Nov. 22, 1938. W. R. STEELE 2,137,251

HARMONICA

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Fig. 1.

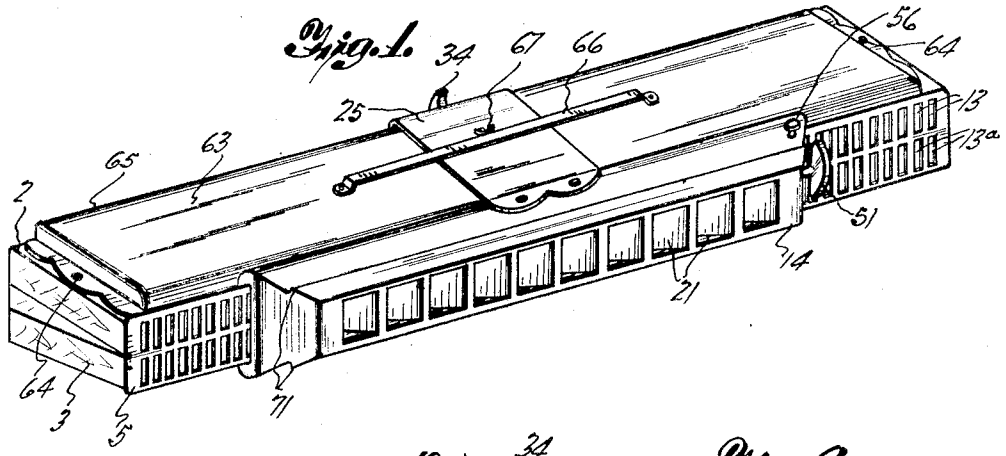

Fig. 2.

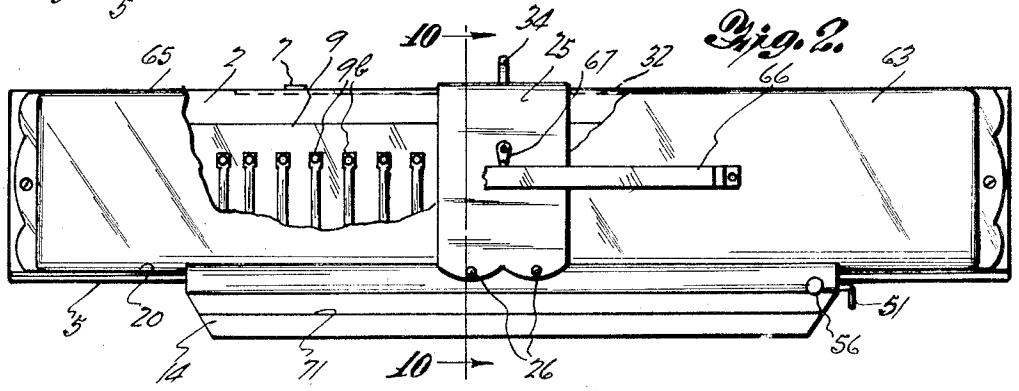

Fig. 3.

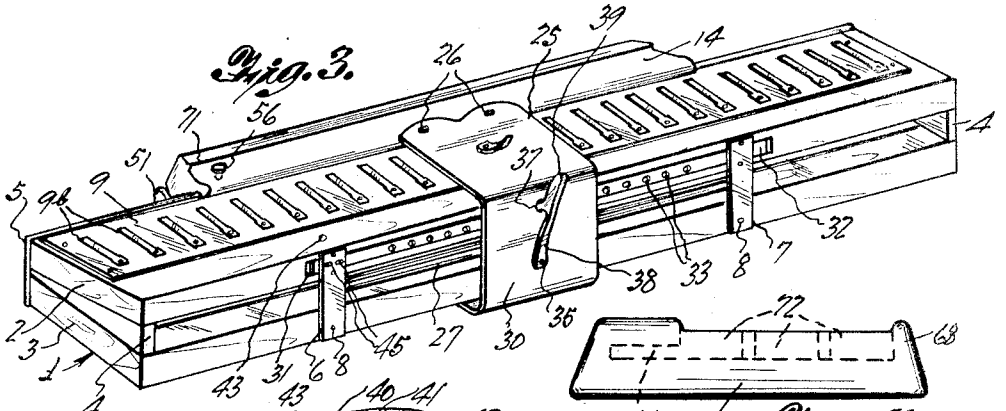

Fig. 11.

