

(No Model.)

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F. E. P. EHRLICH & G. A. F. MÜLLER.

MUSICAL BOX.

No. 398,241.

Patented Feb. 19, 1889.

Fig. 1.

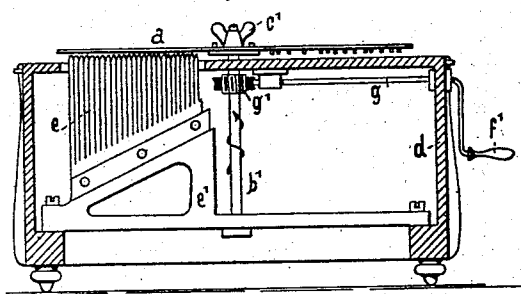


Fig. 2.

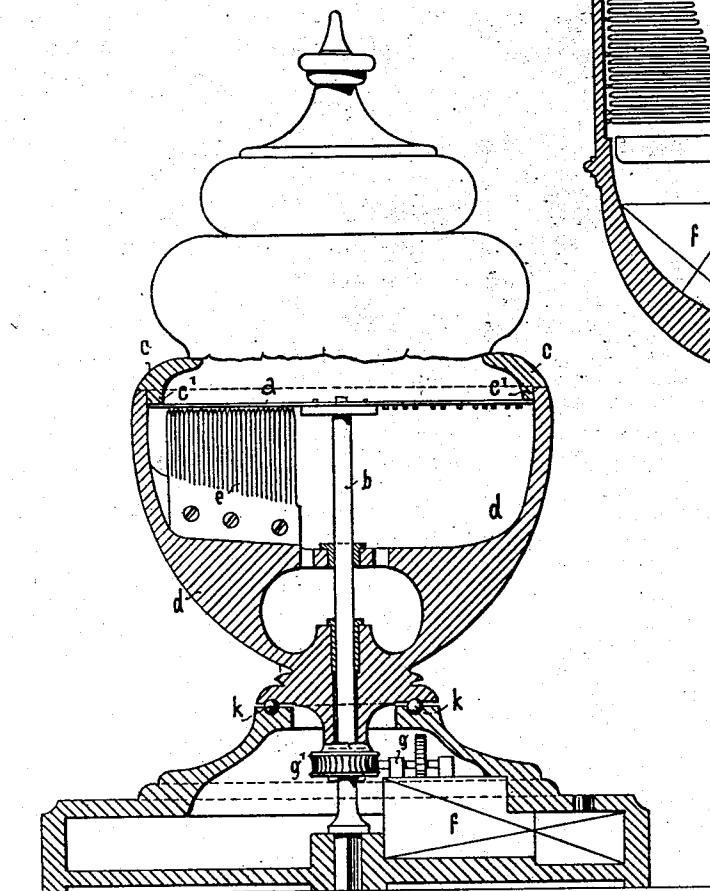
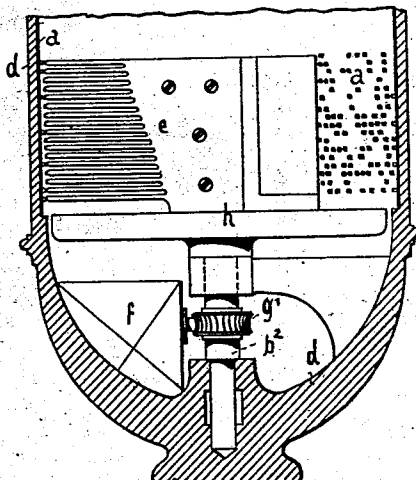


Fig. 3.

Witnesses:
Ewell
Malcolm

Inventors:
F. E. Paul Ehrlich &
Gustav A. F. Müller
by *Marcellus B. Biley*
their atty.

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UNITED STATES PATENT OFFICE.

FRIEDRICH ERNST PAUL EHRLICH, OF GOHLIS, NEAR LEIPSIC, SAXONY, AND
GUSTAV ADOLPH FÜRCHTEGOTT MÜLLER, OF BERLIN, GERMANY, AS-
SIGNORS TO THE FABRIK LEIPZIGER MUSIKWERKE, VORMALS PAUL
EHRLICH & CO., OF GOHLIS, NEAR LEIPSIC, GERMANY.

MUSICAL BOX.

SPECIFICATION forming part of Letters Patent No. 398,241, dated February 19, 1889.

Application filed January 17, 1887. Serial No. 224,629. (No model.) Patented in Germany June 16, 1885, No. 33,761; in France July 24, 1886, No. 150,198; in England July 28, 1886, No. 9,742; in Belgium September 6, 1886, No. 74,465, and in Italy September 11, 1886, XL, 376.

To all whom it may concern:

Be it known that we, FRIEDRICH ERNST PAUL EHRLICH, a subject of the King of Saxony, residing at Gohlis, near Leipsic, Kingdom of Saxony, German Empire, and GUSTAV ADOLPH FÜRCHTEGOTT MÜLLER, a subject of the Prince of Reuss, residing at Berlin, Kingdom of Prussia, German Empire, have invented new and useful Improvements in Musical Boxes, (for which we have obtained Letters Patent in Germany, No. 33,761, June 16, 1885; Great Britain, No. 9,742, July 28, 1886; France, No. 150,198, July 24, 1886; Belgium, No. 74,465, September 6, 1886, and in Italy, No. 376, Vol. XL, September 11, 1886,) of which the following is a specification.

