

[54] **KEY CONSTRUCTION FOR
KEYBOARD INSTRUMENTS**

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

[58] Field of Search **84/423, 433-438**

[56] **References Cited**

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Assistant Examiner—John F. Gonzales

[57] **ABSTRACT**

A key for keyboard instruments includes a key cap member mounted on an elongated key stick made of uniform material, such as wood. A transverse notch is formed in the key stick to receive a pivotal portion of a pivot-spacer member which has upstanding spacer portions on either side of the key stick in the region of the notch. A slot is also formed in the key stick in the region of the notch so as to make the same more flexible in a transverse direction thus allowing the key to engage the spacers and sufficient resiliency of the key stick will prevent sticking of the key to the pivot-spacer member.

8 Claims, 4 Drawing Figures

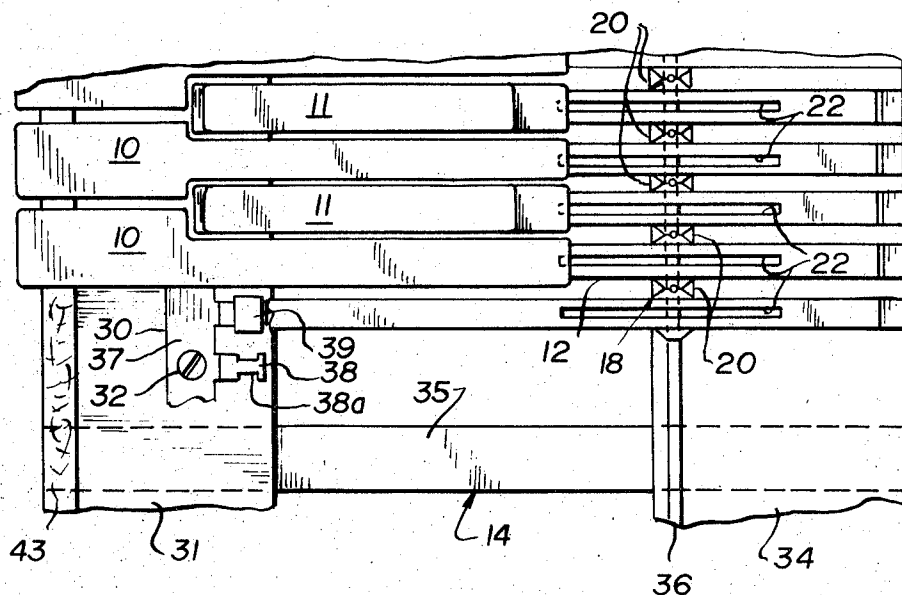


FIG. 1

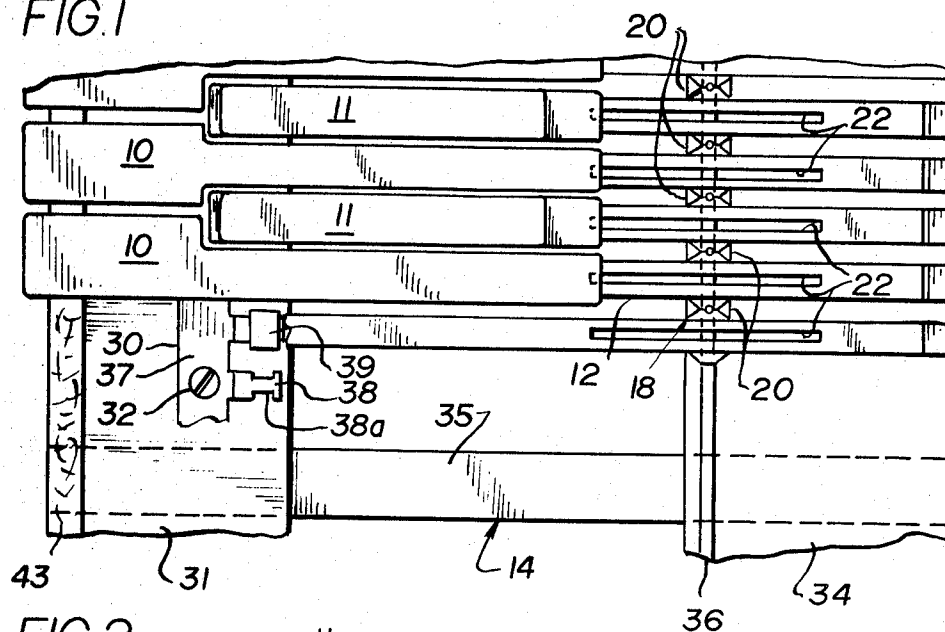


FIG. 2

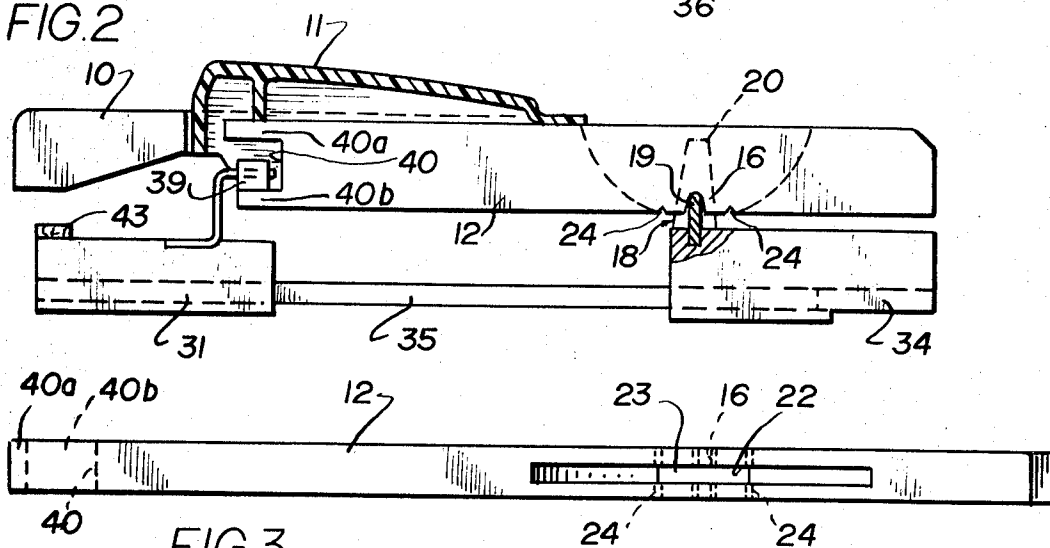
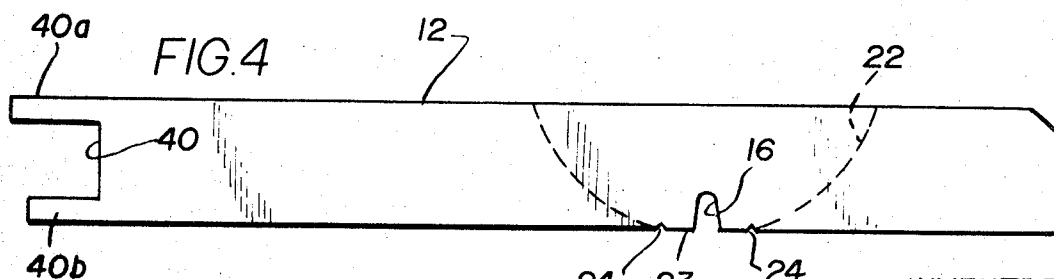


FIG. 3



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KEY CONSTRUCTION FOR KEYBOARD INSTRUMENTS

BACKGROUND OF THE INVENTION

This invention relates generally to musical instrument keyboards, and more particularly to a key construction for use in pianos, organs and other instruments which utilize natural and sharp keys. This invention is an improvement in the keyboard construction disclosed in application Ser. No. 94,288 filed Dec. 2, 1970 and assigned to the same assignee.

