United States Patent

Ohno

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[54] **KEY GUIDE FOR ELECTRONIC MUSICAL INSTRUMENT**

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[73] Assignee: **Nippon Gakki Seizo Kabushiki Kaisha,** Shizuoka-ken, Japan

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Feb. 9, 1970 Japan 45/12460

[52] **U.S. Cl.**.....**84/436,** 84/1.25

[51] **Int. Cl.**.....**G10c 3/12**

[58] **Field of Search**.....84/1.25, 433, 434, 436

[56] **References Cited**

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[57] **ABSTRACT**

For an electronic musical instrument including a keyboard wherein sound can be produced by depressing a key of the keyboard and vibrato or like effect can be produced by vibrating the depressed key to right and left; a key guide which comprises guiding members which are fixed in position and project at their upper ends into recesses formed underside of the keys, respectively, the upper end of each guiding member having a transverse width substantially narrower than that of the recess, and caps of elastic material each fixed around the upper end of the guiding member and having thin wall portions, integrally formed therewith, projecting laterally beyond the both sides of the cap so as to make slidable contact with inside surfaces of the corresponding key, whereby the thin wall portions of each cap permit the lateral vibration of the key, also serving to properly guide the key in vertical direction when the key is depressed downward.

11 Claims, 8 Drawing Figures

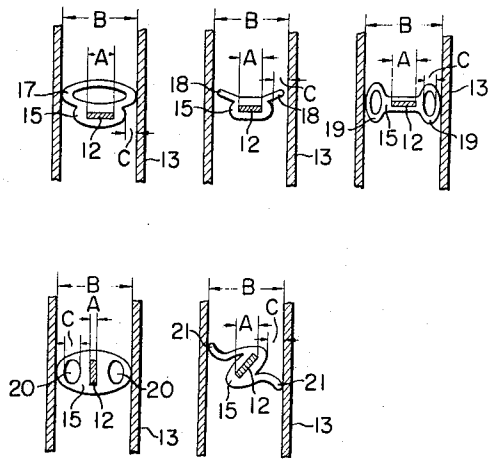


FIG. 1 PRIOR ART

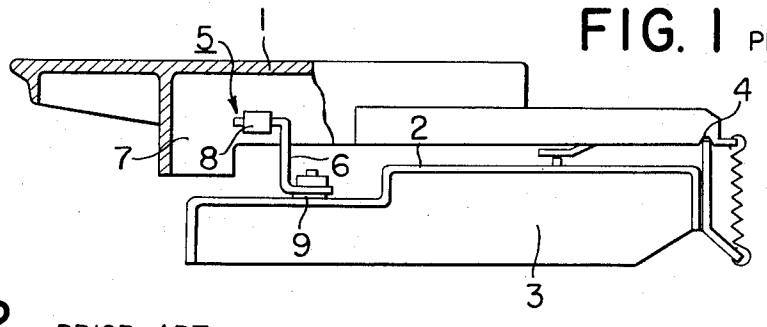


FIG. 2 PRIOR ART

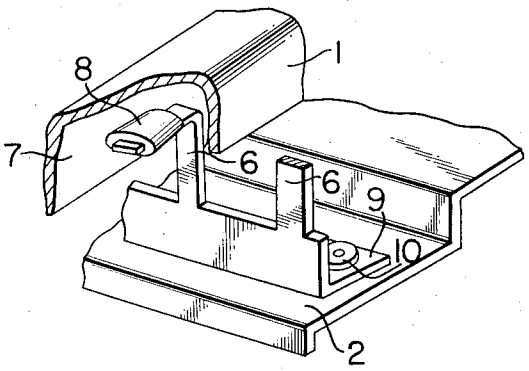


FIG. 3

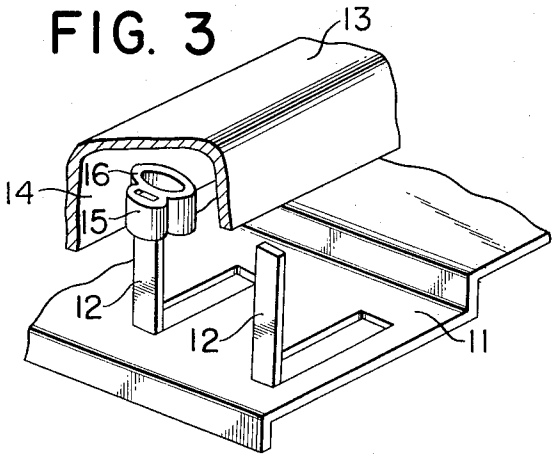


FIG. 4a

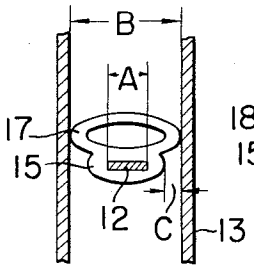


FIG. 4b

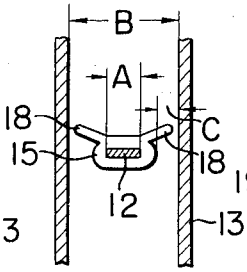


FIG. 4c

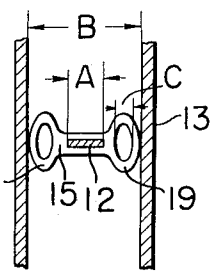


FIG. 4d

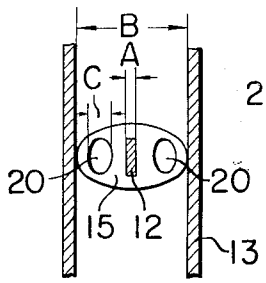
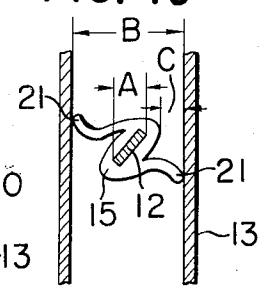


FIG. 4e



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KEY GUIDE FOR ELECTRONIC MUSICAL INSTRUMENT

BACKGROUND OF THE INVENTION

