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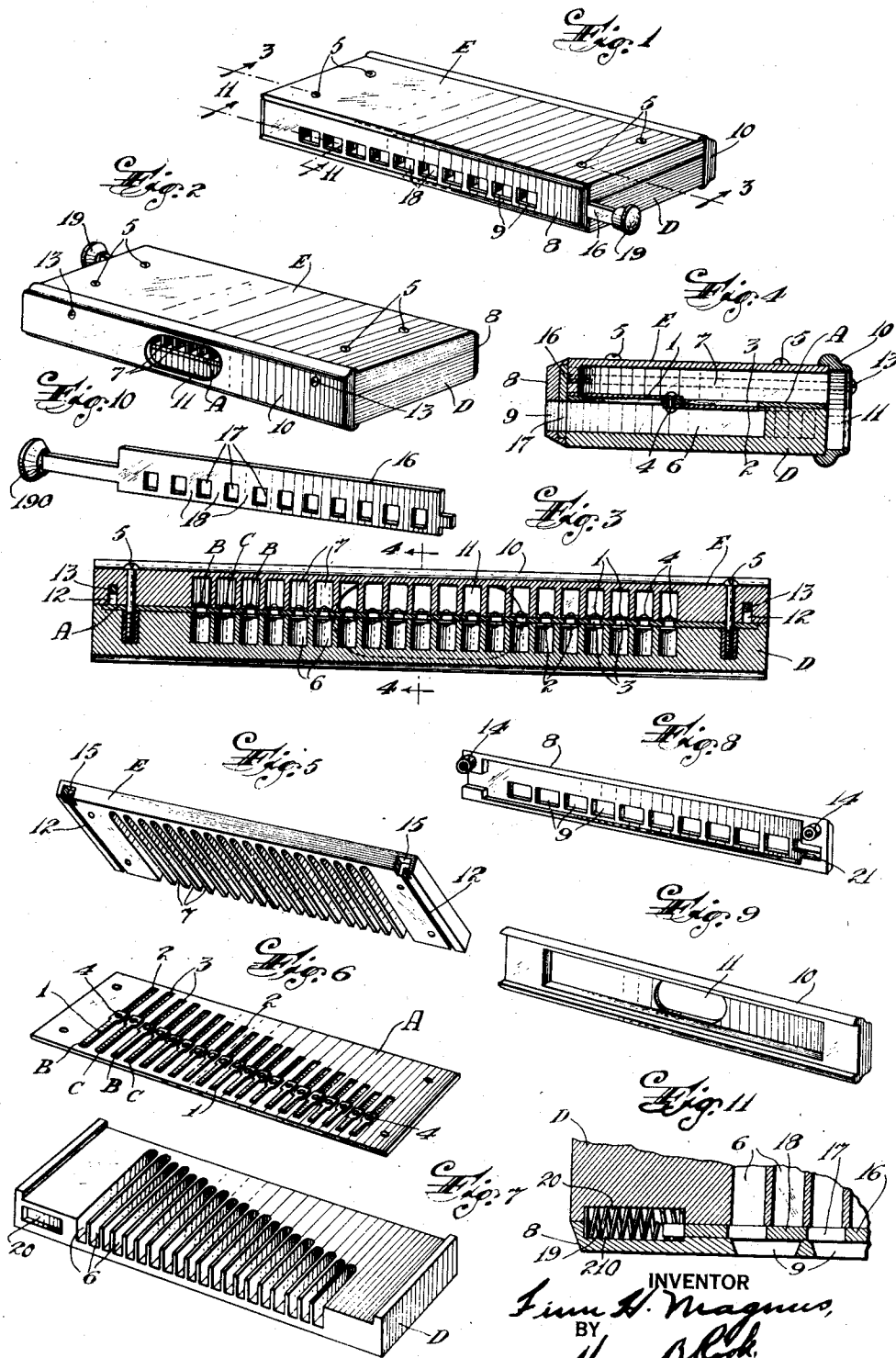
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CHROMATIC HARMONICA

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CHROMATIC HARMONICA

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This invention relates to harmonicas and particularly to harmonicas by which a chromatic scale may be played.

