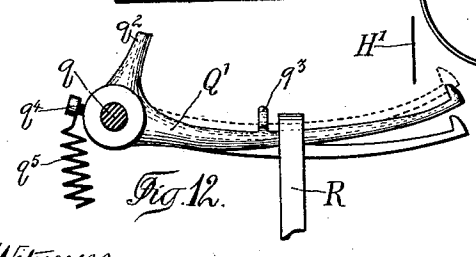

Fig. 12.

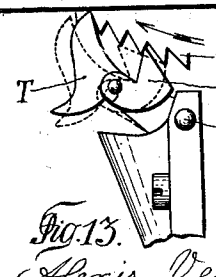

Fig. 13.

Witnesses
Chas. H. Smith
J. Stair

Inventor
Alexis Vernaz
per Lemuel W. Serrell
Atty.

(No Model.)

4 Sheets—Sheet 2.

A. VERNAZ.

MUSIC BOX.

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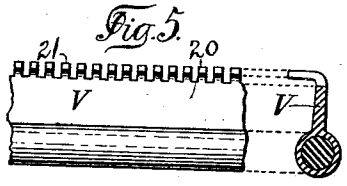
Fig. 5.



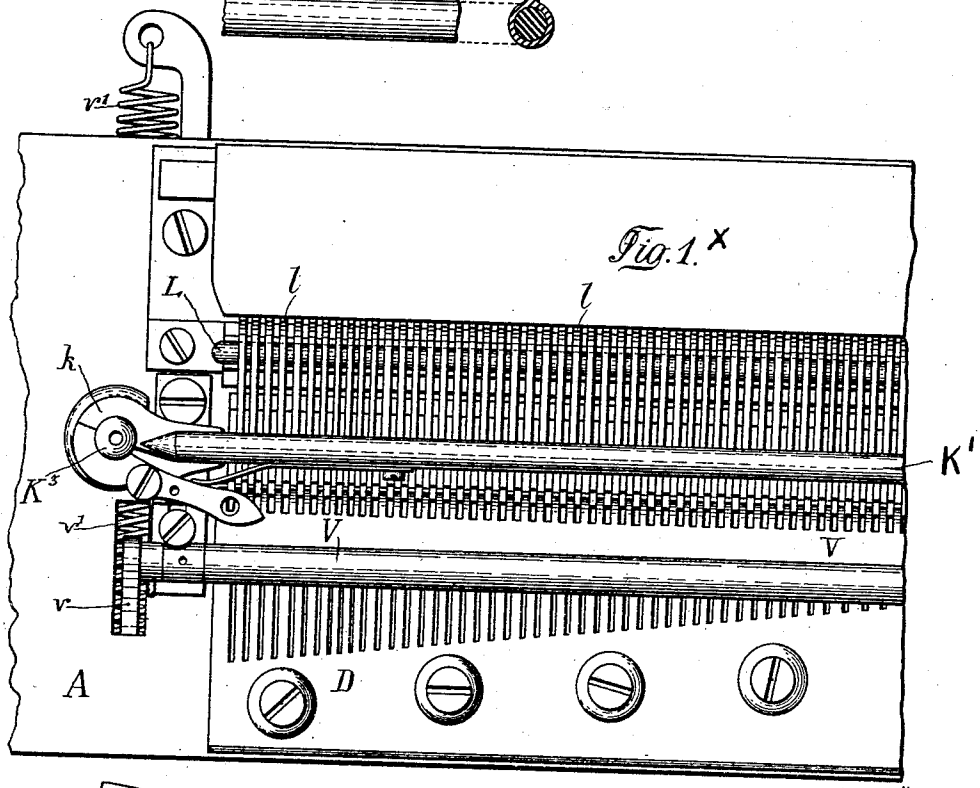


Fig. 1.