The present invention relates to a key guide for an electronic musical instrument of the type including a keyboard wherein sound can be produced by depressing a key of the keyboard and vibrato or like effect can be produced by vibrating the depressed key to right and left.

In a keyboard of a usual keyed instrument including a plurality of keys juxtaposed corresponding to a prescribed order of a musical scale, the keys being selectively depressed to produce a note or notes, a key guide is provided inside of each of the keys in order to prevent the free end of the key from moving sideward to touch the adjacent key during operation. The conventional key guide comprises a plurality of guiding members which extend upward from a frame of the keyboard and project into recesses formed underside of the respective keys, so that the guiding members serve to guide the respective keys in vertical direction to prevent the sideward movement of the keys.

In an electronic musical instrument of the above type wherein vibrato or like effect can be produced by vibrating a depressed key to right and left, that is, an electronic musical instrument having so-called "touch-vibrato" or like effect, the key guide heretofore used in the usual keyed instrument as explained above would constitute a bar to the sideward vibration of the keys.

Accordingly, a key guide for such an electronic musical instrument has been made of a plurality of key guiding members which are connected together at their lower ends to form a plate member, which is supported on the frame through an elastic material, such as rubber, thereby allowing sideward vibration of said plate member. In such a key guide construction, however, the sideward vibration of a single key to obtain the touch-vibrato or like effect gives rise to simultaneous vibration of a plurality of keys, which presents a strange appearance and a relatively large resistance to the sideward vibration of the key.

SUMMARY OF THE INVENTION

It is an object of the present invention to eliminate the above defects in the conventional key guide and provide a key guide which serves to properly guide the keys in vertical direction and allows individual sideward vibration of the respective keys within predetermined small width to produce the touch-vibrato or like effect.

