(No Model.)

E. PAILLARD.

MUSICAL BOX.

No. 268,273. Patented Nov. 28, 1882.

Fig. 1

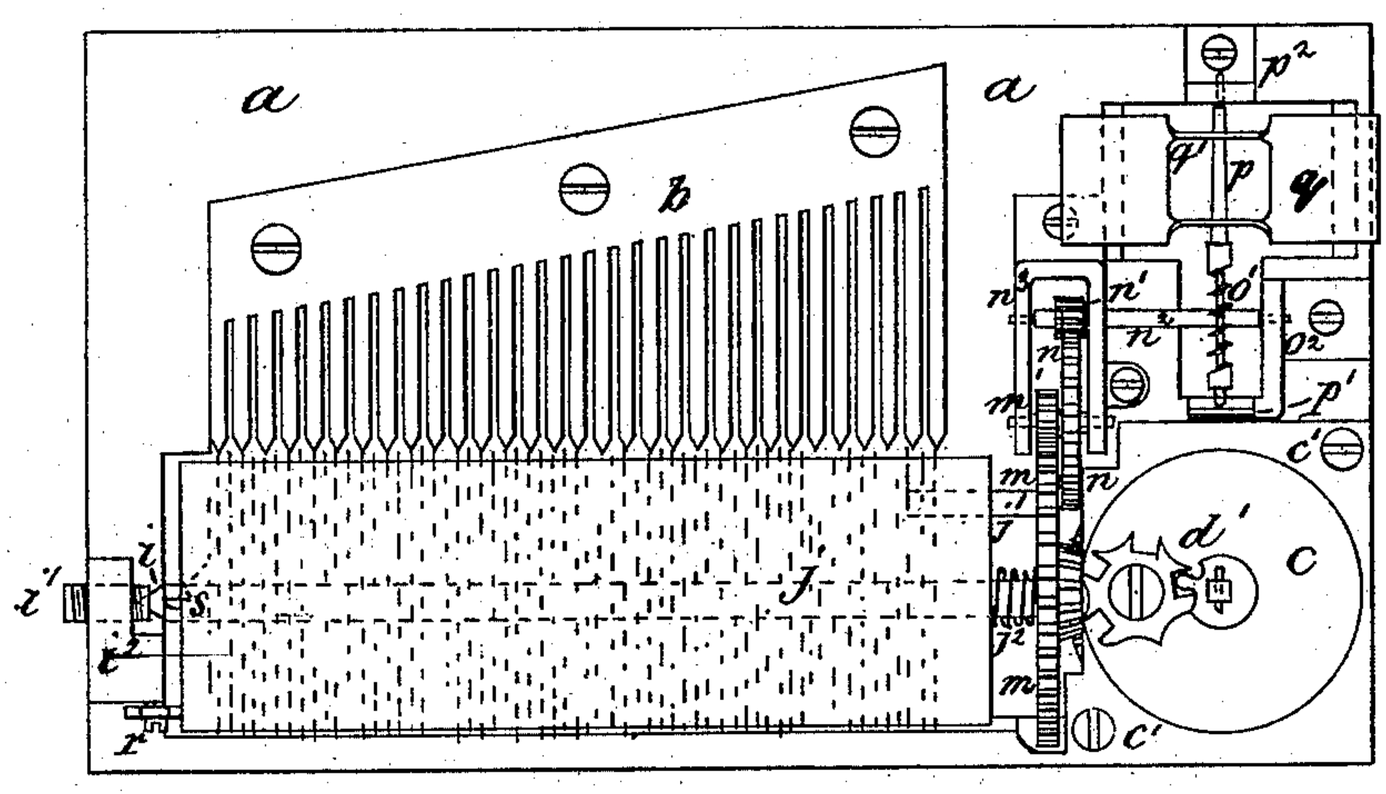


Fig. 2

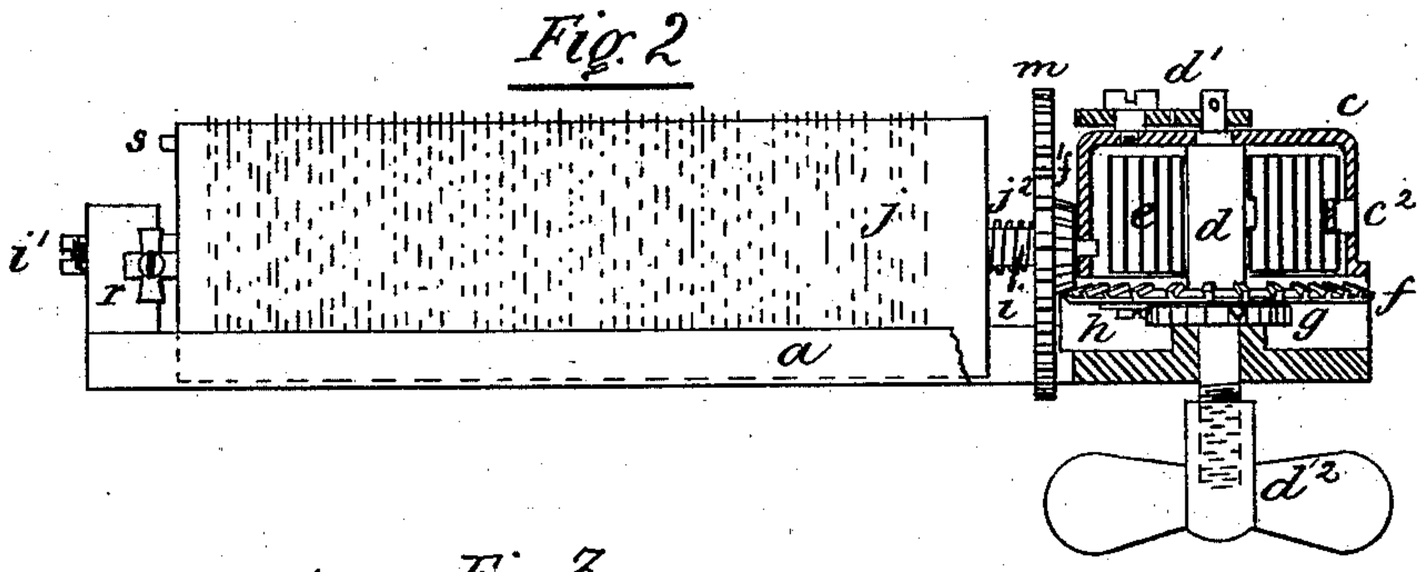


Fig. 3

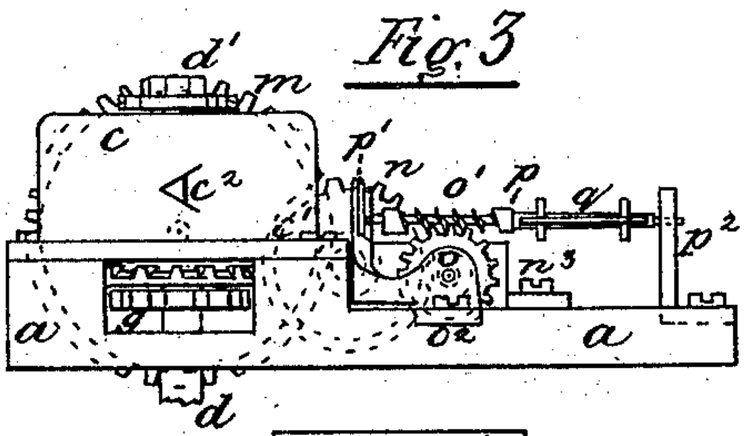


Fig. 4

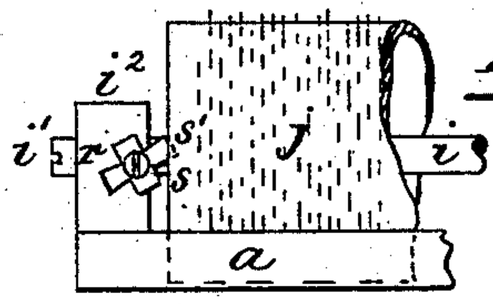


Fig. 5

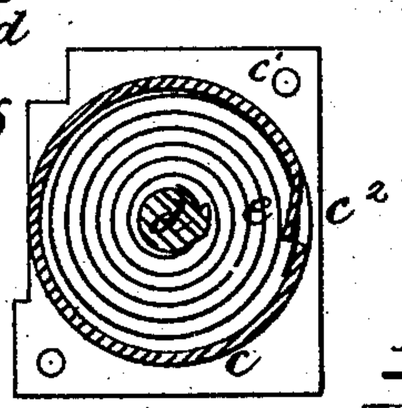


Fig. 6

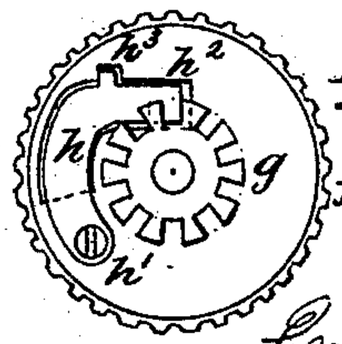
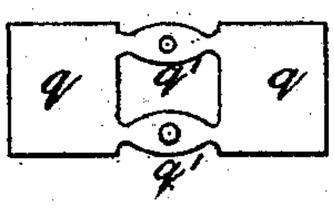


Fig. 7.



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UNITED STATES PATENT OFFICE.

ERNEST PAILLARD, OF SAINTE-CROIX, SWITZERLAND, ASSIGNOR TO M. J. PAILLARD & CO., OF NEW YORK, N. Y.

MUSICAL BOX.

SPECIFICATION forming part of Letters Patent No. 268,273, dated November 28, 1882.

Application filed May 6, 1882. (No model.) Patented in Germany July 11, 1881, No. 27,520.

To all whom it may concern:

Be it known that I, ERNEST PAILLARD, of Sainte-Croix, Canton de Vaud, Switzerland, have invented certain new and useful Improvements in Musical Boxes, (for which I obtained a patent in Germany, No. 27,520, and bearing date the 11th day of July, 1881,) of which the following is a specification.

The improvements in musical boxes forming the subject of this invention relate to the retaining ratchet and pawl of the spring-arbor, the spring-drum, the speed-regulating gear, the tune or air changer, and the pin-barrel shaft. The retaining-pawl of the driving spring-arbor is stamped out from a comparatively thick piece of sheet-steel, and is so shaped as to have sufficient elasticity to spring sidewise