

No. 624,955.

Patented May 16, 1899.

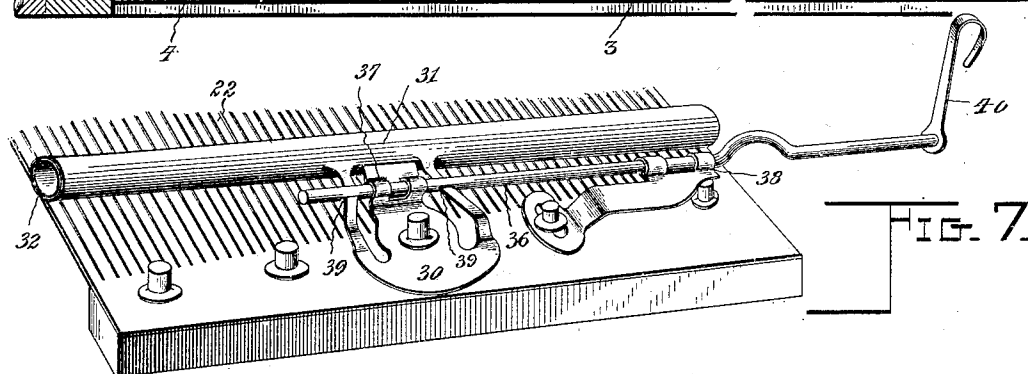
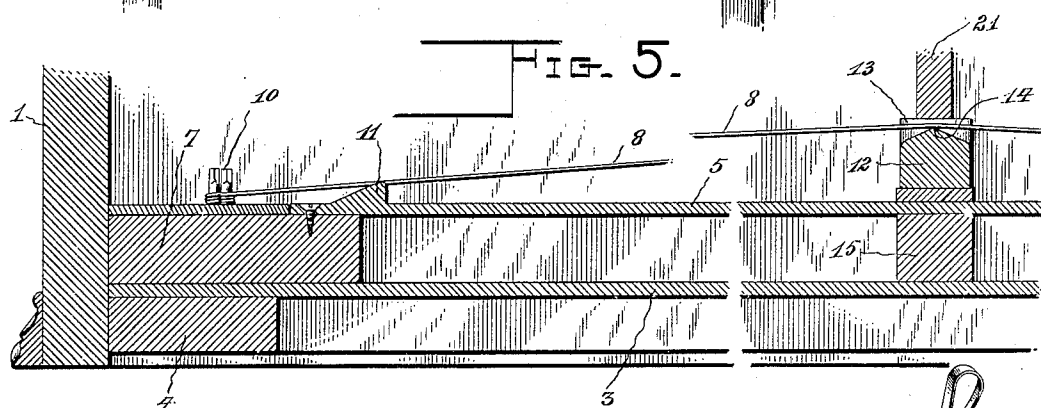
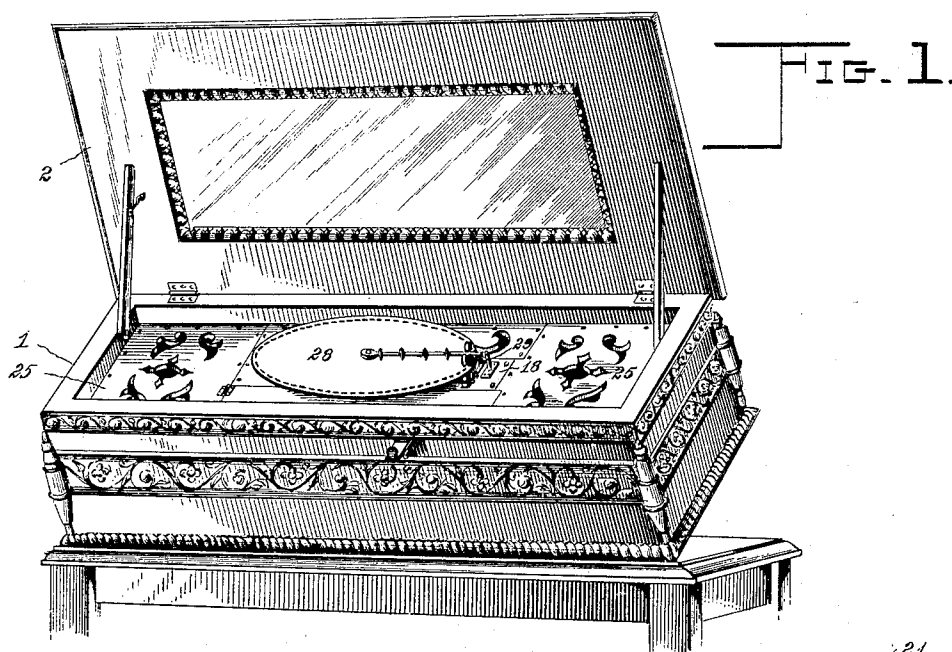
L. D. MARKLE.