In accordance with the present invention, there is provided a key guide for an electronic musical instrument of the above type, comprising a frame, guiding members fixed at their lower ends on the frame and projecting at their upper ends into recesses formed underside of the keys, respectively, the upper end having a transverse width substantially narrower than that of the recess, and caps of elastic material each fixed around the upper end of the guiding member and having thin wall portions, integrally formed therewith, laterally projecting beyond the both sides of the cap so as to make slidable contact at their edges with inside surfaces of the corresponding key.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view, partly broken, of a key and key-switch assembly of an electronic musical instrument;

FIG. 2 is a perspective view of a conventional key guide employed in the electronic musical instrument as shown in FIG. 1;

FIG. 3 is a perspective view of a key guide according to the present invention; and

FIGS. 4 (a), (b), (c), (d) and (e) are plan views showing various forms of the key guide according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now the invention will be explained with reference to the drawings, in which FIGS. 1 and 2 illustrate a key guide heretofore employed in an electronic musical instrument and FIGS. 3 and 4 illustrate various embodiments of the present invention.

A key and key-switch assembly of an electronic musical instrument as shown in FIG. 1 includes a frame 2, keys 1 swingably supported at their rear ends 4 on the frame 2, key-switches 3 each actuated by the corresponding key to produce a predetermined note, and a key guide generally designated by numeral 5. The key guide 5 comprises vertical guiding members 6 fixed at their upper ends into recesses 7 formed underside of the keys 1, respectively, and cushion members 8, made of felt or the like, fixed on the upper ends of the guide members, respectively. Each cushion member 8 makes slidable contact with the inside surfaces of the recessed key 1 to properly guide the corresponding key during its vertical swinging movement. In the conventional construction of the key guide as shown in FIG. 2, a plurality of guiding members 6 are connected together at their lower portions to form an integral plate member 9, which is supported on the frame 2 by means of a bush 10 of resilient material, such as rubber, which allows slight sideward movement of the plate member 9 when the key 1 is vibrated to right and left in order to produce "touch-vibrato" or like effect. The touch-vibrato or like effect may be obtained, as is well-known in the art, by transmitting the vibration of the plate member 9 to a mechanical-electrical transducer (not shown) such as a piezoelectric element, a photoelectric element, a variable resistor or the like. In such a construction, the vibration of one of the keys produces simultaneous movement of a plurality of guiding members which are connected together by the plate member 9 and, consequently, simultaneous vibration of a plurality of keys, which is undesirable because the operation of the key requires much force and the simultaneous movement of the plural keys presents a strange appearance.

In the preferred embodiment of the present invention as shown in FIG. 3, guiding members 12 are individually fixed at their lower ends on a frame 11 and project at their upper ends into recesses 14 formed underside of keys 13, respectively. The upper end of the guiding member has a transverse width which is substantially narrower than that of the recess 14, and a cap 15 made of elastic material such as natural rubber, synthetic rubber, plastics or the like is fitted on the upper end of the member 12. The cap 15 has elastic

thin wall portions **16**, integrally formed therewith, which project laterally beyond the both sides of the cap so as to make slidable contact with the inner surfaces of the recessed key **13**. The laterally projected ends of the elastic thin wall portions **16** may be lightly in contact with the inside walls of the key **13** when the key is in an undepressed position. Preferably, lubricant oil or other suitable lubricating material may be applied on the surface of the elastic thin wall portions **16** in order to reduce friction between the inside surfaces of the key and the elastic thinned portions. In FIG. **3**, the guiding members **12** are shown as separately stamped out of the frame **11**, but these guiding members may be connected together at their lower ends to form an integral part which may be fixed on the frame by soldering or welding.

FIGS. **4**(a)–(e) show various forms of the key guide according to the present invention. FIG. **4**(a) shows a form in which the thin wall portions are made in the form of an oval ring **17** which is integrally formed with the cap **15**, (FIG. **4**(b) shows a form in which thin wall portions are made in the form of fins **18** integrally formed at the opposite sides of the cap **15**, and FIG. **4**(c) shows a form in which thin wall portions are made in the form of oval rings **19** and **19** integrally formed at the both sides of the cap **15**. In any of the forms shown in FIGS. **4**(a), (b) and (c), the guiding member **12** is made of a plate which is oriented at a right angle to axial direction of the key **13** and has a cap **15** fitted on the upper end thereof. The guiding member may be made of a plate which is arranged in parallel with or at a suitable angle to the axial direction of the key. FIG. **4**(d) shows a form in which the guiding member **12** is arranged in parallel with the axial direction of the key **13**, while FIG. **4**(e) shows a form in which the guiding member **12** is arranged at an angle to the axial direction of the key. In FIG. **4**(d), the cap **15** is formed in an ellipsoid of elastic material which has oval-shaped voids **20** in the both side portions thereof so as to form thin walls. In FIG. **4**(e), arcuately curved thin wall portions **21** are integrally formed at the both sides of the cap **15**.