into the notches of the ratchet-wheel without requiring hardening and tempering. It is secured to the side of and located in an opening formed through the bevel-wheel which is on the arbor, and imparts the power of the mainspring to the pin-barrel. The spring has a projection on its side, which fits into a notch, forming part of said opening in the bevel-wheel, in line with the direction of strain exerted on the pawl by the ratchet-wheel, said ratchet-wheel being secured to the arbor in close proximity to the bevel-wheel.

The improvement in the spring-drum consists in making it of sheet metal, stamping it out in the desired shape, and then drawing it into proper form, all of the holes therein for the screws which secure the drum to the frame, &c., for the arbor and other bearings, being punched at one time. The retaining-hook for holding the end of the mainspring is also a part of the drum, and is formed by cutting and bending inwardly an angular piece from the side of the drum. By this arrangement the spring-hook never becomes loose, nor is it liable to break, as do and are the hooks which are riveted in the side of the drums as heretofore made. Besides, these drawn-metal drums are stronger and cheaper than those of cast metal. They are perfect duplicates on account of all the holes being made in them at one operation, thus saving time in putting up the movements and in making repairs.

In the train of wheels of the regulating-gear of musical boxes heretofore made considerable noise is produced on account of the high speed of the fan, &c. This noise I eliminate by using a much larger fan and a lighter fly-wheel and running them at a lower speed, which I am enabled to do by certain improvements in the wheel and pinion bearings, they all being stamped out and formed up of sheet metal, and a further saving is had in obtaining the desired result by using one less wheel and pinion in the train; and the pin-barrel shaft is formed with taper end, which is supported in an adjustable screw.

I will now refer to the accompanying drawings to more fully explain the construction and operation of my improvements in musical boxes.

Figure 1 is a plan view. Fig. 2 is a side elevation, with the spring-drum in section. Fig. 3 is an end view. Fig. 4 is a part side elevation, showing the air-changer in operation. Fig. 5 is a plan sectional view of the spring-drum. Fig. 6 is an underneath view of the bevel-wheel, showing the retaining pawl and ratchet; and Fig. 7 is a plan view of the fan as stamped out and before being bent into shape.

The main frame *a* and comb of keys *b* are substantially of the ordinary construction. At one corner of the main frame *a* is a recessed projection, on which is secured the spring-drum *c* by means of the screws *c' c'*, passing through its flange. These screw-holes, as well as the central hole for the bearing of the upper end of the arbor *d* and the hole for the stud of the winding safety device *d'*, which is of the ordinary construction, are formed in the drum, after it is drawn into the shape shown, at one operation.