Known instruments of this character usually include at least two reed plates each having a plurality or bank of reeds thereon which are tuned respectively to the natural tones and half tones, and one or more sets or banks of wind cells with slide valves or dampers, all so arranged that the full or natural tone cells or reeds are normally open or undamped and the full tone and half tone or sharp or flat cells or reeds can be closed or damped, alternately. However, such harmonicas are complicated and are seriously limited in the range and variety of musical tones, harmony and special effects.

One object of my invention is to provide a novel and improved harmonica in which all reeds for the complete chromatic scale shall be mounted on a single reed plate and the reed plate shall be combined with a unique construction and arrangement of wind cells and a slide valve, whereby the natural tones and half tones can be played easily and selectively by simple shifting of said slide valve.

It is the general practice to arrange each "blow" or "exhale" reed and the corresponding "draw" or "inhale" reed in side-by-side relation at opposite sides of the reed plate to communicate with the same wind cell. Also the wind or air currents leaving all of the "blow" reeds pass directly into a sound chamber, while the wind or air currents entering all of the "draw" reeds pass directly from said sound chamber. In other words, the reed plate and reeds form one side of a sound chamber that is common to all of the reeds. This arrangement requires each wind cell to be of a width greater than the aggregate of the widths of two reeds, which limits the number of reeds that can be arranged on a plate without causing the instrument to be excessively long. Further, the velocity of the wind or air currents passing the reeds and through the wind cells is low, which requires relatively hard exhaling or inhaling, and the intensity of the sound is small due to the passage of the sound waves directly from the reeds to the large, common sound chamber.

Therefore further objects of my invention are to provide a harmonica wherein the reeds, wind-cells and sound chamber shall be constructed and arranged in a novel and improved manner to permit the use of a maximum number of reeds on the same reed plate for an instrument of a given length, or in other words, to permit the

use on the same reed plate of a substantially larger number of reeds than in known harmonicas without an excessive increase in length of the instrument; and to provide a novel and improved construction and arrangement of wind cells, reeds and a sound chamber, whereby sounds of high intensity and large volume can be produced with easy exhalation and inhalation.

Another object is to provide a harmonica embodying novel and improved features of construction whereby either full tones or half tones can be played singly and alone, or either a full tone or a half tone can be played with a harmonizing tone to produce a chord, so that a wide variety of musical chords and special effects can be obtained with a minimum of difficulty and skill and without special "tonguing."

Still further objects are to provide a harmonica which shall embody novel and improved structural features comprising a reed plate and a pair of casing plates or cell blocks so constructed and arranged as to provide a separate wind cell and separate sound cell for each pair of "blow" and "draw" reeds, whereby the instrument shall be simple and unusually intense sound can be produced with a minimum of exertion; and to provide such an instrument wherein there is a common sound chamber for all of said sound cells to produce large volume and excellent tonal quality of sound, and to obtain other advantages and results as will be brought out by the following description in conjunction with the accompanying drawings in which

Figure 1 is a perspective view of a harmonica embodying my invention viewing the same from the front or mouth piece.

Figure 2 is a similar view of the harmonica from the rear.

Figure 3 is an enlarged vertical longitudinal sectional view on the line 3—3 of Figure 1.

Figure 4 is a transverse vertical sectional view on the line 4—4 of Figure 3.

Figure 5 is a perspective view of the top casing plate or body section of the harmonica.

Figure 6 is a perspective view of the reed plate with the reeds assembled thereon.

Figure 7 is a similar view of the bottom casing plate or body section.

Figure 8 is a rear perspective view of the mouth piece detached from the harmonica.

Figure 9 is a similar view of the sound chamber plate.

Figure 10 is a detached perspective view of the valve slide.

Figure 11 is an enlarged fragmentary horizontal sectional view on the line 11—11 of Figure 1.

Figure 12 is a view similar to Figure 1 showing a modification of the invention.

Figure 13 is an enlarged horizontal sectional view on the line 13—13 of Figure 12.

Figure 14 is a vertical transverse sectional view on the line 14—14 of Figure 13.

Figure 15 is a rear perspective view of the harmonica with the sound chamber plate removed.

Figure 16 is a fragmentary perspective view of the wind cell block or plate.

Figures 17 and 18 are perspective views of the bottom and top casing plates or body sections, respectively, and

Figure 19 is a detached perspective view of the rear valve of the harmonica.