MUSIC BOX.

(Application filed Apr. 9, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

John F. Deufferwiel -

[Signature]

By *his* Attorneys,

Levi D. Markle Inventor

Chas. H. Snow & Co.

No. 624,955.

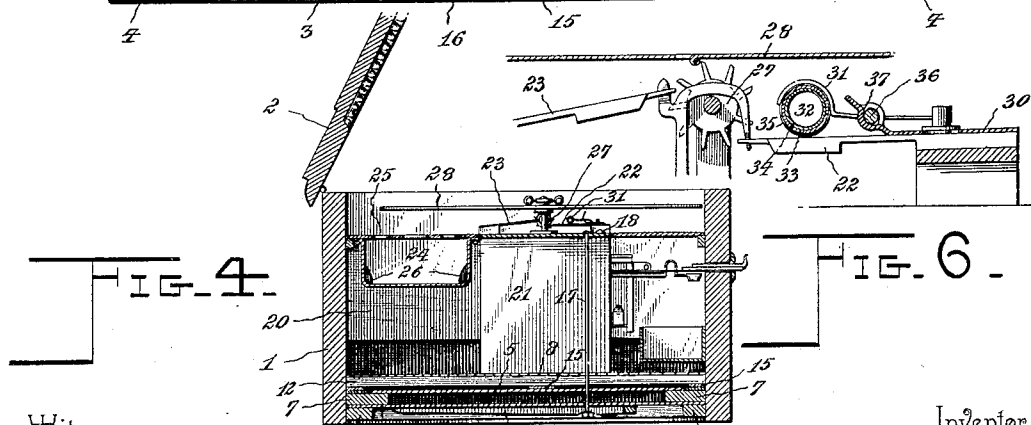
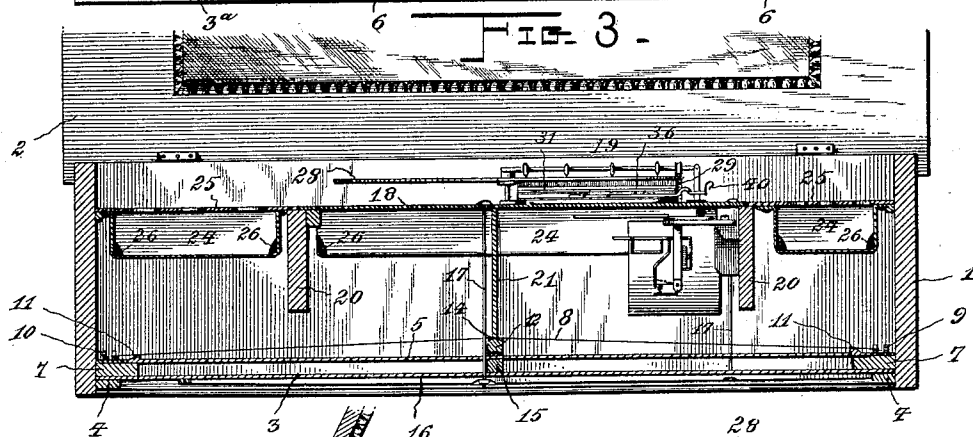
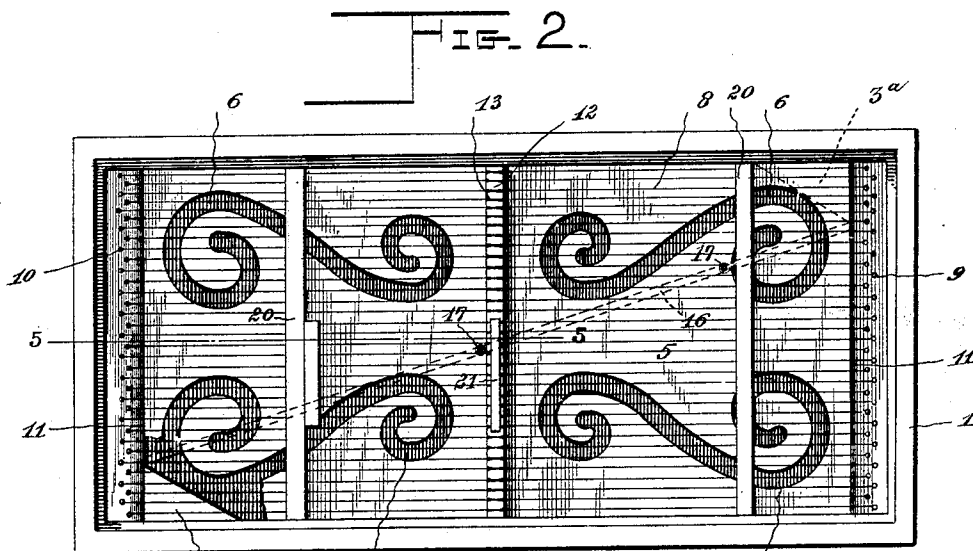
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John F. Deufferwiel