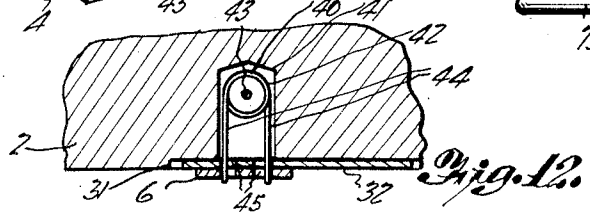

Fig. 12.

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Fig. 4.

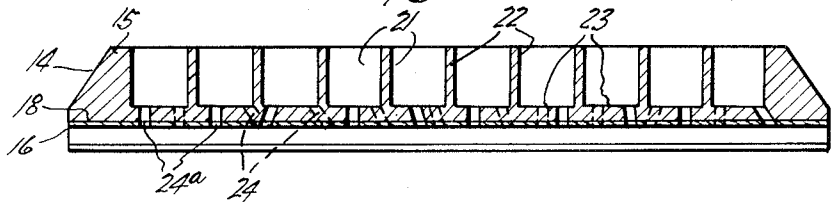


Fig. 5.

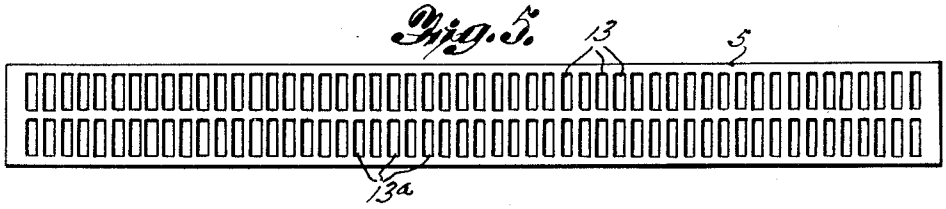


Fig. 6.

Fig. 7.

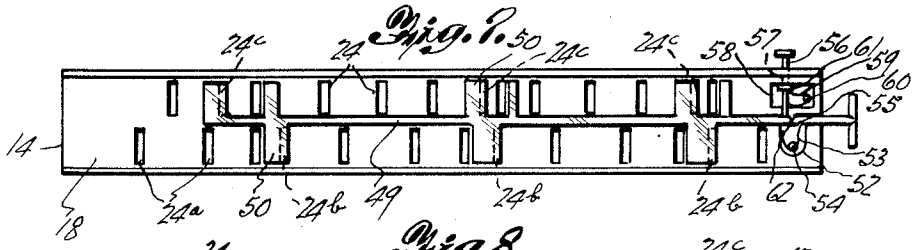
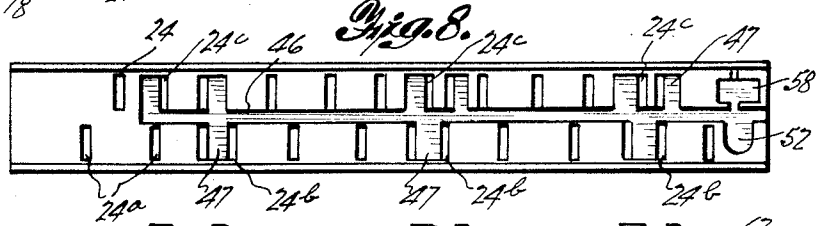


Fig. 8.



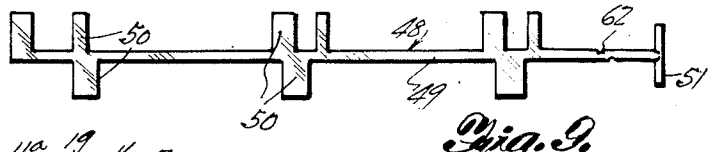


Fig. 9.