In the side of the drum *c* is cut and pressed inwardly an angular piece, c^2, which forms the hook for holding the outer end of the mainspring *e*, as shown in Figs. 3 and 5, and the inner end of the spring *e* is held by a hook on the arbor *d*. Immediately below the drum *c* is the bevel-wheel *f*, fitted to turn on the arbor, and below the bevel-wheel, rigidly secured to the arbor, is the ratchet-wheel or notched disk

g. These are located in the recess of the projection on which the drum *c* is secured, and the arbor *d* has its lower bearing in the bottom of the recess and extends beyond the bottom of the main frame, where it is provided with the winding-key d^2, screwed thereon.

On the under side of the bevel-wheel *f* is secured by the set-screw *h'* the spring-pawl *h*, which is cut out of comparatively thick sheet-steel in the shape shown at Fig. 6. It is bent up into a correspondingly-shaped opening made through the bevel-wheel *f*, and its end h^2 is bent down to catch sidewise into the notches of the ratchet-wheel *g*, and on the side of the spring, in line with the thrust of the ratchet-wheel on the end h^2, is formed the projection h^3, which bears against the side of a recess formed in the opening in the bevel-wheel, so that none of the strain of the mainspring *e* is felt by the spring part of the pawl *h*, which is between the projection h^3 and the holding-screw *h'*, and which is made sufficiently long to impart to the pawl resilience without necessitating hardening and tempering the same. By this construction I am enabled to obviate one of the principal sources of trouble of this class of instruments, as the retaining-springs and the pawls of the same, as now made, are continually breaking.

The shaft *i* of the pin-barrel *j* is fitted at one end to rotate in a bearing made therefor in the side of the spring-drum *c*, and its other end is pointed and rests in a conical hole in the end of the adjustable screw *i'*, fitted in the standard i^2, projecting up from the main frame *a*. On this shaft *i* is secured the bevel-pinion *f'*, meshing into the bevel-wheel *f*, and the gear-wheel *m*, which meshes into the pinion *m'*, secured to the side of the intermediate wheel, *n*, which imparts motion by the pinion *n'* on the spindle or shaft n^2 to the fly-wheel *o*. The pinion *m'* and wheel *n* rotate in bearings in the frame n^3, as does also one end of the shaft n^2. The other end of this shaft works in the frame o^2. Above the fly-wheel *o* is located in a horizontal position the fan-spindle *p*, on which is cut the screw *o'*, into which works the teeth of the fly-wheel *o*. One end of the spindle *p* is pivoted in an arm forming part of the frame *o'*, and as this end is the thrust end a simple anti-friction bearing is provided for it by slotting the arm at right angles to the spindle *p* and inserting therein a small piece of hardened steel, *p'*, against which the end of the spindle bears. The other end of the spindle *p* has a bearing in the bracket-frame p^2, and on it, between this frame and the fly-wheel *o*, is placed the fan *q*. This fan *q* is much larger than ordinarily, and is cut from thin sheet metal, as shown at Fig. 7. The connecting-pieces *q' q'* being centrally perforated, they are then bent at right angles to the resisting-planes *q*, and the spindle *p'*, which is slightly taper, is passed through their central holes, as shown at Fig. 1. The adjustable screw *i'* allows the barrel *j* to be readily removed and all end-play of shaft *i* to be taken up. By this arrangement of the speed-regulating gear I eliminate an intermediate wheel and pinion, as required in the regulating-gear of musical boxes heretofore, saving the friction due to the same, which enables me to make the fly-wheel lighter and the fan larger, whereby the speed of the pin-barrel is maintained uniform and correct by a much less number of revolutions of the fan, which in this system is only eleven hundred and twenty-five, as against two thousand three hundred and four in the old system, so that the wear and tear on the various parts is greatly reduced. Both ends of the shaft *i* may be made conical, if desired.

The frames and brackets n^3, o^2, and p^2 are all cut out of sheet metal, bent by formers into shape, and secured by screws to the main frame *a*, so that their renewal at any time is readily and cheaply accomplished.