Musical instrument keyboards include a plurality of keys in parallel side-by-side arrangement which are pivotal about a point located between their ends when the key is depressed and released. The point of pivotal movement of each key generally is in longitudinal alignment with each other key along the keyboard frame and means are provided for holding the keys in a fixed position with respect to the keyboard frame while permitting the keys freely to pivot. Such means may include metal pins, or the like, driven into a rear portion of a wooden key bed or frame and the pins are arranged to extend upwardly through slots or holes formed in the bottom of the keys. Some type of bushing such as felt cloth or the like, is then used in the slots between the keys and the metal pins to provide quiet operation of the keys, while also limiting forward and rearward movement of the keys and to provide the proper touch quality of the musical instrument utilizing the keyboard.

While the disadvantages of the above described keyboard are manifestly concerned with cost and complexity of manufacture, this type of keyboard has acquired substantial acceptance by musicians because of their touch quality. Therefore, when designing keyboards for reducing manufacturing costs, many times changes made also affect touch quality substantially so that the resultant keyboard is unacceptable to musicians. Another problem with musical instrument keyboards of the prior art is that under certain playing conditions, the keys may tend to rotate about their longitudinal axis because of the key pivot and support arrangements heretofore used. This is particularly true when playing upon the keyboard in a glissando fashion, i.e. dragging the fingers over the keys from bass to treble or vice versa. To prevent this pivotal movement of the keys, it is necessary that means be provided to firmly grip the pivotal area of the key structure so it will not pivot or rotate about its longitudinal axis, but will freely pivot upwardly and downwardly when struck and released. A problem is presented when keys made of wood are guided with a small clearance, lest they tend to stick when the temperature and/or humidity change.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved key construction which greatly improves the upward and downward pivotal movement of the key while substantially retarding any longitudinal rotation of the key when sideward pressure is applied thereto.

Another object of the invention is to provide an improved key made of wood for a musical instrument keyboard assembly wherein the keys are held against torsional movement during playing of the musical instrument, as for example, when playing in glissando

fashion, i.e., dragging the fingers across the keys from bass to treble or vice versa, and which keys eliminate the possibility of sticking which may occur during atmospheric changes of humidity and/or temperature.

Briefly, the piano key is formed of a key cover or cap which is mounted to a key arm or stick of longitudinal configuration, rectangular in the cross-section and preferably of uniform material such as wood or the like. A transverse notch is formed in the key support rearwardly of the key member mounted thereon and the notch is arranged to receive a pivot-spacer member which may be a molded unit mounted to the keyboard frame. The upstanding spacer portions of the pivot-spacer are positioned on either side of the notch within the key arm to firmly hold the key for upward and downward pivotal movement, but to prevent rotation thereof. Most advantageously the key arm has formed therein a slot in the region of the notch which removes a substantial amount of material to provide transverse resiliency of the key arm so that absorption and elimination of moisture due to changes in atmospheric conditions will have little or no effect on expansion or contraction of the material in the region of the notch so that no sticking of the piano key will occur. The slot is preferably of semicircular configuration with a radius of the semicircle substantially in coincidence with the vertical axis of the notch. Also, grooves may be formed on the bottom of the key support, on either side of the notch to define terminating portions of a cut through formed by the slot at the bottom of the key support to prevent splitting or cracking of the wood key arm.

The key of this invention is used in a keyboard assembly formed of a hardwood frame. Secured to the frame is a rearwardly turned finger guide member which has a resilient member which holds the key substantially aligned on the frame to prevent lateral movement of the key. Each of the keys, i.e., the natural and sharp keys are mounted on a wooden key stick or key support such that plastic key caps, which have downwardly turned sidewall portions, cooperate with the key stick to form a channel at the forward end thereof to receive the resilient member of the forward guides. This forward guide and the pivot-spacer member cooperate to hold the keys in position to the frame.