By his Attorneys,

Leri D. Markle

Inventor

[Signature]

Chas. H. Snow & Co.

UNITED STATES PATENT OFFICE.

LEVI D. MARKLE, OF NORWICH, NEW YORK.

MUSIC-BOX.

SPECIFICATION forming part of Letters Patent No. 624,955, dated May 16, 1899.

Application filed April 9, 1898. Serial No. 677,019. (No model.)

To all whom it may concern:

Be it known that I, LEVI D. MARKLE, a citizen of the United States, residing at Norwich, in the county of Chenango and State of New York, have invented a new and useful Music-Box, of which the following is a specification.

My invention relates to musical instruments, and particularly to music-boxes, and has for its object to provide improved sound multiplying and distributing devices adapted especially for use in connection with music-boxes, whereby with an operating or tone-producing mechanism of small size a volume of sound having extensive carrying qualities may be obtained, and, furthermore, to provide a simplified and improved construction of cithern attachment for use in connection with plural-comb sound-producing devices.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a music-box constructed in accordance with my invention. Fig. 2 is a plan view of the same with the sound-boxes and sound-producing mechanism omitted to show the construction and arrangement of the sounding-plates and sympathetic strings. Fig. 3 is a longitudinal section. Fig. 4 is a transverse section. Fig. 5 is an enlarged partial longitudinal section on the plane indicated by the line 5-5 of Fig. 2. Fig. 6 is a detail transverse section of the sound-producing mechanism to show the arrangement of the cithern attachment with relation thereto. Fig. 7 is a detail view in perspective of the cithern attachment applied in operative position to the comb by which it is affected.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

In a casing 1, having side and end walls and a suitable cover 2, is arranged a horizontal wooden sounding-board 3 coextensive with the interior of the casing, with the exception that the diagonally opposite corners thereof are cut away to form triangular openings 3^a (shown in Fig. 2) to allow circulation of air through the interior of the casing and at the same time allow a more complete communi-

