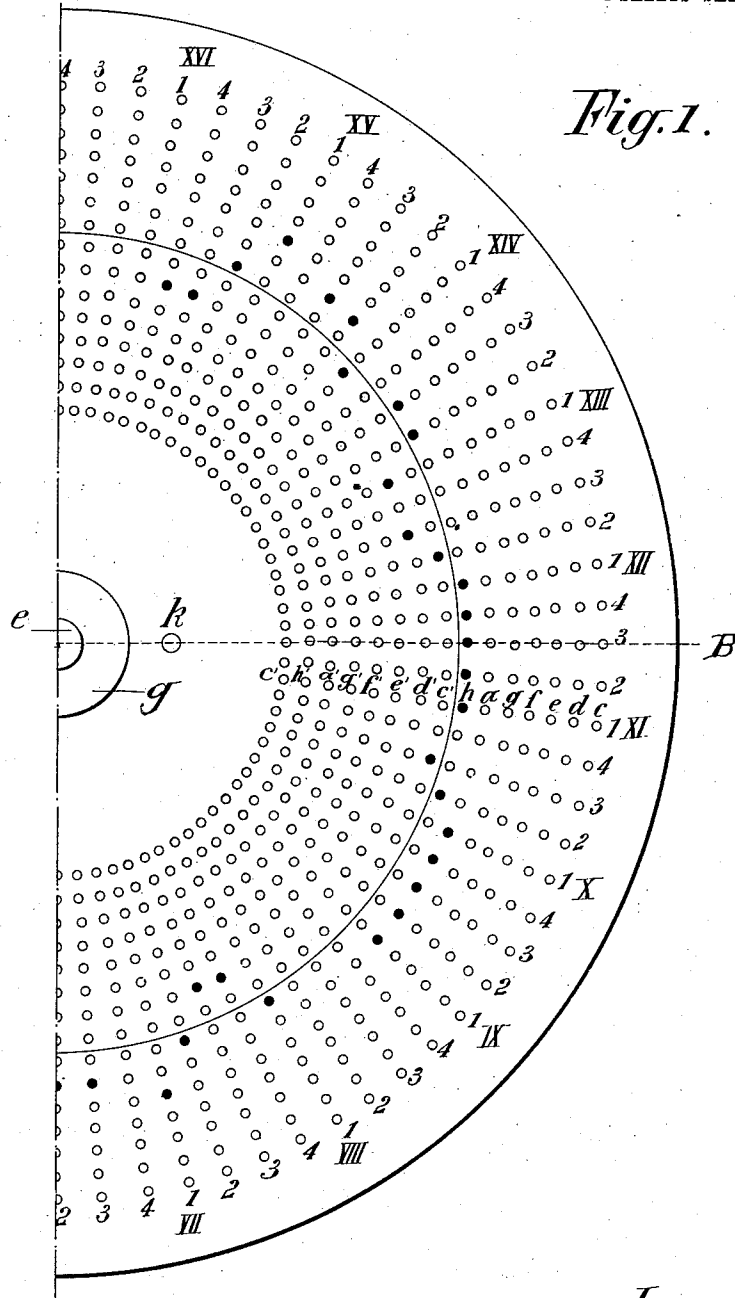


H. GRAF.
 CHANGEABLE PIN DISK FOR MECHANICAL MUSIC BOXES.
 APPLICATION FILED MAY 10, 1911.

1,027,245.

Patented May 21, 1912.