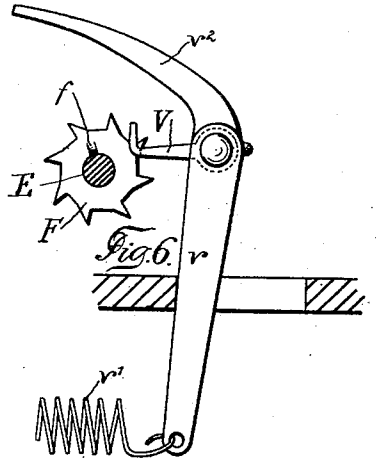


Fig. 6.

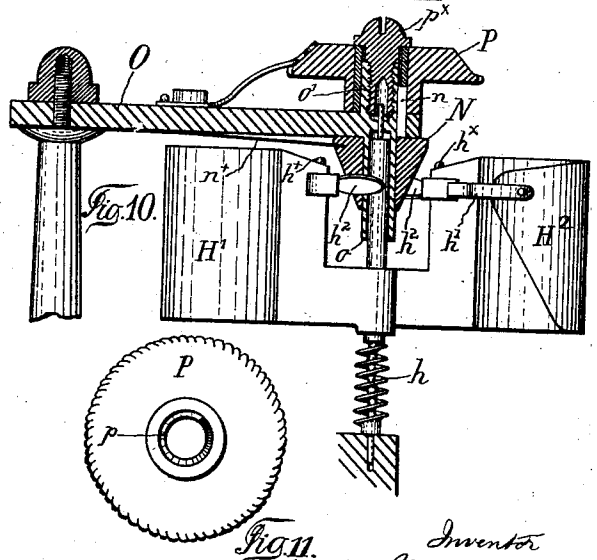


Fig. 10.

Fig. 11.

Witnesses
Chas. H. Smith
J. Stair.

Inventor
Alexis Vernaz
per Lemuel W. Serrell
Atty

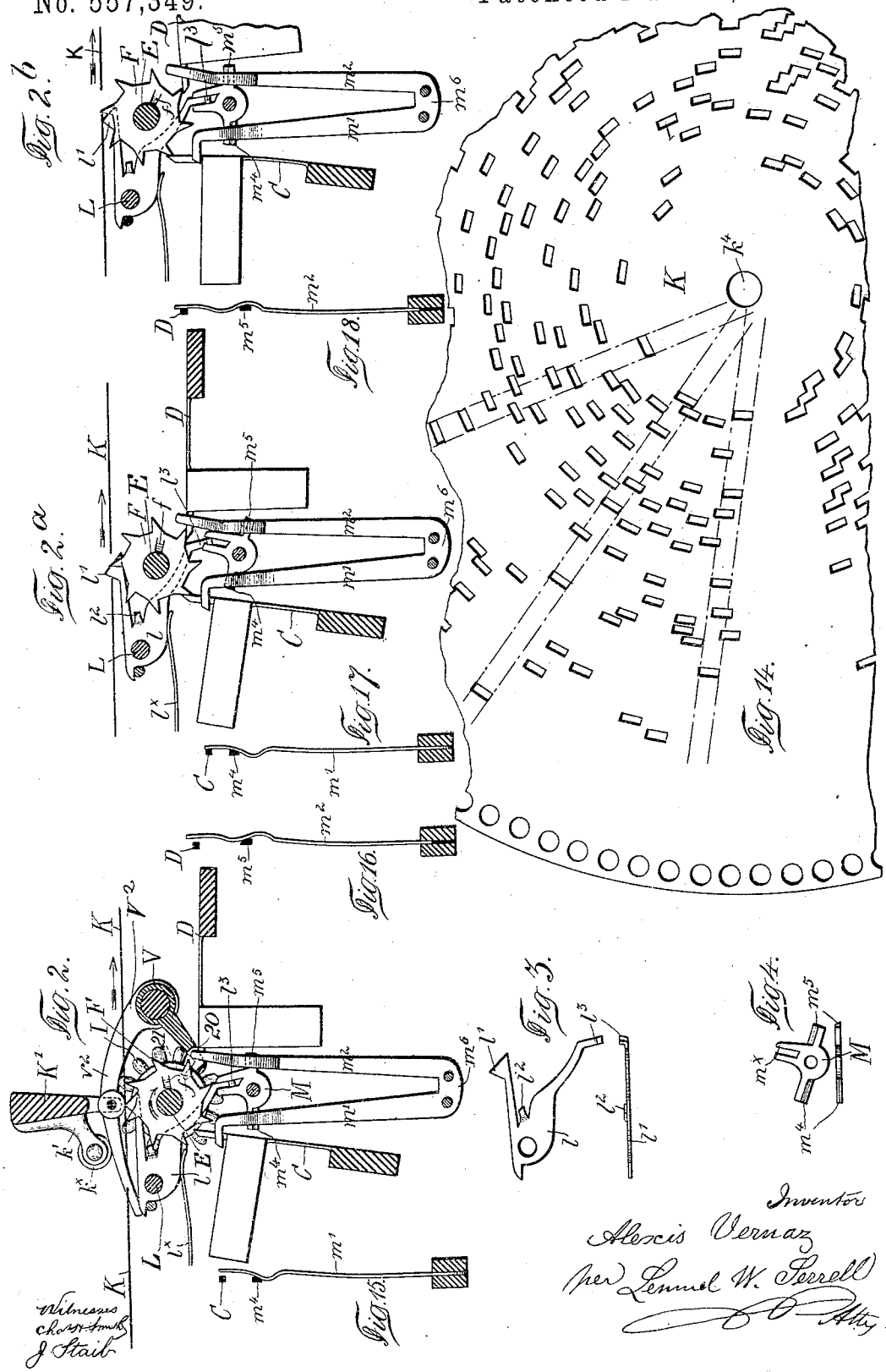
(No Model.)

