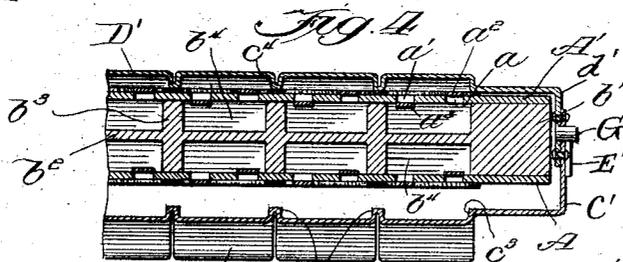
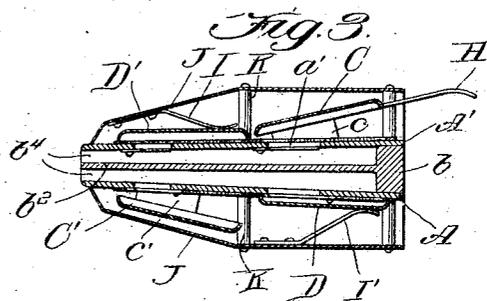
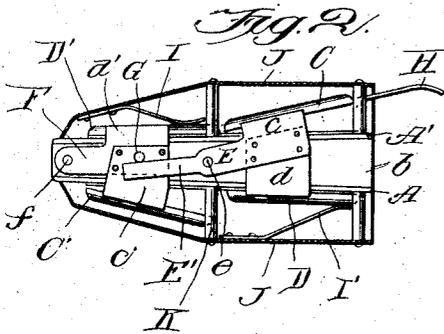
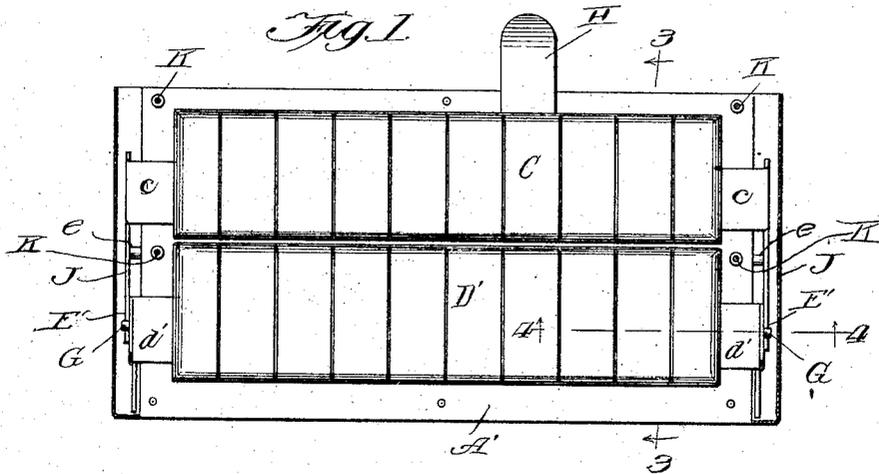


J. E. MURPHY.  
 REED HARMONICA.  
 APPLICATION FILED MAR. 10, 1906.



Upper Back & Lower Front Reed Banks

Exhaling	c	e	g	c	e	j	c	e
Inhaling	d	f	a	d	f	a	d	f

Upper Front & Lower Back Reed Banks

Exhaling	c*	f*	a*	c*	f*	a*	c*	f*
Inhaling	b	d*	g*	b	d*	g*	b	d*

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# UNITED STATES PATENT OFFICE.

JOSEPH E. MURPHY, OF CHICAGO, ILLINOIS.

## REED-HARMONICA.

No. 882,575.

Specification of Letters Patent.

Patented March 24, 1908.

Application filed March 10, 1906. Serial No. 305,370.