4 SHEETS—SHEET 1.



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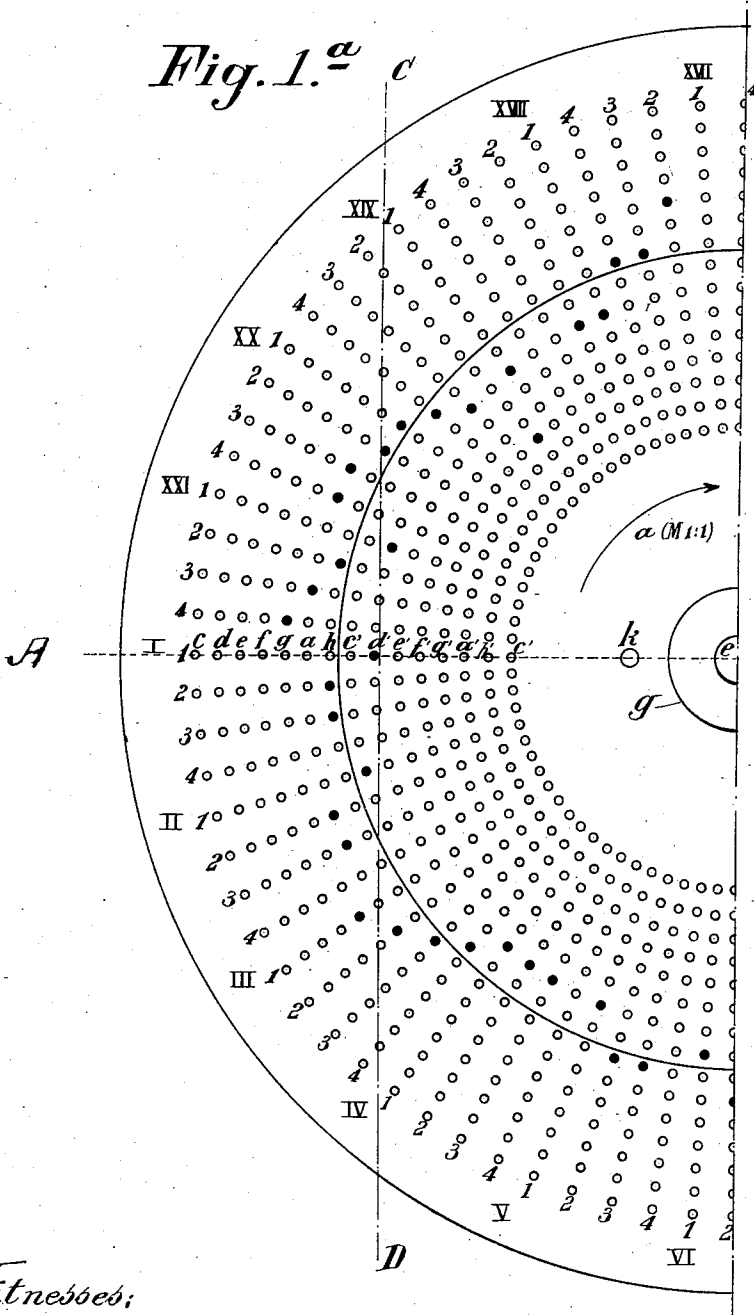
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 2.

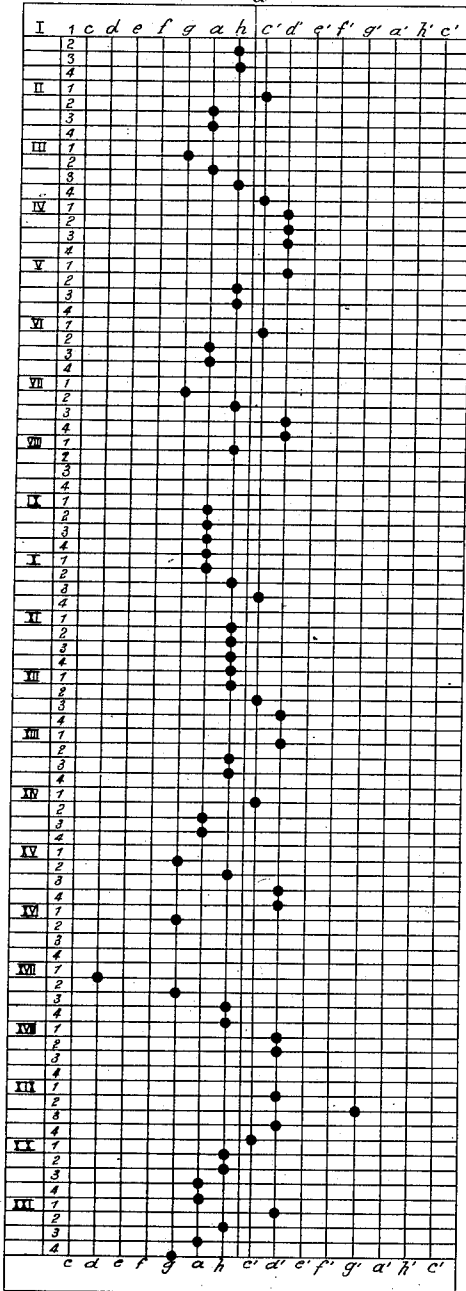


Fig. 3.

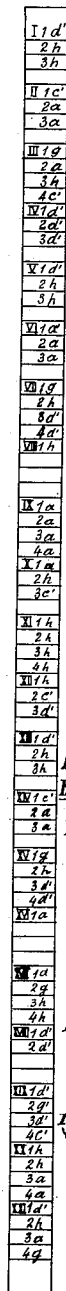


Fig. 6.