4 Sheets—Sheet 3.

A. VERNAZ.

MUSIC BOX.

No. 557,349. Patented Mar. 31, 1896.



(No Model.) 4 Sheets—Sheet 4.

A. VERNAZ.

MUSIC BOX.

No. 557,349. Patented Mar. 31, 1896.

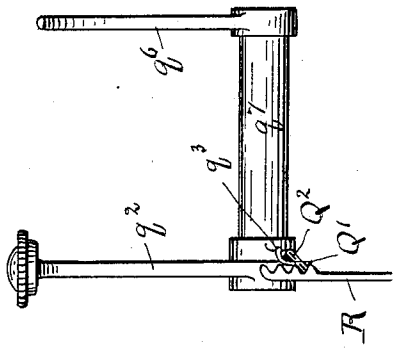


Fig. 21.

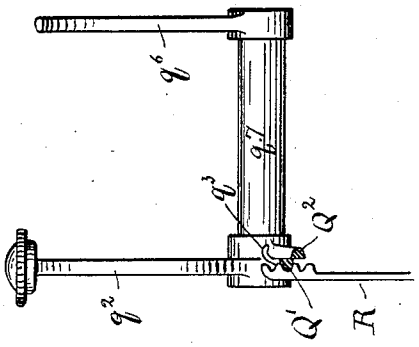


Fig. 20.

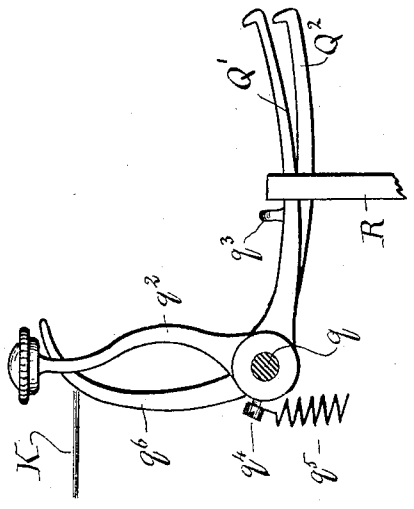


Fig. 19.

Witnesses
Chas. H. Smith
Geo. T. Pinckney

Inventor
Alexis Vernaz
per Lemuel W. Serrell
Atty.