*To all whom it may concern:*

Be it known that I, JOSEPH E. MURPHY, a citizen of the United States, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reed - Harmonicas; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in reed harmonicas or mouth organs, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

Among the objects of my invention is to supplement the usual diatonic reeds of a harmonica with one or more reed banks equipped with reeds which, together with the reeds of the diatonic scale, complete the chromatic scale. In one arrangement of my novel harmonica, the reeds of the diatonic scale may be normally open for playing in the usual manner, while the reeds for the remaining tones of the chromatic scale may be normally cut off from the passage of air thereover; and mechanism is provided for opening the latter reeds for the passage of air thereover when a tone not included in the diatonic scale is to be played, the air controlling devices being such as to cut off the passage of air from the reeds of the diatonic scale at this time. The term "reed bank" is hereinafter used to designate the inhaling and exhaling reeds which, in the ordinary harmonica, are attached to one plate of the instrument. Usually, in the present construction of harmonicas, a secondary reed bank is employed with each primary reed bank having a like arrangement of inhaling and exhaling reeds, which may be pitched either an octave higher than the reeds of the primary bank to give richness of tone, or may be pitched in any other suitable harmony relatively to the reeds of the primary bank.

A further object of the invention is to provide a harmonica in which are combined two or more sets of reed banks which operate in connection with mechanism in the nature of stop plates or valves, arranged to cut one or more of the reed banks out of service at a time, and so far as this feature of my invention is concerned, said mechanism may operate in connection with other arrangements of the scale and may itself be varied.

When the instrument embraces as its primary musical feature the combination with a set of reeds tuned to the tones of the diatonic scale, of other reeds tuned to the remaining tones necessary to produce the chromatic scale, the simpler arrangement is to have the reed banks for the tones of the diatonic scale normally in position for open playing and to arrange the reed banks for the remaining tones of the chromatic scale to be opened and closed for playing by manipulation of the air controlling mechanism. This method is preferable because it maintains the present arrangement of the diatonic scale of the instrument, and is believed to render the manipulation of the air controlling mechanism as simple as it may be made. Moreover, the arrangement of the diatonic scale for open playing enables the instrument to be used as an ordinary harmonica without manipulation of any of its parts. In order to produce a uniform arrangement of the chords of the diatonic scale it may be found desirable to place the seventh tone of the scale in the secondary set of reed banks, as will more fully hereinafter appear.

In the present instance, I have shown the two pairs of reed banks arranged on two parallel plates and occupying the relative positions of the reed plates of an ordinary harmonica, but made of sufficient width to receive two banks of reeds each, so that there are an upper and lower front reed bank and an upper and lower rear bank reed bank. As herein shown, all the reeds of the diatonic scale, but that appropriated to the seventh tone of the diatonic scale, are arranged, one bank at one side and in front of the instrument, and the other bank at the other side and at the back of the instrument, while the reeds of the remaining tones of the chromatic scale and the reel appropriated to the seventh tone of the diatonic scale occupy a correspondingly reversed relation.

Referring now in detail to the drawings illustrating one form of my improvements: Figure 1 is a top plan view of a harmonica embodying my improvements. Fig. 2 is an end view thereof. Fig. 3 is a transverse section, taken on line 3—3 of Fig. 1. Fig. 4 is a fragmentary section, taken on line 4—4 of Fig. 1. Fig. 5 is an inner face view of one of the stop plates of the air controlling mechanism. Fig. 6 is a diagram illustrating the arrangement of the reeds for producing the

tones of the diatonic scale and the remaining tones which combine with the diatonic scale to produce the chromatic scale.

As shown in the drawings, the frame of the instrument consists of the two side plates A A<sup>1</sup> and an intermediate frame, usually made of wood comprising solid back and end portions *b b*<sup>1</sup> to which the plates are attached, and longitudinal and transverse partitions *b*<sup>2</sup> *b*<sup>3</sup>, respectively, by which are formed reed cells *b*<sup>4</sup> leading to the air passages *a a*<sup>1</sup> formed in the side or reed plates A A<sup>1</sup>, through which passes the air that vibrates the inhaling and exhaling reeds *a*<sup>2</sup> *a*<sup>3</sup>, respectively. In the present arrangement two reed banks for the tones of the diatonic scale and two reed banks for the remaining tones are employed, the reeds of the primary banks in each instance being tuned to produce the fundamental tones and the reeds of the secondary banks being tuned to produce harmonizing tones which serve to give fullness and richness of tone to the primary reed banks. It is assumed that the reed banks for producing the tones of the diatonic scale are the upper back and lower front reed banks, while the reed banks for producing the remaining tones of the chromatic scale are the upper front and lower back reed banks. Preferably, the reeds are so disposed on the reed plates that the primary exhaling reeds shall be located at the back of the instrument and the primary inhaling reeds located at the front of the instrument, and the secondary exhaling and inhaling reeds correspondingly located. In accordance with the present arrangement, therefore, the mechanism for controlling the passage of air to the reed banks is constructed to simultaneously cut off the upper front and lower back reed banks, or those producing the tones other than those of the tones of the diatonic scale, and to open the lower front and upper back reed banks, or those producing the tones of the diatonic scale.