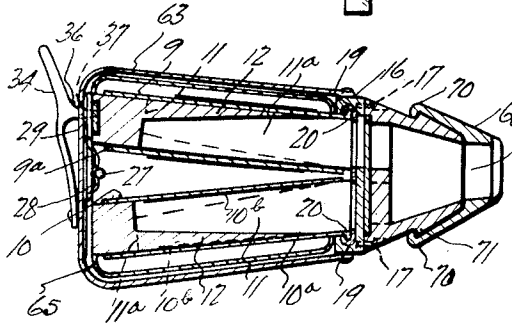


Fig. 10.

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2,137,251

HARMONICA

Walter R. Steele, La Mesa, Calif.

Application March 15, 1937, Serial No. 130,835

6 Claims. (Cl. 84—377)

My invention relates to improvements in harmonicas and the main object is to provide an instrument of this kind which will play in all major keys and may be modulated from one key to another while being played, in all cases maintaining the same breathing sequence and the same characteristic chords due to the use of a sliding mouthpiece having a number of holes each of which may be selectively registered with a plurality of differently tuned reeds as required.

Another object is to provide an instrument of this kind including a slidable key changer or valve by which the key may be changed from major to its relative minor key at will and including a means for locking in either position where there is a sustained run in either key.

Another object is to provide an instrument of this kind having a slidable mouthpiece by which either sharps or flats may be played as required and without changing the breathing sequence.

Another object is to provide an instrument of the foregoing advantages which is simple and compact in construction and convenient in operation while being played.

With these and other objects in view the invention resides in the novel construction and arrangement of parts as hereinafter fully set forth and claimed, reference being had to the accompanying drawings as showing a preferred embodiment of my invention for purposes of exemplification.

In the drawings:

Figure 1 is a perspective view looking toward the frontal edge of my instrument.

Figure 2 is a plan view, a portion of one of the bell casings being broken away.

Figure 3 is a perspective view looking toward the rear edge, the uppermost casing being removed entirely.

Figure 4 is an enlarged longitudinal section through the mouthpiece alone.

Figure 5 is a frontal elevation of the slotted front plate alone.

Figure 6 is a frontal edge view of one of the sticks showing the reeds thereon.

Figure 7 is a rear edge view of the mouthpiece showing the key changing valve in place thereon.

Figure 8 is a similar view but with the valve removed.

Figure 9 is an elevation of the key changing valve alone.

Figure 10 is an enlarged cross section along the line 10—10 in Figure 2.

Figure 11 is a plan view of a chord coupler which may be slidably mounted on the mouthpiece.

Figure 12 is an enlarged cross sectional detail view of the spring centering device for the mouthpiece lock bar.

In carrying out my invention I provide a reed plate assembly of a frame 1 made up of a pair of sticks 2 and 3 of elongated rectangular shape mounted in V-shape with their frontal edges meeting and diverging toward their rear edges, the ends being enclosed by the end blocks 4 set between the sticks. An elongated front plate 5 is attached to and covers the frontal edges of the sticks 2 and 3 and at spaced points each side of their centers the rear edges are connected by strips 6 and 7 pinned to the sticks as at 8. All these parts form a rigid frame assembly and leave the four rectangular upper and lower faces of the sticks exposed as shown. A reed plate is mounted on each of these exposed faces, the plates 9 and 9a on the upper stick 2 having reeds 9b arranged to play by drawing the breath and the plates 10 and 10a on the lower stick 3 having reeds 10b which are played by blowing the breath. Each reed plate carries 26 reeds in the instrument shown though this of course may be varied according to the playing range desired. The reeds on the upper pair of reed plates and stick are tuned exactly the same as those in the lower pair of reed plates and stick, the only difference being in the breathing required and the reeds on the lower sides of both sticks are spaced to fall between the reeds on the upper sides so that two parallel rows of reeds are provided each with a separation of a half tone between any two adjacent reeds.