cation of the vibrations of the sounding devices and of the incased volume of air to the exterior or surrounding atmosphere. In the construction illustrated this sounding-board 3 is supported by strips 4, secured to the walls of the casing and set up or back slightly from the lower edges of said walls, whereby when the casing is in a horizontal position, as indicated in Figs. 3, 4, and 5, the lower surfaces of said strips are removed from a supporting surface or base. Also supported in a horizontal position in the casing, parallel with and above the plane of the sounding-board 3, is a metallic sounding-plate 5, which may be suitably scrolled, as indicated in Fig. 2, or provided with openings 6, which are approximately of an area equal to the combined areas of the openings 3^a in the sounding-board and for an analogous purpose—namely, to allow a circulation of air through the interior of the casing. This sounding-plate, which is also approximately coextensive with the interior of the casing, is supported at its edges by strips 7, to which it is permanently secured by means of screws or analogous devices, and stretched in parallel longitudinal positions above the plane of the sounding-plate are sympathetic strings 8, tuned in unison and terminally attached to securing-pegs 9 at one end of the casing and tuning or wrest-pins 10 at the opposite end of the casing, whereby the unison-pitch of the strings may be preserved. These sympathetic strings extend over terminal bridges 11, located, respectively, contiguous to the pegs and pins, and also over an intermediate bridge 12, supported by the sounding-plate, said intermediate bridge being provided with notches or seats 13, of which the floors are ridged, as shown at 14, to form reduced bearings for the strings 8. The sounding-board 3 and plate 5 are spaced apart under the intermediate bridge 12 by means of a spacing-block 15, and extending diagonally under the sounding-board 3, approximately from one angle of the casing to the diagonally opposite angle, is a sounding-bar 16, (shown in Figs. 3 and 4 and also in dotted lines in Fig. 2,) and engaged with this sounding-bar at points upon opposite sides of the plane of the intermediate bridge 12 are tension-bolts 17, which extend vertically downward from the base-plate or secur-

ing-plate 18 of the sound-producing apparatus 19, said base-plate resting upon suitable transverse supports 20 in the casing above the plane of the sympathetic or sounding strings 8 and also having a bearing upon a sounding-post 21, which in turn is seated upon the upper surface of the intermediate bridge 12. Thus the vibrations of the base-plate 18 of the sound-producing apparatus are communicated through the sound-post directly to the intermediate bridge which supports the sympathetic or sounding strings and also through said bridge to the sounding-plate 5, and from thence through the spacing-block 15, which performs the function of an auxiliary sounding post or block, to the sounding-board 3, and by increasing the tension of the bolts 17 the several vibratory sounding devices, including the board 3, plate 5, and strings 8, may be strained upwardly at intermediate points to increase their tension, and thus the rapidity of the vibrations thereof and correspondingly the intensity of the sound-increasing qualities thereof, by making said sounding devices more sensitive to the sound-waves originating in the sound-producing apparatus.

In practice the sympathetic or sounding strings 8 are tuned in unison to accord with an intermediate tongue of the combs 22 and 23, which form the sounding elements of the apparatus 19, and the object in tuning said strings in unison rather than chromatically is to obtain the resonance of the strings in connection with the sounding-plate and sounding-board without causing the sounding or singing of the strings in any special distinctive tone. By thus tuning the strings in unison I can utilize the sound-augmenting qualities thereof to increase the amplitude of vibration of the sound-waves without causing a confusion of sounds and without necessitating the use of a damper or other means in connection therewith for checking the vibration when it becomes pronounced. A further advantage of the unison tuning of the strings is to produce an even tension thereof, and thus apply a uniform pressure to all portions of the bridge to produce an even tension throughout the sounding-plate and sounding-board. This avoids the warping or unequal straining of the parts of the structure.

In addition to the above-described means for increasing the volume of tone produced by the sounding-tongues, and preferably located in a series above the plane of said sounding devices, I employ resonance-boxes 24, constructed of sheet metal, galvanized iron being the material which I have found by experiment to be that which is best suited to the purpose. These boxes have a reverberatory function and are fitted at their upper sides with wooden diaphragms 25, which are preferably scrolled to allow communication and circulation of air, the lower corners or angles of the boxes being preferably cut away, as shown at 26, for communication with the in-

terior of the casing. Located, as above indicated, above the plane of the sounding board and strings and approximately in the plane of the sound-producing apparatus and supported by the same means—namely, the brackets or cross-bars 20 and the sounding-post 21—these resonance-boxes add vastly to the volume of the tone produced by the structure and impart a solidity to the tone, which enables the combs of a small sound-producing device 19 to be heard distinctly for great distances and throughout a large building from the fact that the quantity of air which is affected by the vibrations of the various parts is extensive. It will be noted that the resonance-boxes are connected with the casing and the supports therein solely by means of the diaphragms 25, the metallic body portions of the boxes being flanged at their upper edges and secured to the under surfaces of said diaphragms, whereby the boxes are practically supported in a pendent position within the interior of the casing and spaced from the plane of the stretched or vibratory sounding devices, consisting of the above-described board 3, plate 5, and strings 8.