UNITED STATES PATENT OFFICE.

ALEXIS VERNAZ, OF STE. CROIX, SWITZERLAND, ASSIGNOR TO MERMOD FRÈRES, OF SAME PLACE.

MUSIC-BOX.

SPECIFICATION forming part of Letters Patent No. 557,349, dated March 31, 1896.

Application filed July 27, 1895. Serial No. 557,331. (No model.)

To all whom it may concern:

Be it known that I, ALEXIS VERNAZ, of Ste. Croix, Switzerland, have invented certain new and useful Improvements in Musical Boxes, of which the following is a specification.

The invention relates to that class of musical boxes in which the tunes are obtained by automatically sounding the steel prongs of a fixed sonorous comb; and the invention has especially for its object a combination of means for causing the said automatic sounding of the prongs by means of a traveling perforated sheet of paper or other suitable material.

The invention further consists of certain parts and details and combinations, as will be hereinafter described and claimed, reference being had to the accompanying drawings, which form a part of this specification, and in which similar letters and numerals of reference indicate corresponding parts in all the figures.

Figures 1 and $1^{\times}$ are plan views representing, jointly, the whole of the instrument, the perforated sheet being supposed to be withdrawn. Fig. 2 is a cross-section through the sonorous combs, showing those parts of the mechanism which are repeated in front of every prong of the combs, the ranging device intended to set the star-wheels with their respective teeth in straight lines, and through the arm or lever intended to guide the perforated sheet, the said parts existing in front of every prong of the combs, the latter being shown at rest. Fig. 2^{a} shows the said parts in front of each prong in the position in which the dampers m' and m^{2} bear against the respective prongs C and D, and a tooth of the star-wheel F is in an opening of the perforated sheet, but not yet acted upon by the latter. Fig. 2^{b} shows the same parts as Fig. 2^{a}, but with the dampers m' and m^{2} out of reach of the respective prongs and the tooth of the star-wheel F within an opening of the perforated sheet. Fig. 3 shows separately one of the levers l. Fig. 4 shows separately one of the levers M. Fig. 5 shows separately, in plan view and cross-section, the ranger V. Fig. 6 shows the said ranger V in combination with its lever v and a star-wheel F. Fig. 7 shows separately one of the friction-rings J. Fig. 8 shows separately one of the star-wheels F. Fig. 9 is an axial section of the double pinion placed upon the end of the axis of the star-wheels. Fig. 10 is a partial section of the speed-regulator. Fig. 11 is an under side view of the knob P of the regulator. Fig. 12 is a side elevation of the stopping device. Fig. 13 is a side elevation of the silent click. Fig. 14 is a partial plan view of the perforated sheet. Fig. 15 is a side elevation of the damper m' in the position of Fig. 2. Fig. 16 is a side elevation of the damper m^{2} in the position of Fig. 2. Fig. 17 is a side elevation of the damper m' in the position of Fig. 2^{a}. Fig. 18 is a side elevation of the damper m^{2} in the position of Fig. 2^{a}. Fig. 19 is a view of the stopping mechanism. Fig. 20 shows the same parts at right angles to Fig. 19 and with the levers Q' Q^{2} in section, the parts being in the position for the music-box to stop automatically; and Fig. 21 is a view similar to Fig. 20, with the parts in position for the box to continue playing until the motor runs down.

In all the figures of the drawings the same letters and numerals of reference refer to the same parts.

The base-plate A bears a motor B and one or more combs provided with sonorous prongs—as, for instance, C and D. The wheel b' of the motor B engages a pinion e, which is fixed to the shaft E, also a pinion g on the shaft G, which shaft carries a wheel that acts on the worm-pinion h of the speed-regulator, as usual in music-boxes.

The wheel b^{2} of the motor B engages a pinion i, which is free to rotate on the shaft E and which is rigidly connected by means of a sleeve or tubular axis with the pinion I, the latter having projections that pass into holes in the perforated sheet to revolve the same.