In the key guide according to the present invention, the transverse width of the upper end of the guiding member **12**, designated by A in FIG. **4**, is substantially narrower than the width of the recess **14** of the key **13**, designated by B in FIG. **4**, and the cap **15** fitted on the upper end of said guiding member makes slidable contact at the side edges of the elastic thin wall portions thereof with the inner surfaces of the key **13**, so that when the key **13** is depressed the cap **15** serves to properly guide the key in vertical direction owing to the slidable contact between the inside surfaces of the key and the side edges of the thin wall portions of the cap, and when the depressed key **13** is vibrated to right and left in order to produce touch-vibrato or like effect the thin wall portions of elastic material make elastic deformation to permit the vibration of the key to right and left by the width shown by C in FIG. **4**.

It will be understood that the present invention provides a key guide for an electronic musical instrument of the above type, which is so constructed that when the key is depressed downward it is properly guided in vertical direction so that it may not accidentally move sideward to touch an adjacent key, and when the key is positively or forcedly vibrated to right and left in order to produce the vibrato or like effect it is permitted to elastically move to right and left within a predetermined width. When the vibration of the key is stopped, the key restores its original position and becomes properly guided in vertical direction. In the key guide according to the present invention, when a key is positively vibrated to right and left to produce the vibrato or like effect there occurs movement of only that key which is subjected to positive vibration and no simultaneous movement of the other keys. Accordingly, the keys can be lightly and smoothly vibrated to right and left to produce touch-vibrato or like effect, without requiring so much force in the operation of the key or presenting strange appearance of a plurality of keys being simultaneously vibrated sideward.

I claim:

1. A key guide for an electronic musical instrument including keys each of which is provided with a pair of laterally spaced side walls defining a recess therein and can be slightly moved reciprocally in a lateral direction thereof to produce a special musical effect, which key guide comprises a frame, guiding members fixed at their lower ends on said frame and projecting at their upper ends into the recesses of the keys said upper end of each of said guiding members having a transverse width substantially narrower than that of the corresponding recess, and caps of elastic material each fixed on the upper end of each guiding member a having both sides located close to the respective side walls of each key, each of said caps being provided with thin wall portions, integrally formed therewith, laterally projecting beyond the both sides of the cap toward the side walls of the key so as to make slidable contact with the side walls of the corresponding key, whereby said thin wall portions permit each of said keys to be moved in the lateral direction of the key.

2. The key guide as claimed in claim **1** wherein the thin wall portions of each of said caps are lightly in contact with the inner side surfaces of the corresponding key when the key is in an undepressed position.

3. The key guide as claimed in claim **1** wherein the thin wall portions of each of said caps form an oval ring.

4. The key guide as claimed in claim **1** wherein the thin wall portions of each of said caps form a pair of fin-like projections extending laterally from opposite sides of said cap.

5. The key guide as claimed in claim **4** wherein each of said fin-like projections is arcuately shaped.

6. The key guide as claimed in claim **1** wherein the thin wall portions of each of said caps form a pair of oval rings at both sides of said cap.

7. The key guide as claimed in claim **1** wherein the thin wall portions of each of said caps form an ellipsoid having a pair of voids at opposite sides of said cap.

8. A key guide as in claim **1** wherein the thin wall portions of each of said caps comprise an oval ring.

9. A key guide as in claim **1** wherein the thin wall portions of each of said caps comprise a pair of fin-like projections extending laterally from opposite sides of said cap.

10. A key guide as in claim **1** wherein the thin wall portions of each of said caps comprise a pair of oval rings at both sides of said cap.

11. A key guide as in claim 1 wherein the thin wall portions of each of said caps comprise an ellipsoid having a pair of voids at opposite sides of said cap.

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