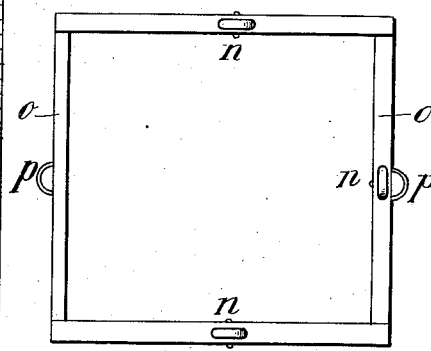


Fig. 7.

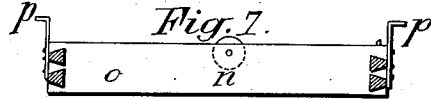


Fig. 8.

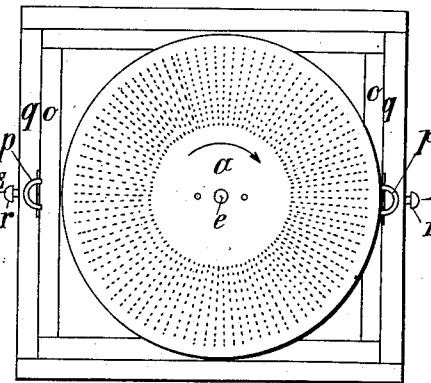
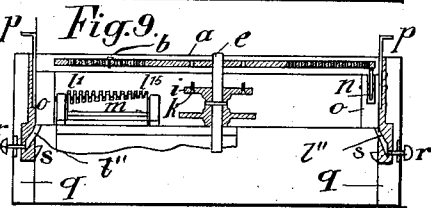


Fig. 9.



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4 SHEETS—SHEET 4.

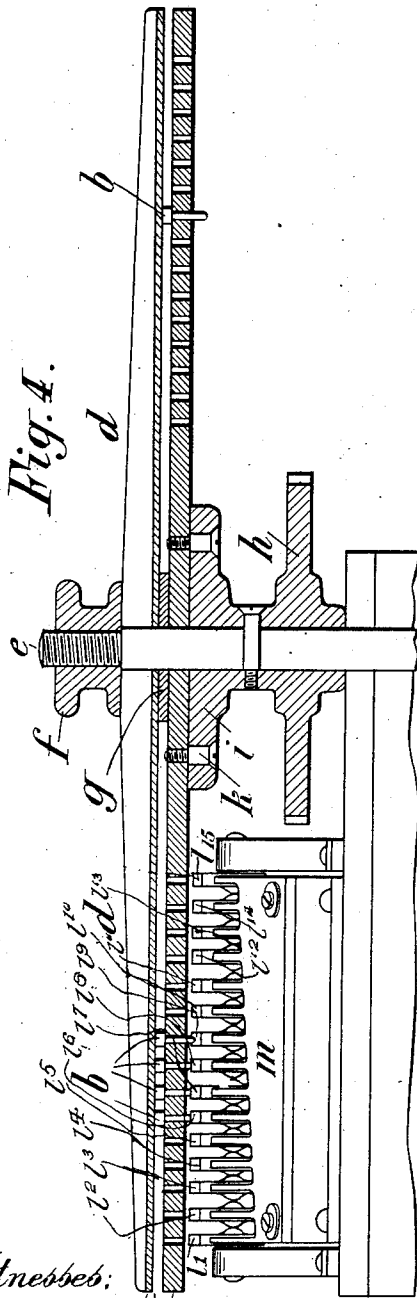


Fig. 4.