By means of a suitable combination of diameters and teeth numbers of the wheels b' and b^{2}, on the one hand, and of the pinions g and i, on the other hand, the relative speed of the star-wheels and of the perforated sheet may be determined at will, and this will preferably be done in such a manner as to have the star-wheels rotating with a somewhat higher speed than the perforated sheet.

Each of the star-wheels F is provided on one of its faces with a lateral projection f,

Figs. 8 and 9, and is free to rotate on the shaft E. Between every two adjacent star-wheels F there are provided split rings J, which embrace with smooth friction the shaft E, and in the slot *j* of which is engaged the projection *f* of one of said adjacent star-wheels F, so as to have the said rings J and star-wheels F normally rotating with the shaft E, but able to be stopped without stopping said shaft E.

The combs C and D are so disposed as to have each of their prongs able to be acted upon by one of the teeth of the corresponding star-wheel F when said star-wheel is rotated in the direction indicated by an arrow in Fig. 2.

Upon a longitudinal shaft L, fixed in suitable bearings, there is a series of levers *l*, each provided with a nose *l'*, a lateral projection or tooth l^2 to stop the teeth of the corresponding star-wheel, an arm l^3, the end of which forms a suitable hook to engage the fork $m^\times$ of a three-armed rocking lever M having two beveled arms m^4 and m^5. Each of the said levers *l* is acted upon by means of a suitable spring $l^\times$, so as to normally bear with its nose *l'* against the lower face of the perforated sheet K.

In reach of each prong of the combs C and D there are two spring-shaped dampers *m'* and m^2 fixed at m^6 to a suitable bearing and formed, substantially as shown in side elevation in Figs. 15 to 18 of the drawings, with suitable bosses disposed so as to be acted upon, respectively, by means of the arms m^4 and m^5 of the three-armed rocking lever M, according as the latter is rocked by means of the arm l^3 of the lever *l* either into the position shown in Fig. 2, in which the dampers do not bear against the prongs of the combs, or into the position shown in Fig. 2^a, in which the dampers bear against the said prongs. Those two positions of the rocking lever M and of the dampers *m'* and m^2 are obtained by means of the nose *l'* of the lever *l* being either depressed by a full portion of the perforated sheet K or engaged in an opening of the same.

When the parts are in the position shown in Fig. 2, the nose *l'* of the lever *l* being depressed by a full portion of the sheet K, the tooth l^2 of the said lever *l* prevents the star-wheel F being rotated by the shaft E and holds the same in such a position as to have none of its teeth engaged nor in contact with the perforated sheet K. In this position of the lever *l* its arm l^3 holds the rocking lever M in the position in which the dampers *m'* and m^2 are out of action. Now when the perforated sheet in the course of its forward motion presents an opening in front of the said nose *l'* of the lever *l* the latter is rocked by the spring $l^\times$ into the position shown in Fig. 2^a, in which the tooth l^2 leaves the star-wheel F free to be rotated by the shaft E, and the arm l^3 causes the rocking lever M to press the dampers *m'* and m^2 against the prongs C and D. The star-wheel F being rotated with the axis E in consequence of the friction of the split rings J until its teeth meet the prongs C and D, the forward motion of the perforated sheet K causes the nose *l'* of lever *l* to be again depressed and the arm l^3 causes the dampers *m'* m^2 to be again retracted out of reach of the prongs C and D. Then the edge of the opening of the sheet K catches one of the teeth of the star-wheel F which projects into said opening and causes the star-wheel F to sound the prongs C and D, which would not take place by means of the mere friction of the rings J against the star-wheel F. The latter then continues its rotation until one of its teeth is stopped again by the tooth or projection l^2 of the lever *l* when the parts have reached again the rest position shown in Fig. 2.

The perforated sheet K is pressed against the range of noses *l'* by means of an arm K' provided with a series of suitable rollers pivoted to said arm. The latter is hinged at K^2 to a suitable bearing and may be locked to a central stud K^3 by means of a suitable locking device *k*. In case the perforated sheet be circular, as shown in Fig. 14, the stud K^3 will act as a pivot for the said sheet K.