The sticks 2 and 3 each have grooves in their frontal edge portions which align with the reeds on the reed plates, these grooves opening alternately on opposite sides of the sticks as shown in Figures 6 and 10. In other words alternate grooves, as the ones indicated at 11 (on both sticks 2 and 3) open upwardly in registry with the reeds on the upper plates 9 and 10 while the intervening grooves 11a open downwardly to the reeds on the lower plates 9a and 10a. The grooves all open as well at the frontal edges of the sticks and taper in vertical width toward their rear extremities so as to leave narrow tapering tongues 12 which act as baffles to separate the grooves from all reeds but those lying over their open sides and to strengthen the structure. The front plate 5 has parallel rows of slots 13 and 13a which are aligned with and open into the open frontal ends of the grooves 11 and 11a

in the upper and lower sticks respectively. Thus by blowing the breath into any of the lower row of slots 13a the reeds on the lower reed plates 10 and 10a will be played while by drawing the breath through the upper row of slots 13a the reeds on the upper plates 9 and 9a will be played. In each case the reeds played constitute and include the chromatic scale.

Inasmuch as all major scales are symmetrically the same in formation I provide a sliding mouthpiece shown generally at 14. This mouthpiece is of elongated bar-like shape tapering toward its frontal edge 15. A mounting strip or frame 16 is secured by screws 17 to the rear face 18 of the mouthpiece and the upper and lower margins of this strip are undercut so as to provide channels 19 running lengthwise. The frontal edges of the uppermost and lowermost reed plates 9 and 10a are turned upwardly and downwardly respectively so as to provide guide ribs 20 over which the margins of the front plate 5 are turned to hold the front plate in place and the undercut channels 19 will then slidably ride these margins as shown when the mouthpiece is mounted on the harmonica. Thus the mouthpiece 14 may be moved endwise along the frontal edge of the instrument as desired and required in the playing of the instrument.

Formed in the frontal edge of the mouthpiece are ten square holes 21 which are spaced apart and isolated by intervening walls 22 and which open out at their frontal ends. The holes are also separated from the rear face 18 of the mouthpiece by the walls 23. Each hole 21 however has a pair of ports 24 and 24a which pierce the walls 23 and open out the rear face of the mouthpiece, one port 24 of each hole registering with the row of "draw" slots 13 in the front plate 5 and the others 24a registering with the row of "blow" slots 13a. Thus by sliding the mouthpiece 14 over the front plate 5 and blowing or drawing breath through the holes 21 any desired sequence of the reeds 9b and 10b may be played in major scales in various keys as desired.

In order to hold the mouthpiece 14 in any adjusted position I provide the assembly now to be described. A band 25 of U-shape is secured by pins or screws 26 at its ends to the upper and lower edges of the mouthpiece mounting strip 16 and extends around the rear edge instrument frame 1 as shown. A guide rod 27 is secured at its ends to the connecting strips 6 and 7 and extends therebetween parallel with the sticks 2 and 3 inside the rear edges thereof. A spring guide 28 is attached at 29 to the inner face of the bight 30 of the band 25 and slidably rides this rod 27 pressing resiliently thereagainst so as to exert a sufficient pull on the mouthpiece 14 at all times to overcome any tendency to looseness thereof. The upper stick 2 has a lock bar with grooves 31 extended along its rear edge out at each end past and beneath the upper ends of the strips 6 and 7. A lock bar 32 is slidably mounted in this groove 31 and has a plurality of apertures 33 spaced along its length, the distance between their apertures corresponding to the distance between the slots 13, 13a in the front plate 5.

A lock dog or catch 34 is attached at 35 to the bight 30 of the band 25 and has a nose portion 36 which extends through an opening 37 in said bight and may be entered into any of the apertures 33 thus locating and locking the mouthpiece 14 at any of several positions along the front of the instrument as will be understood. The shank 38 of the dog 34 is thin and resilient and is tensioned to normally swing the nose 36 forwardly into one of the apertures 33 but by pressing back on the upstanding ear 39 the dog may be readily released while the mouthpiece is moved.