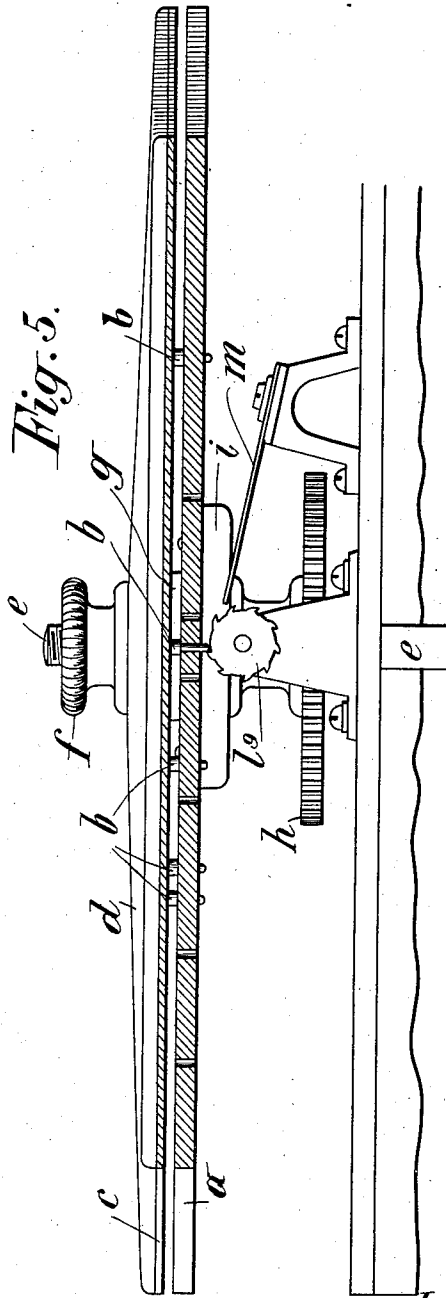


Fig. 5.

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UNITED STATES PATENT OFFICE.

HEINRICH GRAF, OF BIELEFELD, GERMANY.

CHANGEABLE-PIN DISK FOR MECHANICAL MUSIC-BOXES.

1,027,245.

Specification of Letters Patent.

Patented May 21, 1912.

Application filed May 10, 1911. Serial No. 626,242.

To all whom it may concern:

Be it known that I, HEINRICH GRAF, a subject of the German Emperor, and resident of Bielefeld, Germany, have invented certain new and useful Improvements in Changeable-Pin Disks for Mechanical Music-Boxes, of which the following is a specification.

A circular disk the diameter and thickness as well as the division of which corresponds to the mechanical music boxes is divided into concentric circles. A hole having a small diameter is made into the disk at each point of intersection between the circles and the radii. Each of the perforated circles thus produced is intended for one tone of the instrument while the radial perforated rows determine the measure of the piece of music; the measure may besides be changed by the speed of rotation of the disk or plate. For producing the tones small pins are inserted through the holes from the back toward the front according to note boards. Thereafter the circular disk thus provided with pins is covered by another imperforate circular disk, this second disk being pressed against the first one in any suitable manner for instance by means of a screw or any other equivalent means. The pins are thus invariably fixed in position, but after the cover plate has been released they may be easily removed at will either individually or all together at a time and again be inserted in another order. The manner in which the pins are secured in position has been shown by way of example in the accompanying drawings, in which:

Figure 1 is a top plan view of one half of the perforated disk; Fig. 1^a is a top plan view of the opposite half of the perforated disk; Fig. 2 is a top plan view of a note board; Fig. 3 is a similar view of another form of note board; Fig. 4 is a sectional view on line A—B of Figs. 1 and 1^a; Fig. 5 is a sectional view on line C—D of Fig. 1^a; Fig. 6 is a top plan view of the music box, the disks being removed; Fig. 7 is a side elevation view of same; Fig. 8 is a top plan view of the music box; Fig. 9 shows a sectional view on line E—F of Fig. 8.

The said drawings also show one form of embodiment of the method of securing the pins in the disk. As shown in these drawings, a circular disk *a* (Figs. 1, 1^a, 4 and 5) having a diameter of about 25 centi-

meters and a thickness of about 4 millimeters and made of brass, iron, aluminium or any other suitable material is divided in the example shown in 15 concentric perforated circles, spaced apart about 5 millimeters and in 84 radial perforated rows so that $15 \times 84 = 1260$ holes are obtained having each a diameter of 1 millimeter. In the disk shown the measure has been supposed to be $\frac{4}{4}$; therefore 4 perforated radial rows have been united so as to form an entire measure and the 21 measures thus obtained have been designated on the edge of the disk by I—XXI and the $\frac{1}{4}$ measure by 1—4. Besides at the beginning of each measure the various tones above the corresponding holes have been distinguished by the letters "c, d, e, f, g, a, h, c', d', e', f', g', a', h', c'."