I have herein illustrated one convenient form of mechanism for effecting this result which is made as follows: Said mechanism comprises a plurality of rectangular plates C C<sup>1</sup> D D<sup>1</sup> which are appropriated one to each reed bank and each made of a length to cover all of the reeds of its bank when in its closed position, and also constructed in a manner to separate the reeds of each cell from the others. Said stop plates are herein shown as made of sheet metal stamped to form and are provided at their ends with extensions *c c*<sup>1</sup> *d d*<sup>1</sup> which extend to the end of the frame and are turned inwardly toward each other and riveted or otherwise fastened together, as shown in Figs. 2 and 4. The connected back plates C D are hinged to the end members *b*<sup>1</sup> of the frame by means of arms E made integral with the end extensions *c* of the stop plate C, as herein shown, whereby, when one of said plates is closed down upon

its associated reed bank, the other plate is swung away from its associated reed bank. The other two connected plates C<sup>1</sup> D<sup>1</sup> are, in a like manner, pivoted to the end members of the frame by means of pivot studs *f* extending through arms F formed integral with and extending forwardly from the end extension *d*<sup>1</sup> of the upper front plate D<sup>1</sup>, as herein shown. Said front upper and lower stop plates, therefore, operate in alternation as do the back upper and lower stop plates. In order that all of said stop plates shall be operated from a single key or lever, I have shown the hinge arms E for the back plates provided with extensions E<sup>1</sup> that project forwardly below and engage pins G extending laterally from the connected end members of the front upper and lower stop plates C<sup>1</sup> D<sup>2</sup>. With this construction, therefore, when the connected upper and lower back plates C and D are swung on their hinges, the extension E<sup>1</sup> communicates a swinging motion to the connected upper and lower stop plates C<sup>1</sup> D<sup>1</sup>, and the interaction of said plates is such that the lower front and upper back stop plates are swung away from their reed banks when the upper front and lower back stop plates are swung towards their reed banks and vice versa. As herein shown, the said plates are thus operated by means of a short arm H extending rearwardly from and rigid with the upper back stop plate C. If desired, a key may be substituted for the arm H.

The stop-plates are held in their normal positions, as shown in Figs. 2 and 3, by springs I I<sup>1</sup> attached to the outer casing J which covers the mechanism. As herein shown, said springs have the form of leaf springs and bear at their free ends against the normally closed stop plates D and D<sup>1</sup>. The casing is made of two parts or members attached to the frame by means of posts K, in the manner shown in Fig. 3. The stop plates are formed with marginal side and end ribs or flanges *c*<sup>2</sup> *c*<sup>3</sup>, respectively, as more clearly shown in Fig. 5, and with transverse ribs *c*<sup>4</sup>, the latter reference characters being appropriated to all the plates alike. The side and end marginal flanges of each plate fit closely upon the outer face of its associated reed plate around the reeds, or upon a felt or cushioning facing, as herein shown, and serve, when the plate is in its closed position, to stop off all the reeds of the associated bank from the passage of air therethrough. The transverse ribs *c*<sup>4</sup> of said plates stop off the passage of air from the reeds of one cell to those of another of the same bank. As herein shown, strips of felt secured to the faces of the reed plates between the reeds of the different reed cells provide air tight joints between adjacent reed cells.

In Fig. 6 is shown a diagram illustrating the arrangement of the diatonic and supplementary scales, said diagram being one typ-

ical arrangement for the key of C. The upper half of said diagram illustrates the usual arrangement of the major diatonic scale for harmonicas, as at present arranged, with the exception that the seventh tone of each octave is omitted, while the lower half of the diagram illustrates the relation of the remaining tones which combine with the tones of the diatonic scale to produce the chromatic scale, with the addition of the seventh note of the major diatonic scale. It is to be understood that said diagrammatic illustration applies to both the primary and secondary reed banks when the secondary reed banks are pitched an octave higher than the primary reed banks. In said typical diagram it is contemplated that the tones of the diatonic scale, with the exception of the seventh tone, as shown, shall be played as open tones, while the seventh tone and the remaining tones necessary to complete the chromatic scale are designed to be played by manipulation of the cut-off plates or valves described. In some instances, the complete diatonic scale may be found in the same reed bank. A change of key will, of course, correspondingly alter the diagram, but the relation of the intervals shown may be maintained.