A lock bar centering spring 40 is located in a recess 41 formed in the rear edge of the stick 2 beneath the strip 6, this recess opening out into the groove 31. The spring 40 has a torsional coil 42 through which a pin 43 passes and has the normally divergent rearwardly extended legs 44. The lock bar 32 and the upper end of the strip 6 have aligned spaced slots 45 through which these spring legs 44 pass and against the outermost edges of which the legs bear. The spring 40 thus normally holds the lock bar 32 in a centered position but allows it to move either way a distance equal to one space between the apertures 33 the legs 44 butting against the inner edges of the slots 45 limiting this movement. Thus the mouthpiece may be moved one note's width in either direction without releasing the dog 34 so that sharps or flats may be played for any position of the mouthpiece selected by the mouthpiece locking assembly.

For changing from a major key to a minor key I provide a key changing assembly now to be described. The rear face 18 of the mouthpiece 14 is recessed out along the center between the rows of ports 24 and 24a as shown at 46 and has also laterally extended recesses 47 extending out adjacent certain of these ports. The center recess 46 opens out the right hand end also of the mouthpiece. A key changer or slide valve 48 is provided, the same being punched from sheet metal of such thickness that it will fit into the recesses 46 and 47 and will clear the adjacent mounting strip 16. The valve 48 comprises a stem or shaft 49 to slidably fit the center recess 46 and spaced laterally extending valve wings or ears 50 which play in the recesses 47. The end of the stem 49 will extend from the mouthpiece through the open end of the recess 46 and it has a thumb piece 51 turned forwardly.

Extra ports 24b are provided in the lower row of ports 24a in the mouthpiece 14 adjacent to the third, sixth and ninth ports counting from the left and opening into the same holes 21 as do these ports. The lower recesses 47 then connect these adjacent ports 24a and 24b and in the normal or "C major" position of the valve 48 the lower wings 50 close these extra ports 24b. However by pushing the valve 48 inward or to the left as far as it will go the ports 24b are opened and the adjacent and connected ports 24a are closed. Thus the notes or reeds tuned to "G" which would be played by blowing through these ports 24a are covered by the valve and instead the ports 24b are opened leading to the notes or reeds tuned to "A" thus changing to A minor tonic chord. Likewise extra ports 24c are provided in the upper row of ports 24 adjacent to the second, sixth and tenth original ports counting from the left and opening into the same holes 21. The uppermost recesses 47 extend properly adjacent these connected ports 24 and 24c and the wings 50 lying in these recesses normally close the extra ports. However as the valve is pushed in the ports 24 which ordinarily would play the "A" notes or reeds when drawing the breath will be closed and the ports 24c leading to the "G" sharp notes or reeds will be opened to complete proper tonic minor scale.

This operation of the valve 48 is readily carried out while playing the instrument as will be understood.

A spring recess 52 is formed laterally from the recess 46 adjacent the open end thereof and a torsional coil spring 53 is held by a pin 54 therein, one leg of the spring being braced against the side of the recess and the other engaging a notch 55 in the valve stem 49 and serving to normally urge the valve to the right or outwardly to major position. Where there is a sustained run in a minor key the valve may be locked in minor position by a lock plunger 56 which is slidably mounted down through a bore 57 in the mouthpiece adjacent its right hand end and at right angles to the line of movement of the valve. A recess 58 is formed around this plunger and a torsional coil spring 59 is held by a pin 60 therein with one leg braced in the recess and the other engaging a stop 61 on the plunger so as to normally urge the plunger outwardly. A notch 62 is provided in the upper edge of the valve stem 49 in such position that as the valve is pushed inward to "minor" position the plunger 56 may be pushed at its lower end into the notch. The relative strengths of the springs 53 and 59 is such then that the outward pressure of the spring 53 will lock the notch and plunger and hold the plunger in inthrust position until the valve is pushed inward slightly and the plunger is released after which the valve will return to normal position.