The sound-producing apparatus 19, as hereinbefore described, preferably includes a plurality of combs 22 and 23, having unison-tongues adapted to be sounded simultaneously by means of the spur-wheels 27, as in the ordinary practice, said spur-wheels being actuated by the disk 28, with which is engaged a feed-wheel 29, which may be actuated by any suitable means, but forming no part of my present invention. In connection with one of the combs, however, and preferably the lower comb 22, is arranged a cithern attachment, including a spring-armed supporting-plate 30, having a semitubular seat 31, of which the open side is turned downwardly or toward the plane of the tongues of the comb 22, and a transversely-compressible elastic contact-tube 32, fitted in said semitubular seat 31 and projecting through the lower open side of the seat for contact with said tongues. The function of this contact-tube is, when desired, to bear with greater or less pressure upon the tongues of the comb 22 at an intermediate point, and thereby shorten and sharpen the vibrations of the tongues in order to produce a cithern or guitar like effect. It is desirable, however, not only to shorten the vibrations of one set of tongues, in order to give them a twang, but to accomplish said object without detracting materially from the resonance thereof, and in order that this may be accomplished I have found it necessary to employ a special construction of contact-tube having sufficient compressibility to allow it to spread upon the surfaces of the tongues and yet return promptly to its expanded position when the pressure is released, and, furthermore, to allow said compression or spreading of the surface of the tube upon the tongues without exerting an excessive pressure there-
of upon the tongues. Therefore the construc-

tion of tube which I prefer embodies a double thickness or plural layers 33 and 34 of paper cemented together coextensively and covered exteriorly by a layer of cloth, fabric, or textile material 35. The function of the exterior layer of textile material is to soften the contact with the tongues to prevent buzzing. Thus with a construction of contact-tube as specified I can by bringing the same into light contact with the tongues slightly shorten and sharpen the vibrations, so as to produce the cithern or guitar effect, and by still further increasing the pressure I can add to this effect gradually, and, finally, when the maximum pressure is applied I can so deaden or damp the vibrations as to practically silence the tongues of the lower comb. Obviously the greater the pressure which is applied by the contact-tube to the tongues the greater will be the area of the tongues which is affected by the tube, owing to the spreading of the surface of the tube upon the tongues, and hence any intermediate effect between that of a slight shortening of the vibrations to the complete deadening thereof can be attained.

The means illustrated in the drawings for operating the contact-tube includes a cam-rod or spindle 36, mounted in suitable bearings 37 and 38 and having cut-away or cam faces 39 for contact with the arms of the plate 30, one or both of said bearings having sufficient frictional contact with the surface of the spindle to hold it at any desired revoluble adjustment. The spindle is preferably provided with a terminal handle 40.

A further advantage of the vibratory sounding devices is derived from the fact that the sounding-plate is trussed by means of the sounding-strings in that the strings rise from their points of attachment to the casing to their point of bearing upon the intermediate bridge 12, and hence strain downwardly upon said intermediate bridge, and this downward pressure is obviously communicated through the spacing-block 15 to the intermediate or unsupported portion of the sounding-board. Thus when the tension of the sounding-board and sounding-plate is increased by the tightening of the tension-bolts 17, which tend to raise said board and plate slightly at their centers, the tension of the sounding-strings is correspondingly increased.

It is obvious that in practice various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. A music-box casing having a sounding-board, sound-producing mechanism spaced from the plane of the sounding-board, sympathetic or sounding strings arranged between the sound-producing mechanism and the plane of the sounding-board and terminally attached to fixed portions of the casing

beyond the edges of the sounding-board, and a bridge supported by the sounding-board at an intermediate point and spanned by said strings which decline toward the plane of the sounding-board as they recede from the plane of the bridge to exert upon the sounding-board a perpendicular pressure in a direction outward or from the sound-producing mechanism, substantially as specified.