Specifically describing the embodiment of the invention illustrated in Figures 1 to 11 inclusive the harmonica includes a reed plate A on which is mounted a plurality of pairs of reeds, each pair comprising a "blow" or exhale reed 2 and a "draw" or inhale reed 1. Preferably the pairs B are tuned to full or natural notes and the pairs C are tuned to half tones, i. e., sharps or flats. As shown, the pairs of reeds correspond in number and are tuned to the notes of the complete chromatic scale, there being twenty pairs of reeds each tuned to one note.

Generally the reeds of a pair in a harmonica are arranged in side by side relation to each other, but in accordance with my invention the reeds 1 and 2 of each pair are arranged in longitudinal alinement with each other or in end to end relation with their adjacent ends in overlapping relation to one another. The reed plate has the usual slots 3 over which the respective reeds are mounted, and the "draw" reed is mounted at one side of the plate while the "blow" reed is mounted at the other side, both reeds of a pair being secured on the reed plate by the same fastening means such as a rivet 4. This arrangement permits the use of a maximum number of reeds within a given length of reed plate.

The reed plate is secured between two casing plates or body sections D and E as by means of screws 5. The bottom section D has a plurality of grooves 6 one for each pair of reeds. These grooves serve as wind cells and each is preferably of a width slightly greater than the width of the corresponding reeds and of a length slightly greater than the aggregate of the lengths of the reeds of the pair. The grooves 6 open through the front edge of the body section as clearly shown in Figures 4 and 7.

The top body section E has a groove 7 for each pair of reeds and said grooves open through the rear edge of the section that is opposite the edge of the bottom section D through which the grooves 6 open. While all of the grooves 6 and 7 can be called "wind cells," to avoid circumlocution hereinafter the grooves 7 will be denoted "sound cells."

At the front of the body or casing of the harmonica is secured a mouth piece 8 that has a plurality of openings 9, each to register with two adjacent wind cells or grooves 6 as shown in Figure 11, and at the rear of the body or casing of the harmonica plate 10 forming a sound chamber that is common to and communicates with all of the grooves 7 and has an outlet 11. The mouth piece and sound chamber may be secured to the casing in any suitable way, but as shown the underside of the top section E has a groove

12 at each end opening through the front and rear edges thereof and in which lies a screw rod 13 which passes through the sound chamber plate and into a screw threaded boss 14 on the rear side of the mouth piece 8. The front edge of the top section E has recesses 15 to receive the bosses 14 of the mouth piece plate.

A valve slide 16 is mounted at the rear of the mouth piece plate to control communication between the mouth piece opening 9 and the wind cells 6. As shown, this valve slide has openings 17 spaced by solid portions 18 so that when the slide is in one position the openings 17 will register with the respective wind cells 6 for the pairs of reeds tuned to the natural tones, in which position the portions 18 of the slide will prevent communication between the mouth piece openings 9 and the wind cells for the pairs of reeds tuned to the half tones. In its other position the openings 17 of the slide will permit communication between the mouth piece openings and the cells for the last-mentioned or half tone reeds, while the portions 18 will at the same time prevent communication between the mouth-piece openings and the cells for the pairs of reeds tuned to the other scale, for example the natural tones. A compression spring 19 is arranged in complementary recesses 20 and 21 in the body section D and the mouth-piece plate and abuts one end of the valve slide, as shown in Figure 11, so as to normally hold the slide in a position to permit communication between the mouth-piece openings and the cells for the pair of reeds tuned to one scale, specifically the natural tones.

It will thus be seen that there is a separate wind cell 6 at one side of the reed plate and a separate sound cell 7 at the other side of the reed plate for each pair of reeds, and that there is a single sound chamber common to all of the sound cells. Therefore, intense sound may be produced by the air currents flowing through the wind cells and sound chambers past the reeds with a minimum of exertion during inhalation and exhalation and the sound chamber ensures large volume and good tonal quality of the sound.

By simply sliding the valve slide 16 the mouth-piece openings may be caused to register selectively with the reeds of the natural tones or the reeds of the half tones. Conveniently the slide has a fingerpiece or handle 19 projecting from one end of the mouth-piece for manipulation of the slide. While I have shown the slide at the front of the instrument, i. e., at the mouth piece, it will be understood that the slide might also be located at the rear of the instrument to control passage of air through the sound cells 7.