The change of tune or air is accomplished by the barrel *j* being moved into different longitudinal positions on its shaft *i*, for which purpose it is fitted freely on the shaft *i*, and is caused to rotate therewith by the carrier *j'*, secured to the wheel *m* in the ordinary manner. Between the wheel *m* and the end of the barrel *j* on the shaft *i* is placed the spiral spring j^2, which keeps the other end of the barrel against my improved air-changer. This air-changer consists simply of the cog-plate *r*, fitted to turn freely on a screw-stud on the standard i^2 at right angles to the axis of the barrel.

The teeth of the cog-plate *r* are of different lengths, and their ends are flat, and the end of the barrel bears against the end of the tooth adjacent thereto, as shown at Figs. 1 and 2, it sliding on the end of the tooth until the short pin *s*, projecting out from the end of the barrel, comes in contact with this tooth, thereby turning the cog-plate *r* round and bringing the succeeding tooth against the end of the barrel, the barrel having a depression, *s'*, just behind the pin *s* to allow the front corner of the tooth to catch therein as the cog-plate is being turned, as shown at Fig. 4, to insure the end of the tooth assuming a flat position with the end of the barrel. Four teeth are shown in the cog-plate *r* in the drawings, the diametrically-opposite ones being of the same length, so that only two positions are assumed by the barrel *j*. Consequently with this air-changer the instrument is adapted to play only two tunes or airs. For a three-air changer the plate will have three teeth of different lengths, or six teeth having three different lengths, arranged, if desired, to repeat each or any of the airs, or to cause the barrel to render the three airs consecutively; and it will readily be seen how an air-changer embodying this principle may be made to shift the barrel into any number of positions and in any order desired. This tune-changer, although here shown and described, is not claimed in this specification, but forms the subject-matter of another application for Letters Patent filed by me August 24, 1882.

It is obvious that each and any number of the improvements hereinbefore set forth may be applied to musical boxes, and that their

construction may be modified and their positions in relation to one another may be changed without departing from the nature of my invention—as, for instance, the air-changer may be placed at the other end of the barrel, either to work against a flange attached thereto or against its end, and the barrel-spring placed to act against the other end, and the spring-drum and arbor may be placed at right angles to the position occupied by them, as shown, and motion imparted to the pin-barrel by straight wheels instead of bevel-wheels.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A drawn sheet-metal mainspring-drum having a hook in the interior integral therewith, formed by a part of the side cut, and bent inwardly, substantially as and for the purpose set forth.

2. A retaining-pawl for mainspring-arbors formed from sheet metal and secured to the side of a wheel running free on the arbor, and provided with a projection which bears against the side of a recess in the wheel in line with the catching end of the pawl, in combination with a ratchet or notched disk wheel secured to the arbor, substantially as and for the purpose set forth.

3. As an improvement in fly-fans for regulating the speed of gear-trains, the same cut from sheet metal with the two resisting-planes connected by bars centrally perforated, which are afterward bent at right angles to the planes to form the means by which the fan is secured to its spindle, substantially in the manner hereinbefore set forth.

4. In combination with a high-speed rotating spindle, a metal bearing-frame slotted at right angles to the spindle, and a hardened-steel step inserted in said slot, thereby forming the thrust-bearing for the spindle, substantially as set forth.

5. In combination, the drawn sheet-metal drum *c*, having a flange provided with holes for the holding-screws *c'*, and a sprink-hook, c^2, integral therewith, the mainspring *e* and arbor *d*, substantially as set forth.

6. In combination, the arbor *d*, wheel *f*, spring-pawl *h*, provided with projection h^3, fitting in a recess in an opening in the wheel *f*, and the ratchet-wheel or notched disk *g*, substantially as set forth.

7. In combination, the wheel *m* on the barrel-shaft *i*, pinion *m'*, wheel *n*, pinion *n'*, fly-wheel *o*, screw-spindle *p*, fan *q*, and their bearing-frames and brackets n^3, o^2, and p^2, substantially as set forth.

8. In a musical box, the pin-barrel shaft *i*, provided with a conical end bearing, in combination with the adjustable screw *i'*, provided with a conical hole in its end, as and for the purposes set forth.

In witness whereof I have hereunto set my hand, at Sainte-Croix, Canton de Vaud, Switzerland, this 24th day of November, A. D. 1881.

ERNEST PAILLARD.

Witnesses:

EUGÉNE THORENS,

PAUL GOLAY.