2. A music-box casing having a terminally-supported sounding-board forming one wall of the casing, sound-producing mechanism spaced from the plane of the sounding-board, a bridge spanning the sounding-board at an intermediate point, and sounding or sympathetic strings arranged within the casing, between said sound-producing mechanism and the sounding-board, terminally attached to fixed portions of the casing beyond the edges of the sounding-board, and spanning said bridge to exert an outward pressure upon the bridge in a direction perpendicular to the plane of the sounding-board, and all of said strings being tuned in unison to exert a uniform pressure upon the bridge at all points of contact therewith, substantially as specified.

3. A music-box casing having a trussed sounding-board including adjustable sounding or sympathetic strings and a bridge bearing upon the sounding-board at an intermediate point and spanned by said strings, whereby the strings exert upon the sounding-board a pressure in a direction perpendicular to the plane thereof, and a sounding-post terminally seated upon said bridge and bearing thereon in the same direction as the said sounding-strings, substantially as specified.

4. A music-box casing having a sounding-diaphragm, truss-strings spanning the diaphragm and exerting pressure in one direction upon an intermediate portion thereof, and a tensile-adjusting device connecting said diaphragm with a fixed object and straining the diaphragm in a direction opposite to said truss-strings, substantially as specified.

5. A music-box casing having a sounding-diaphragm carrying a bridge, truss-strings spanning the diaphragm and bearing upon said bridge to exert pressure upon the diaphragm in one direction perpendicular to its plane, a sounding-post stepped upon the bridge, and a tensile brace connecting the diaphragm with a fixed object to strain said diaphragm in a direction opposite to said truss-strings, substantially as specified.

6. A music-box casing having spaced parallel sounding-diaphragms connected at an intermediate point for simultaneous vibration, and a tension device for straining said diaphragms in a common direction perpendicular to their planes, to vary the tension thereof, substantially as specified.

7. A music-box casing having spaced parallel sounding-diaphragms connected at an intermediate point by an interposed sounding-block, and a tension device for straining said

diaphragms in a common direction perpendicular to their planes, to increase the tension thereof, substantially as specified.

8. A music-box casing having parallel spaced sounding-diaphragms, supported at their edges and connected at intermediate points by an interposed sounding-block, a sounding-bar spanning the exterior surface of one of the diaphragms, and a tension device connected with the sounding-bar for simultaneously straining the diaphragms in a direction perpendicular to their planes, to increase the tension thereof, substantially as specified.

9. In a music-box, the combination with a casing and a sound-producing apparatus arranged therein, of parallel spaced sounding-diaphragms connected at an intermediate point by an interposed sounding-block, and a tension-bolt connecting the base of the sound-producing apparatus with intermediate points of said diaphragms, for straining the latter in a direction perpendicular to the planes thereof, to increase their tension, substantially as specified.

10. In a music-box, the combination with a casing, and a sound-producing apparatus arranged therein and having a metallic base, of parallel spaced sounding-diaphragms disposed parallel with said base and connected at intermediate points by an interposed sounding-block, and a tension-bolt connecting the base of the sounding apparatus with said diaphragms at a point contiguous to the sounding-block, for straining the diaphragms in a direction perpendicular to the planes thereof, to increase their tension, substantially as specified.

11. In a music-box, the combination with a casing and a sound-producing apparatus arranged therein, of parallel spaced sounding-diaphragms, connected for simultaneous vibration, adjustable trussing devices spanning one of the diaphragms, and a tension-bolt connecting the base of the sounding apparatus with the sounding-diaphragms, for straining the latter in opposition to the pressure of the trussing devices, substantially as specified.

12. In a music-box, the combination with a casing and an inclosed sound-producing apparatus, of parallel spaced sounding-diaphragms connected at intermediate points for simultaneous vibration, sounding or sympathetic strings spanning one of the diaphragms and having a bearing upon a bridge at an intermediate point of said diaphragm, and connections between the sound-producing apparatus and said diaphragms, including a tension-bolt for straining the diaphragms in a direction perpendicular to their planes, and in opposition to the pressure of said strings, substantially as specified.