I claim as my invention:—

1. In a reed harmonica, two reed banks, one bank containing reeds which are tuned to all the tones which supplement the usual diatonic scale to complete the chromatic scale, and the reeds of each bank being arranged for playing chords and means for controlling the passage of air alternately to the two reed banks at will, for the purpose set forth.

2. In a reed harmonica, two reed banks, the reeds of one of which are tuned to the tones which supplement the diatonic scale to complete the chromatic scale and also to the seventh tone of the diatonic scale, and means for controlling the passage of air to the two reed banks at will.

3. In a reed harmonica, two reed banks, the reeds of one bank being tuned to the tones of the major diatonic scale with the seventh tone omitted, and the reeds of the other bank being tuned to the remaining tones necessary to complete the chromatic scale and including the seventh tone of the diatonic scale.

4. In a reed harmonica, two reed banks, one tuned to the tones of the major diatonic scale with the seventh tone omitted and the other tuned to the remaining tones of the chromatic scale including the seventh tone of the diatonic scale, and means for allowing air to pass through the reed banks alternately.

5. In a reed harmonica, two reed plates each bearing a set of reeds, the reeds of the two plates taken together being tuned to the tones of the chromatic scale and cut-off

plates movable toward and away from the reed plates for the purpose set forth, each plate having marginal ribs or flanges to close on the plate around said reeds.

6. In a reed harmonica, two reed plates each bearing a set of reeds, the reeds of the two plates taken together being tuned to the tones of the chromatic scale and cut-off plates movable towards and away from the reed plates for the purpose set forth, each plate having transverse ribs which close on the plate to stop off one reed from another of the same plate.

7. In a full toned reed harmonica, two pairs of reed banks, each pair divided into a primary and a secondary bank, the primary bank of one pair being tuned to the principal tones of the diatonic scale, and the primary bank of the other pair being tuned to the tones necessary to complete the chromatic scale, the reeds of the secondary bank of each pair being tuned in harmony with the reeds of its principal bank, and means for playing the reeds of either pair of banks at will, for the purpose set forth.

8. In a full toned reed harmonica, two pairs of oppositely disposed plates, each bearing a front and a back bank of reeds, two of said banks being harmonically tuned to the principal tones of the diatonic scale, and the other two banks being harmonically tuned to the remaining tones of the chromatic scale, and stop-plates movable towards and from said reed bearing plates and arranged to open for playing harmonically tuned banks, and to simultaneously close the other banks, and vice versa.

9. In a full toned reed harmonica, two oppositely disposed reed plates, each bearing a front and a back bank of reeds, two of said banks being tuned to the principal tones of the diatonic scale and the other two banks being tuned to the remaining tones of the chromatic scale, the individual banks of each pair being disposed on opposite plates of the instrument, stop-plates movable towards and from the reed plates and connections between said stop-plates whereby the plates are movable to simultaneously open or close the passage of air to the individual banks of one pair, and close or open, respectively, the passage of air to the banks of the other pair, for the purpose set forth.

10. In a reed harmonica, two reed plates, each bearing a front and a back bank of reeds, stop-plates movable toward and from each bank, interacting connections between said plates whereby two of said plates are movable simultaneously towards and from their associated reed banks, while the other two of said plates have a simultaneous reverse movement, and a single device for operating all of said plates.

11. In a reed harmonica, two reed plates, each bearing a front and a back bank of

reeds, stop-plates movable toward and from  
 each bank, said plates operating in pairs and  
 the plates of each pair being rigidly connect-  
 ed together and pivoted to the frame of the  
 5 instrument, an operating device connected  
 with one of said pairs of plates, and an arm  
 on the latter pair of plates operating the  
 other pair of connected plates.

In testimony, that I claim the foregoing as  
 my invention I affix my signature in pres- 10  
 ence of two witnesses, this 8th day of March  
 A. D. 1906.

JOSEPH E. MURPHY.

Witnesses:  
 W. L. HALL,  
 A. M. BUNN.