A pivot-spacer member of molded plastic, forming an integral unit of one octave length of the keys, is secured to the rear rail of the key frame. The rear rail of the key frame has an elongated slot formed therein and the pivot-spacer member has a downwardly extending portion which fits into the slot and can be there held in place by adhesives or the like. The upwardly extending spacers of the pivot-spacer member extend on either side of the key support in the region of the slot formed therein to firmly hold the key.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view showing a partial segment of a key-board assembly utilizing the key construction of this invention;

FIG. 2 is a side elevational view of the keyboard assembly of FIG. 1;

FIG. 3 is a top view of a key support forming the key construction of this invention; and

FIG. 4 is a side view of a key support of FIG. 3.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring now to the drawings, a plurality of keys have covers or caps 10 and 11 mounted on similar elongated key sticks 12, which are made of wood, or similar material. The keys are arranged in parallel side-by-side arrangement to form part of a piano keyboard which is designated generally by reference numeral 14. Each of the key arms 12 is held in position on the piano keyboard structure 14 by a notch 16 which is set upon a pivot-spacer member 18. The pivot-spacer member has pivotal portions 19 which receive the notch 16 and has upstanding spacer portions 20 on each side thereof to confine lateral movement of the key sticks.

Most advantageously, a slot 22 is formed in each of the elongated key sticks 12 to remove a substantial amount of the material in the region which has the notch 16 which receives the pivotal member 19. When the elongated key sticks 12 are formed of uniform material such as wood, or the like, the removal of the material by forming the slot 22 allows this region of the key sticks 12 to be more resilient and pliable in the lateral direction. Therefore, if moisture or other atmospheric conditions, such as temperature cause expansion or contraction of the key sticks 12, it will be less affected in this region since the material removed will not absorb or expell moisture and will allow the key stick to be more flexible, i.e. resilient in the transverse direction. The spacer portions 20 will not then hold the key support 12 too tightly and sticking is prevented.

In the illustrated embodiment, the slot 22 is semicircular in configuration and arranged to be perpendicular to the notch 16, with the vertical radius of the slot being in substantial alignment with the vertical axis of the notch. The slot 22 is such that it will cut through the bottom portion of the key sticks 12 as indicated by reference numeral 23. Within the material of the key sticks 12, on each side of the cut through 23, are formed grooves 24 which may serve to prevent or reduce splitting or cracking of the material because of the cut through 23 after the slot 22 is formed.

The key bed 14 includes a forward metal guide member 30 which is of a comb-like configuration and which is secured to the forward board 31 by a screw 32 or the like. The pivot-spacer member 18 is carried to the rear board 34 in a slot 36 formed therein and the pivot-spacer member 18 is preferably glued in place within the slot. The pivot-spacer member 18 and the forward guide member 30 are in alignment one with the other to receive the plurality of keys 10 and 11 at spaced-apart intervals along the keyboard. The key frame 14 may be of hardwood construction including a plurality of pieced together hardwood components securely fastened either by glue, wood screws or staples or any combination thereof. In the instance case, the components are held together by glue and staples.

The guide member 30 has a solid strip portion 37 from which extend a plurality of elongated aligned spaced-apart fingers 38 which have their uppermost portions bent over rearwardly to face the rear rail 34. Although the guide fingers 38 appear to be equally spaced-apart, they may in fact be at different spacings to accommodate the different widths of sharp and natural keys. An undercut portion 38a is formed on each of the bent over portions and laterally extending portions are used to prevent a rubber guide 39 from easily com-

ing off of the finger portion 38. Only one of the resilient guides 39 is shown in FIGS. 1 and 2, but it will be understood that a resilient guide is provided on each of the guide fingers.

FIG. 2 illustrates the key sticks 12 and a sectional view of the associated sharp key cover 11 mounted thereon. Here it can be seen that the key sticks 12, like all other key sticks has a cut out portion 40 at its front end from which the upper and lower portions 40a and 40b extend. The key is positioned with respect to the front guide 30 so that the portions 40a and 40b extend above and below an associated resilient guide member 39. The upper and lower portions 40a and 40b limit the extent of vertical travel of the key to that point at which they engage the resilient guide members 39. The key sticks 12 may be connected to any suitable striking mechanism for piano operation or when the keyboard is used for organ musical instruments it may have extended wires or other devices connected thereto. A felt pad 43 is positioned on the front rail 31 just beneath the forward end of the natural keys 10. This pad prevents the natural keys 10 from making noise upon being depressed and prevents the natural keys 10 from pivoting about the guide member 39, which would otherwise occur as a fulcrum point.