In Figures 12 to 18 inclusive I have shown a modification of the instrument whereby harmonizing tones or chords may be played.

This instrument includes two reed plates F and G one of which may be substantially identical with the reed plate A while the other is the same except that its reeds are tuned in harmony with the reeds of the plate F. Between the two reed plates is a wind cell block or plate H which has a plurality of slots 20 therethrough all of which also open through the front edge of the plate or block. A bottom casing section I is secured to the bottom side of one reed plate, i. e., the plate G, while a top section K is secured to the top side of the other reed plate of the casing sections, said sections reed plate and wind cell block being secured together by any suitable means such as screws or bolts 21. The bottom body section I has a groove 22 for each pair of reeds of the

lower reed plate G, said grooves opening through the rear edge of the section. The top section K has a similar groove 23 for each pair of reeds which opens through the rear side of the plate. Each slot 20 forms a wind cell common to a pair of reeds on each reed plate, while each groove 22 serves as a sound cell for a pair of reeds on the bottom reed plate and each groove 23 serves as a sound cell for each pair of reeds on the upper reed plate. A sound chamber plate L is secured to the rear of the casing or body of the harmonica, for example in the same manner in which the sound chamber plate 18 is mounted, so as to form a sound chamber between itself and the rear edges of the sections H, I and K. The sound chamber has outlets 24 at the top and bottom thereof, although other arrangements of outlets may be utilized. The larger the capacity of the outlets the less there will be of resistance to the flow of air currents and muffling of the sound.

A mouth-piece 25 corresponding to the mouth piece 8 is provided, and a valve slide 26 like the valve slide 16 is utilized for selectively playing the natural tones and half tones.

With the instrument constructed as so far described, it will be observed that whenever a pair of reeds of one plate is subjected to vibration by wind from the corresponding wind cells 20, a corresponding pair of reeds on the other reed plate will be vibrated to produce a tone in harmony with the tone produced by the reeds of the first-mentioned plate. Should it be desired to prevent the playing of the reeds of one plate, a second valve slide 27 may be mounted at the rear of the instrument so as to in one position prevent the flow of air currents through either the grooves 22 or the grooves 23. As shown, the slide 27 has diagonal slots 28 through which pass pins 29 on the body of the harmonica so that when the slide is pushed longitudinally in one direction it will be moved downwardly to close the grooves 22 in the bottom plate K, while when the slide is moved longitudinally in the other direction it will be located between the outlets of the grooves 22 and 23 and thus permit flow of air through both sets of grooves. A spring 30 is provided for normally holding the slide in the last-mentioned position, the spring constituting a wire having a loop at the center of its length surrounding a pin 31 on the slide and having its ends resting on the pins 29. For holding the slide in the position to close the groove 22 one of the slots 28 may have a keeper notch 32 to cooperate with the corresponding pin and restrain longitudinal movement of the slide under the influence of the spring 30. Manual manipulation of the slide will disengage the notch 32 from the pin and permit actuation of the slide by the spring.

Other modifications and changes in the details of structure of the harmonica will occur to those skilled in the art as within the spirit and scope of the invention.

Having thus described my invention, what I claim is:

1. A harmonica comprising a reed plate, a plurality of pairs of reeds mounted on said plate, each pair comprising a "blow" reed and its corresponding "draw" reed arranged in longitudinal alinement with each other, and a body having a separate wind cell at one side of said reed plate and a separate sound cell at the other side of said reed plate for each pair of reeds.

2. The harmonica set forth in claim 1 wherein said body comprises two sections secured together

with said reed plate between them, one section having a plurality of grooves opening through one edge thereof to form said wind cells and the other section having a plurality of grooves opening through the edge thereof that is opposite the aforementioned edge of the first-mentioned section to form said sound cells.

3. The harmonica set forth in claim 1 with the addition of a sound chamber common to and communicating with all of said sound cells.