The "ranger" is formed of a comb V, Fig. 5, having suitable projections on the ends of its teeth that pass in between the star-wheels F. The said comb V has a tubular axis upon a longitudinal shaft in front of the range of star-wheels F in such a position that it can act on one tooth of each of such star-wheels F and sets the teeth into line. One end of the tubular axis of the comb V carries an arm or lever *v* acted upon by a spring *v'*, which tends to rock the ranger V into the position shown in Fig. 6. The other end of said tubular axis of the ranger V carries an arm v^2, which is acted upon by a roller $k^\times$, that is carried in jaws *k'*, that project from the arms K'. The arm v^2 is automatically depressed by the roller $k^\times$ when the arm K' is swung down in affixing the perforated sheet K. By this movement of the arm v^2 the comb V is rocked, so that the edge 20 of the comb is out of reach of the teeth of the star-wheels F; but the teeth 21 of the ranger-comb are between the star-wheels. When the arm K' is lifted to take off the perforated sheet, the ranger V is brought into action by the spring *v'* and acts to bring the teeth of all the star-wheels into line by the edge 20 of the ranger acting upon the adjacent teeth of the star-wheels F.

The speed-regulator, acted upon by suitable gearings, as specified above, is composed of wings H' and H^2, which form elastic air-bags in which the air is caught when the regulator is rotated. The pressure of the air thus caught causes the said elastic wings to be more or less extended, whereby each of them presses the arm h^2 of a crank-lever *h'* pivoted at $h^\times$ against a cone N placed around the axis of the regulator. The cone N surrounds a sleeve *o* fixed to the under surface of the bridge O, and it can be shifted up and down on the

same. The upper surface of said bridge O bears a sleeve o', on which is placed a rotative knob P, provided with a central recess having a screw-shaped bottom. The axial displacing of said knob P is prevented by means of a screw $p^{\times}$ screwed into the sleeve o'. The cone N has an eccentric projection n, which projects through the bridge O and which is pressed by means of a spring $n^{\times}$ against the screw-shaped bottom of the recess p of the knob P. Thus it is evident that if the knob P is rotated the cone N will be raised or depressed, and this will increase or reduce the intensity of the friction of the levers h^2, the purpose of this device being to provide means for reducing or increasing by hand the normal speed of rotation of the regulator.

The stopping device is composed of two levers Q′ and Q^2, both fulcrumed at q and provided with a hooked end to catch the wings of the regulator. The lever Q′ has an arm q^2 to be acted upon by hand for stopping the movement. This can be done during the playing of the tune. The same lever is provided with a hook q^3 projecting upward over the adjacent lever Q^2. The latter is provided with a screw or projection q^4, to which is attached a spring q^5 acting upon the said lever for raising the same to its upper position in which it catches the wings of the regulator. The hook or projection q^3 of the lever Q′ is long enough to allow the lever Q^2 to be raised into its upper position by the action of the spring q^5 whenever the hand-lever Q′ is not held in its lowest position by being hooked to the lowest notch of a notched catch-spring R, as seen in Fig. 21. The said catch-spring R has three superposed notches in which the lever Q′ may be hooked at will. When hooked to the lowest of these three notches of the catch R, the lever Q′ is depressed in such a position as to have its hook q^3 draw down the lever Q^2 out of reach of the wings H′ or H^2. When hooked to the middle notch of the catch R, the lever Q′ is depressed in such a position as not to catch the wings H′ or H^2, but to allow the lever Q^2 to catch the said wings without meeting the hook or projection q^3 of the lever Q′. When hooked to the upper notch of the catch R, the lever Q′ is in position for stopping the wings, and of course in this position its hook or projection q^3 is out of reach of lever Q^2. It is evident therefore that when the lever Q′ is in the last-mentioned position the wings of the regulator are stopped by both the levers Q′ and Q^2. Now if the arm q^2 of the lever Q′ is acted on by hand so as to hook the same into the lowest notch of the catch R the hook q^3 will meet the lever Q^2 and depress the same out of reach of the wings H′ or H^2, and the tune will play as long as the motor-spring causes the parts to revolve. Now if the lever Q′ is hooked in the middle notch the same will not stop the movement, but its hook q^3 will leave the lever Q^2 free to stop it. The said lever Q^2 has a tubular axis q^7, and on this axis there is provided an arm q^6 that extends up to the perforated sheet and bears against the edge of the same, as illustrated in Fig. 19. As long as said arm q^6 bears under the action of the spring q^5 against the said edge of the sheet K it holds the lever Q^2 out of reach of the wings H′ and H^2; but if there is provided a suitable notch in the said edge of sheet K then the arm q^6 will engage the said notch and cause the lever Q^2 to stop the wings of the regulator. This will, for instance, take place at the end of each tune; but if the lever Q′ is depressed in its lower position its hook q^3 will prevent the lever Q^2 from stopping the regulator and the movement will continue to play.