Our invention relates to musical boxes or mechanical musical apparatus wherein musical sounds are produced by the vibration of tuned tongues, forks, or other like sound-producing agents; and the invention consists, essentially, in the improved arrangements and combinations of parts hereinafter described, whereby the said musical boxes or apparatus are enabled to play an unlimited number of different tunes by means of readily-changed music-sheets, disks, or plates of a circular or endless-band shape.

In apparatus constructed according to this invention the sound-producing agents are operated by direct contact with projections or their equivalents on the music-sheet, and the apparatus may be operated either directly by hand or by the intervention of a mechanism moved by a spring (motor-spring) or otherwise.

In order that our said invention may be fully understood, we shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheet of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figures 1, 2, and 3 of the accompanying drawings illustrate in vertical section different forms of apparatus constructed according to this invention and in which the sound-pro-

ducing agents are caused to vibrate by coming in direct contact with the music-sheets.

In the various forms of musical boxes interchangeable music-sheets (corresponding to different airs) are employed provided with pins or elevations and depressions, the relative positions of which are determined by the music to be played, and wherein these pins or elevations are caused to act directly upon the metal tongues when the instrument is playing.

According to the arrangement illustrated in Fig. 1, a series of metallic tongues, *e*, are fixed to a plate or support, *e'*, in a case, *d*, and the music-sheet, consisting of a disk, *a*, with concentrically-arranged pins or projections, is placed upon a carrier-plate on a spindle, *b'*, which can be rotated by a handle, *f'*, operating a spindle, *g*, and a worm and worm-wheel, *g'*. The music-sheet must possess sufficient stiffness (being made of a suitable metal, for example) so that when rotated to cause the annular rows of pins to pluck or act upon the tongues *e* the sheet shall not be liable to be distorted, but will remain in the same plane. By operating a fixing device—such as the thumb-nut *c'*—the music sheet or disk can be removed and another disk introduced in its place with the greatest facility and rapidity.

Fig. 2 illustrates a modified form of the apparatus, in which the case *d* is made in the form of a vase with a cover, *c*, the only difference from the above-described arrangement being that the reciprocal action between the tongues and the music-sheet is reversed. A music sheet or disk, *a*, provided with suitably-adjusted pins or projections, is secured upon a spindle or pillar, *b*, fixed in the base of the case, and is secured or held down at its edges or periphery by a rim or projection, *c'*, on the interior of the cover, which prevents the disk from rising out of its place. The metallic comb of tongues *e* is radially fixed in the interior of the case. The body *d* of the vase forming the case is capable of rotating, being supported on anti-friction balls *k*, for ex-

ample, and has a slow rotary motion imparted to it by a motor-spring arranged at *f* acting on suitable intermediate gear, *g g'*. By these means the tongues *e* are caused to travel round the under surface of the disk *a*, and successively are brought in contact with the different radiuses formed by the projections on the disk in such a manner as to produce the tune required. The vase is composed of any material that is favorable to the production of the musical sounds, and may be made to promote the resonance or effectiveness of the instrument by providing it with suitable reverberating surfaces or vibrating bodies and by forming suitable holes in the sides or cover. It is evident that the apparatus may be worked directly by hand by simply substituting a crank-handle for the motor-spring *f*. It will be readily understood that instead of moving the tongues *e* round the under surface of the disk *a* this disk may be put in rotary motion, such as described with reference to Fig. 1, while the vase *d*, with cover *c*, is held at rest. In this case, of course, the anti-friction balls *k* are dispensed with and rotary motion is imparted to the spindle *b*. This may be effected by providing a pivot on the lower end of the spindle *b* and a bearing to receive that pivot, while the worm-wheel *g'*, instead of being fixed on the lower projection of the case *d*, is to be fixed on the spindle *b* itself.

Fig. 3 illustrates another form of apparatus embodying this invention. In this case the music-sheet *a* is in the form of an endless band or cylinder which is inserted into the body of the vase and fixed in position therein. The comb *e* is firmly attached to a revolving plate or turn-table, *l*, on a spindle, *b'*, working in bearings provided in the case, and having

a slow rotary motion imparted to it by a spring and gear at *f* and *g'*, so that the metal tongues are brought in contact at the proper times with the projections on the music-sheet, and are thereby caused to emit the desired sounds.

From an inspection of Fig. 2 of the accompanying drawings it will be understood that a musical box or mechanical musical instrument or apparatus constructed according to this invention, on account of its being inclosed in a hollow case susceptible of tasteful decoration—such as a vase or urn—forms an elegant ornament for a room. The vase form is at the same time highly favorable to the advantageous production of the sound.

We claim as our invention—

1. In a mechanical musical instrument or musical box, the combination of a music-sheet having pins or projections, the comb of tuned tongues revolvably mounted in position, means for revolving said comb of tuned tongues, and the cover or lid having a circumferentially-projecting rim resting upon said music-sheet, substantially as and for the purpose set forth.

2. In a mechanical musical instrument or musical box, the combination of a music-sheet having pins or projections with a cover or lid, *c*, having a circumferentially-projecting rim, *c'*, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses:

FRIEDRICH ERNST PAUL EHRLICH.

GUSTAV ADOLPH FÜRCHTEGOTT MÜLLER.

Witnesses:

ALFRED A. WHITMAN,

CARL BORNGRAEBER.