4. A harmonica comprising a reed plate, a plurality of pairs of reeds mounted on said plate, each pair comprising a "blow" reed and its corresponding "draw" reed arranged in longitudinal alinement with each other, a body comprising two sections secured together with said reed plate between them, the first section having a plurality of grooves opening through one edge thereof at one side of said reed plate, each to form a separate wind cell for one pair of reeds, the second section having at the other side of said reed plate a plurality of grooves opening through the edge of said second section that is opposite the aforementioned edge of the first section, each to form a sound cell for one pair of said reeds, and a sound chamber common to and communicating with all of said sound cells at said edge of said second body section.

5. The harmonica set forth in claim 1 wherein said wind cells are of a width only slightly greater than the width of the corresponding reeds.

6. The harmonica set forth in claim 1 wherein said wind cells are of a width only slightly greater than the width of the corresponding reeds and of a length only slightly greater than the aggregate of the lengths of the reeds.

7. For a harmonica; a reed plate, a plurality of pairs of reeds each including a "blow" reed and a "draw" reed arranged on said plate in longitudinal alinement with each other, and common means fastening the adjacent ends of the reeds of each pair to the reed plate.

8. For a harmonica: a reed plate, a plurality of pairs of reeds each including a "blow" reed and a "draw" reed arranged on said plate in longitudinal alinement with each other and with their adjacent ends in overlying relation to one another, and a rivet passing through both said ends and said reed plate to secure the reeds on the reed plate.

9. The harmonica set forth in claim 1 wherein some pairs of reeds are tuned to natural tones and other pairs to half tones, and with the addition of means for causing said pairs of reeds selectively to be subject to vibration by wind in said wind cells.

10. The harmonica set forth in claim 1 wherein said pairs of reeds correspond in number and are tuned to the notes of the complete chromatic scale, and with the addition of means for causing said pairs of reeds selectively to be subject to vibration by wind in said wind cells.

11. A harmonica including a reed plate, a plurality of pairs of reeds mounted on said plate, said pairs of reeds corresponding in number and being tuned to the notes of the complete chromatic scale, a body having wind cells for said pairs of reeds, and means for causing said pairs of reeds selectively to be subject to vibration by wind in said wind cells.

12. A harmonica including a reed plate, a plurality of pairs of reeds mounted on said plate, said pairs of reeds corresponding in number and being tuned to the notes of the complete chromatic scale, a body having wind cells for said

pairs of reeds, a mouthpiece having openings and a valve slide for selectively establishing and preventing communication between said openings of the mouthpiece and certain of said wind cells.

13. A harmonica including two reed plates, a plurality of pairs of reeds mounted on each plate, each pair comprising a "blow" reed and a "draw" reed, a body having wind cells each of which is common to a pair of reeds on each reed plate, the reeds of one plate being tuned in harmony with the reeds of the other plate, and means for selectively causing and preventing vibration of the reeds of one reed plate by wind from said wind cells.

14. The harmonica set forth in claim 13 wherein same pairs of reeds on one plate are tuned to natural tones and other pairs to half tones, and with the addition of means for causing and preventing vibration of alternate pairs of reeds by the wind in said wind cells.

15. The harmonica set forth in claim 13 wherein some pairs of reeds on one plate are tuned to natural tones and other pairs to half tones, a mouth piece having openings, a slide valve for selectively establishing and preventing communication between said openings and the wind cells for alternate pairs of reeds, and means for se-

lectively causing and preventing vibration of the reeds of one reed plate by wind from said wind cells.

16. The harmonica set forth in claim 13 with the addition of a separate sound cell for each pair of reeds.

17. A harmonica including two reed plates, a plurality of pairs of reeds mounted on each plate, each pair comprising a "blow" reed and a "draw" reed, a wind cell plate mounted between said reed plates and forming wind cells each of which is common to a pair of reeds on each reed plate, and a pair of body sections one secured to the outer side of each reed plate, each of said body sections having a groove for each pair of reeds on the adjacent reed plate to provide a separate sound cell for each pair of reeds.

18. The harmonica set forth in claim 13 with the addition of a separate sound cell for each pair of reeds and a sound chamber common to and communicating with all of said sound cells.

19. For a harmonica; a plate having a plurality of parallel pairs of reeds, each pair including a "blow" reed and a "draw" reed arranged on said plate in longitudinal alinement with each other.

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