13. In a music-box, the combination with a casing and an inclosed sound-producing apparatus, of parallel spaced diaphragms, connected at intermediate points for simultaneous vibration, a bridge spanning the upper

diaphragm, sounding or sympathetic strings spanning one of the diaphragms and bearing upon said bridge, and a sounding-post extending from the sound-producing apparatus to and seated upon said bridge, substantially as specified.

14. In a music-box, the combination with a casing and an inclosed sound-producing apparatus, of parallel spaced diaphragms connected at an intermediate point for simultaneous vibration, a bridge spanning the upper diaphragm, sounding or sympathetic strings spanning said upper diaphragm and seated at intermediate points upon said bridge, a sounding-post extending from the sound-producing apparatus to and seated upon said bridge, and tension devices including a bolt extending from the sound-producing apparatus and connected with the lowermost diaphragm for straining the diaphragms in a direction perpendicular to their planes, substantially as specified.

15. In a music-box, the combination with a casing and an inclosed sound-producing apparatus, of parallel spaced sounding-diaphragms, one of which is provided with a bridge upon which is seated a sounding-post extending from the sound-producing apparatus, and sounding or sympathetic strings spanning one of the diaphragms and seated upon said bridge, substantially as specified.

16. A music-box having a casing of which one wall supports a sound-producing device, and of which the other wall consists of a vibratory diaphragm, tensile connections between said walls, and trussed sounding or sympathetic strings spanning said diaphragm to exert outward pressure thereon, substantially as specified.

17. A music-box casing having diaphragmatic sounding devices, and resonance-boxes spaced from the plane thereof and communicating with the space between the diaphragmatic sounding devices and the resonance-boxes, substantially as specified.

18. A music-box casing having one wall consisting of a sounding-diaphragm, and sheet-metal resonance-boxes arranged within the casing and supported by one wall thereof out of contact with said diaphragm, and communicating with the space between said diaphragm and the opposite wall of the casing, substantially as specified.

19. A music-box casing having a sounding-diaphragm forming one wall thereof, and sheet-metal resonance-boxes arranged within the casing at an interval from, and out of contact with, said diaphragm, and having communication with the outside air and with the space between said diaphragm and the opposite wall of the casing, substantially as specified.

20. A music-box casing having one wall consisting of a vibratory diaphragm, and resonance-boxes having communication with the interior of the casing and with the outside air, substantially as specified.

21. A music-box casing having one of its walls formed by a vibratory diaphragm, and stationary resonance-boxes spaced from the plane of said diaphragm, arranged within the casing, and having communication by opposite openings with the interior of the casing and with the outside air, substantially as specified.

22. A music-box casing having its bottom closed by diaphragmatic sounding devices provided with openings, and resonance-boxes suspended within the casing, and having their inner and outer walls provided with openings, substantially as specified.

23. In a music-box, the combination with a casing and a sound-producing apparatus seated therein, of a plurality of resonance-boxes suspended within the casing approximately in the plane of said sound-producing apparatus, and supported by means in common with said apparatus, and diaphragmatic sounding devices fitted in and coextensive with the bottom of the casing, substantially as specified.

24. In a music-box, the combination with a casing provided with transverse supporting bars or brackets, and a sound-producing apparatus having a base-plate seated upon said supporting bars or brackets, of resonance-boxes suspended within the casing approximately in the plane of the sound-producing apparatus, and supported at their inner sides

by the said supporting bars or brackets and the base-plate of the sound-producing apparatus, diaphragmatic sounding devices fitted in and approximately coextensive with the bottom of the casing, sounding or sympathetic strings spanning said diaphragmatic sounding devices and seated at intermediate points upon the bridge, and a sounding-post interposed between said bridge and the base of the sound-producing apparatus, substantially as specified.

25. The combination with a plurality of sounding-combs having unison-tongues, and means for simultaneously sounding the unison-tongues of said combs, of a cithern attachment having a semitubular seat mounted for movement toward and from the plane of the tongues of one comb, and equal in length with the comb, means for moving said seat, and a compressible contact-tube fitted in said seat and comprising a plurality of layers of paper, and an exterior covering-layer of textile fabric, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

L. D. MARKLE.

Witnesses:

JOHN H. SIGGERS,
HAROLD H. SIMMS.