The silent click shown in Figs. 1 and 13 is intended to prevent the backward motion of the axis of the spring-motor and to allow the winding up of the same. To the motor-axis there is affixed a ratchet-wheel S, in front of which there is a click T pivoted at t to a suitable bearing on the base-plate A. To the said click T there is hinged a strap or skid U formed and disposed so as to bear tangentially against the teeth of the ratchet-wheel S when the latter is rotated, as shown by an arrow in Fig. 13, for winding up the mainspring, thereby holding the tooth of the click T out of reach of the ratchet-wheel S or to allow the tooth of said click T to again engage the ratchet-wheel S when the latter rotates in the reverse direction.

Having thus fully described my invention, I claim—

1. In musical instruments the combination of one or more sonorous combs with a series of star-wheels F, a continuously-rotating shaft E receiving such star-wheels, each star-wheel being provided with a projection f and a split ring engaging the projection, levers l having each a nose l' bearing against the perforated sheet K, the spring $l^{\times}$, a tooth l^2 intended to catch the teeth of the star-wheel F when the nose l' of lever l is engaged in a hole of the perforated sheet K and an arm l^3 engaging the fork $m^{\times}$ of a rocking lever M, the two arms m^4 and m^5 of which act upon the dampers m' and m^2 so as to either press the same against or retract the same out of reach of the prongs of the sonorous combs C and D, without the star-wheel F acting directly upon the dampers m' and m^2 substantially as shown and described.

2. The combination with a musical instrument adapted to be operated by a perforated sheet, of a guide-arm K′ to hold the perforated sheet K in position, a ranger V formed as a comb, a series of star-wheels acted upon by the perforated sheet, and means for moving the ranger V by the arm K′ and means for moving such ranger and bringing the teeth of the star-wheels into line when the arm K′ is raised, substantially as specified.

3. In a musical instrument, the combination with a motor of the wheels b' and b^2, the pinion e and its shaft E, the star-wheels F

upon the shaft E, the pinion i and its connecting-pinion I loose upon the shaft E and driven by the motor to act upon the perforated sheet K, substantially as specified.

4. In musical instruments acted upon by a spring-motor, the combination of the elastic wings H′ and H² with arms h^2 and a cone N capable of being raised or lowered by hand but prevented from rotating by means of a projection n entering a recess p with a helical bottom, with a hand-knob P, substantially as shown and described and for the purpose specified.

5. In musical instruments the combination with a catch R having three notches, of a stop-lever Q′ having an arm q^2 to be acted upon by hand and a hook or projection q^3 projecting over the adjacent lever Q² and a spiral spring q^5, substantially as and for the purposes specified.

6. In musical instruments the combination of a ratchet-wheel S with a click T having a skid U pivoted to the said click T in a point situated between the fulcrum t of the said click and its tooth, substantially as specified.

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

ALEXIS VERNAZ.

Witnesses:
G. MERHLMENT,
BENJ. H. RIDGELY.