Elongated rectangular bells or bell casings 63 are secured at 64 to the upper and lower sides of the frame 1 on the sticks 2 and 3, the casings standing out from the sticks so as to substantially clear the reed plates. The rear edges 65 of these casings are perforated to allow the sound to escape. A scale strip 66 is secured to the upper casing 63 passing over the band 25 which carries a pointer 67 to indicate by suitable graduations on the strip 66 the key to which the mouthpiece 14 is adjusted.

Inasmuch as the length of four of the openings 21 (which is the number the mouth usually covers in playing a harmonica) is necessarily greater than usual a chord coupler 68 may be used, this being of shape similar to the mouthpiece 14 though much shorter and has a recess 69 along its rear edge with inwardly turned guide margins 70. The mouthpiece 14 has ribs 71 along its upper and lower sides and the coupler may thus be slipped endwise over the mouthpiece with the guides 70 over the ribs 71 and the coupler may be moved along the mouthpiece freely. The coupler has three openings 72, one of which is undercut as at 73 so that by blowing into these three openings the air will enter four of the openings 21 in the mouthpiece.

It is thought that further details as to the operation and use of the instrument will be apparent to those skilled in the art without further description herein. There are of course numerous minor changes in construction which might be made without departing from the scope of the invention.

While I have herein set forth a certain preferred embodiment of my invention it is understood that I may vary from the same in minor structural details so as best to provide a practical device for the purposes intended, not departing from the spirit of the invention and within the scope of the appended claims.

I claim:

1. In a device of the kind described, a reed plate assembly having a plurality of reeds, a mouthpiece slidably mounted on the assembly and having openings to conduct air to the reeds selectively in any sequence, a band attached to the mouthpiece and slidably encircling the reed plate assembly, a lock bar, and a dog carried by the band and adapted for locking engagement with the lock bar.

2. In a device of the kind described, a reed plate assembly having a plurality of reeds, a mouthpiece slidably mounted on the assembly and having openings to conduct air to the reeds selectively in any sequence, a band attached to the mouthpiece and slidably encircling the reed plate assembly, a lock bar, and a dog carried by the band and adapted for locking engagement with the lock bar, and said lock bar being slidably mounted and being spring set against movement in either direction.

3. In a device of the kind described, a reed plate assembly having a plurality of reeds, a mouthpiece slidably mounted on the assembly and having openings to conduct air to the reeds selectively in any sequence, a band attached to the mouthpiece and slidably encircling the reed plate assembly, a lock bar, and a dog carried by the band and adapted for locking engagement with the lock bar, the said lock bar being slidably mounted and being spring set against movement in either direction, a graduated scale strip secured to the reed plate assembly parallel to the line of movement of the mouthpiece, and a pointer carried by the band and playing over the strip.

4. In a device of the kind described, a reed plate assembly including pairs of plates each having reeds tuned to the same chromatic scales, the reeds on one pair of plates being played by blowing and on the other pair by drawing, a mouthpiece slidably mounted over the reed plate assembly and having a plurality of openings communicating with the reeds on both the pairs of reed plates, a chord coupler slidably mounted on the mouthpiece, the said coupler being shorter than the mouthpiece and having openings for communicating with the said openings therein, and one of the said openings in the coupler being capable of spanning two of the openings in the mouthpiece.

5. In a device of the character described, a reed plate assembly including a pair of sticks and each carrying a pair of reed plates, the reeds on one stick being played by drawing the breath and the reeds on the other stick being played by blowing the breath, a mouthpiece slidably mounted on the sticks, the said mouthpiece having a plurality of openings separated from the sticks by a rear wall, and this wall having a pair of ports leading from each opening to the reed plates on each stick.

6. In combination with a harmonica including a mouthpiece having spaced openings, a chord coupler adapted for slidable mounting on the mouthpiece, the said chord coupler having a plurality of openings adapted to register with a sequence of openings in the mouthpiece, and one of the openings in the coupler being undercut whereby it will span more than one of the openings in the mouthpiece.

WALTER R. STEELE.