The sound tongs or the like are actuated by the small pins *b* (Figs. 4 and 5) about 1 millimeter thick and 6 millimeters long and provided with a flat circular head or hook or the like which measures about 2 millimeters in height and 3 millimeters in width. These pins are inserted in the holes according to the diagram given by way of example later on and project from the disk on the play side on a length of about two millimeters thus forming points which are similar to the rigidly secured points or hooks of the usual polyphone plates, music box rollers and so on. The said small pins are prevented from waggling in the holes or from being pushed upward therein, first by the thickness of the disk adopted in the example shown and secondly by the cover plate *d* which is intended to be placed on the said disk and is provided with an india rubber lining *c* the said cover plate being pressed down by the nut *f* to be screwed on the shaft *e*. A flat annular extension *g* provided on the circular disk *a* so as to surround the shaft *e* and the height of which corresponds to that of the heads of the pins prevents the cover plate from exerting an irregular pressure. The coupling of the circular disks with the shaft *e* as well as with the toothed wheel *h* meshing with the actuating mechanism is effected on one hand already by the pressure exerted by the nut *f* on both plates and the disk *i*, but more especially still by the steel pins *k* secured into the said disk *i*. The disk *a* must be positioned low enough that the small pins *b* sufficiently act upon the members of the

music box. In the example shown they must be able to rotate for instance the small toothed wheels 1^1 to 1^{15} which in turn cause the tongs of the steel comb to oscillate.

5 In order to support the disk a during the play as well as with a view of more commodiously providing it with the small pins b , the disk rests on the three small rollers n of the wooden frame o (Figs. 6 to 9) which
10 may be lifted up by means of the handles p p and may be arrested in position by the spring latches r r secured in the casing 9 of the music box so that the small pins b do no longer produce tones when the disk a is
15 rotated. When pressure is applied to the spring latches r r the frame falls again back on the latches s s and with it the disks a returns to the position required for playing.

The notes are represented in the example
20 shown by the diagram or patterns shown by Figs. 1, 1^a , 2, and 3. The net like diagram 2 shows the entire division of the disk a developed according to a rectangle. The diagram 3 only contains the numbers I-XXI
25 and 1 to 4 designating the measures. The diagram shown by Figs. 1 and 1^a represents the disk. For tracing the notes of a piece of music on the diagrams shown by Figs. 1, 1^a and 2 the small circles designating the
30 pin holes are filled with black or another color or otherwise distinguished. In the diagram shown by Fig. 3 the letters "c, d, e," etc., designating the notes are added to the numerals I, 1, etc., already marked on
35 the diagram.

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

1. In combination a casing, a disk mounted in said casing, said disk having a series
40 of perforations, a plurality of pins removably inserted into and extending through and beyond said perforations, removable means for holding the pins in the perfora-
45 tions, a series of sound tongs mounted in the casing, and means with which the pins coöperate when the disk is revolved to operate on the sound tongs.

2. A changeable pin disk for mechanical
50 music boxes comprising in combination a disk formed with a plurality of holes, a plurality of pins removably inserted into and extending through and beyond said holes of the disk, the rear ends of said pins extend-
55 ing beyond the disk, a cover plate engaging

the rearwardly projecting ends of said pins, and means for removably holding the said cover plate in position on said disk, and means with which the pins coöperate for
60 producing musical tones.

3. In combination, a case, a disk mounted in the case, said disk having a series of perforations, headed pins mounted in certain of the perforations, a plate fitting over the
65 heads of the pins to retain them in the perforations, means for clamping the plate to the disk, a series of horizontally disposed toothed wheels below the disk, the teeth of
70 said wheels being in the path of the pins, and a comb having teeth which contact with the toothed wheels, whereby the teeth of the comb will be vibrated, and means for revolving the disk.

4. In combination, a case, a shaft mounted in the case, a frame slidably mounted in the
75 case, anti-friction rolls mounted on the frame, a disk mounted on the shaft and adapted to be supported near its end on the anti-friction rollers, said disk having a series of perforations, a series of headed pins,
80 in certain of the perforations, means engaging the heads of the pins for holding them in the perforations, a series of toothed wheels below the disk and in the path of movement of the pins, said pins contacting
85 with the teeth of the wheels when the disk is rotated, a comb having teeth which contact with the toothed wheels when the latter are revolved by the pins, means for revolving the disk, and means for holding the
90 frame in elevated position to remove the pins from the plane of the toothed wheels.

5. In combination, a case, a disk revolvably mounted in the case, said disk having a series of perforations arranged in circular
95 form, detachable pins fitted in selected perforations in the disk, means for holding the pins in the perforations, a series of toothed wheels with which the pins coöperate, and a comb having teeth which contact with the
100 toothed wheels, whereby when the disk is revolved and the pins contact with the toothed wheels, the latter will vibrate the teeth of the comb.

In testimony whereof I have hereunto set
105 my hand in presence of two witnesses.

HEINRICH GRAF.

Witnesses:

WALTHER SCHNUCHEL,
ROBERT STEINHOFF.