With a key support stick 12 constructed in accordance with this invention, the slots 22 then provide sufficient resiliency in the area of the upwardly extended spacers 20 so that moisture when absorbed or expelled in the material, will cause little or no change of the key support in this region. Therefore, the keys will not stick about their pivot points. Also, the key sticks 12 can be more firmly held in the lateral position so that dragging the fingers over the keys from left to right or vice versa will cause little or no rotational movement of the keys about their longitudinal axis.

What has been described is a simple and inexpensive construction for keyboard instruments which is readily manufactured with a minimum of expense and which has improved operating characteristics over a wide range of humidity and temperature.

I claim:

1. A key construction for a musical instrument keyboard which includes a key frame with a pivot member for a key and upstanding spacers adapted to receive a key therebetween, comprising in combination, an elongated key arm of uniform material, a key cover member on said arm at one end thereof to form a key of the keyboard, a transverse notch formed in said elongated key arm rearwardly of said key cover member, said key arm being arranged to be inserted between the upstanding spacers with the sides thereof engaging the spacers and with said transverse notch inserted onto the pivot member, and a slot formed in said elongated key arm between the sides of the portion thereof between the spacers and substantially parallel to such sides in the region of said notch to cause said elongated key arm to be more resilient in the region of said notch to eliminate sticking of said elongated key arm between the upstanding spacers.

2. The key construction of claim 1 wherein said slot is formed in said elongated key arm in a direction perpendicular to said notch and intersects therewith.

3. The key construction of claim 1 wherein said slot is semicircular in side elevation, with the plane of said

slot being perpendicular to said notch and the vertical axis of said notch being substantially in coincidence with the radius of said slot.

4. The key construction of claim 1 wherein said elongated key arm is formed of wood and said slot passes completely through said elongated key arm causing an opening in the under side of said key arm in the region of said notch, and further including grooves formed in said elongated key arm on each side of said notch and transverse to the longitudinal axis of said elongated key arm to provide terminations for said opening of said slot thereby preventing inadvertent splitting or cracking of the material of said elongated key arm.

5. A musical instrument keyboard assembly, comprising in combination, a key receiving frame for receiving a plurality of natural and sharp key means, guide means formed along a forward portion of said key receiving frame, pivot-spacer means secured to said key receiving frame at a rearward portion thereof, said pivot-spacer means having longitudinally aligned pivot spacers extending upwardly therefrom and a plurality of spacer portions extending upwardly on opposite sides of said discrete pivot portions, and a plurality of discrete elongated natural and sharp key means positioned on said key receiving frame to form an instrument keyboard, each natural and sharp elongated key means including a key cover member to form either a natural or sharp key of the piano keyboard, and an elongated key arm of uniform material to receive said key member at one end thereof, a transverse notch formed in said elongated key arm rearwardly of said

key cover member mounted thereon, said transverse notch arranged to be inserted onto said discrete pivot portions of said pivot-spacer means with each side of said elongated key arm engaging one of said spacer portions, and a slot formed in said elongated key arm between said sides and substantially parallel thereto in the region of said notch to cause the portion of said elongated key arm between said spacer portions to be resilient and thereby eliminate tight engagement of said key means between said spacer portions.

6. The musical instrument keyboard assembly of claim 5 wherein said slot is formed in said elongated key arm in a direction perpendicular to said notch and intersects therewith.

7. The musical instrument keyboard assembly of claim 5 wherein said slot is semicircular in side elevation with the plane of the slot being perpendicular to said notch and the vertical axis of said notch being substantially in coincidence with a radius of said slot.

8. The musical instrument keyboard assembly of claim 5 wherein said key arm is formed of wood, and said slot passes completely through said elongated key arm forming an opening in the region of said notch, and further including grooves formed in said elongated key arm on each side of said notch and transverse to the longitudinal axis of said elongated key arm to provide terminations of said opening of said slot thereby preventing inadvertent splitting or cracking of the material of said elongated key arm.

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