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DOUBLE TOUCH KEY FOR MUSICAL INSTRUMENTS

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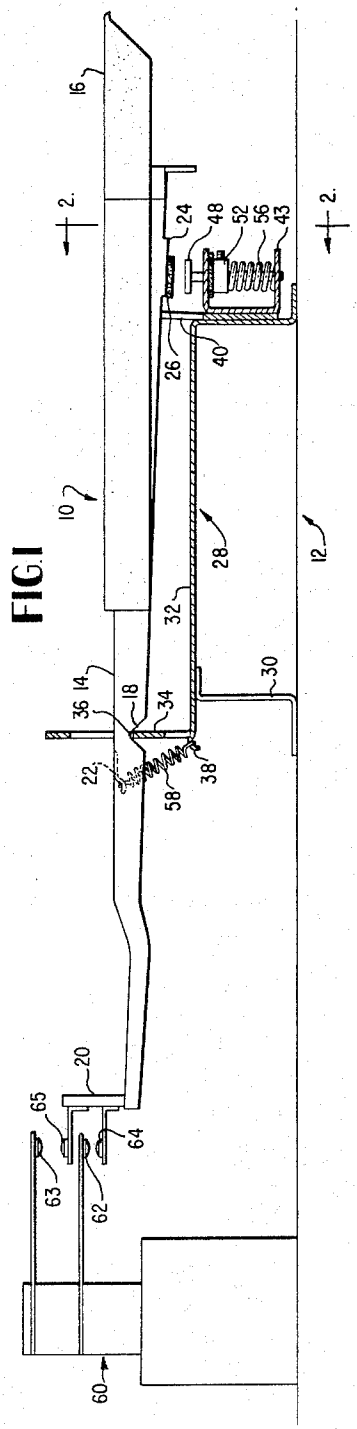


FIG. 1

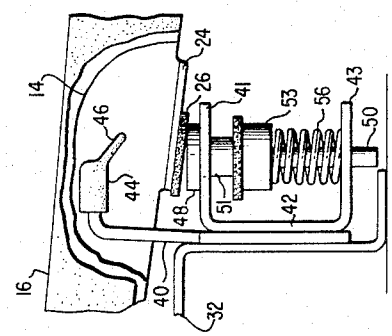


FIG. 5

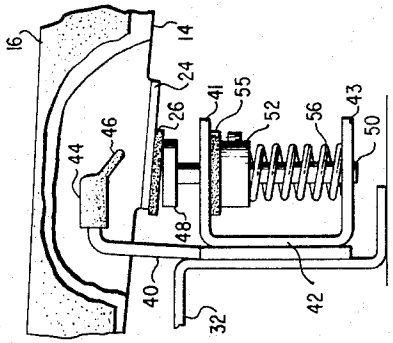


FIG. 4

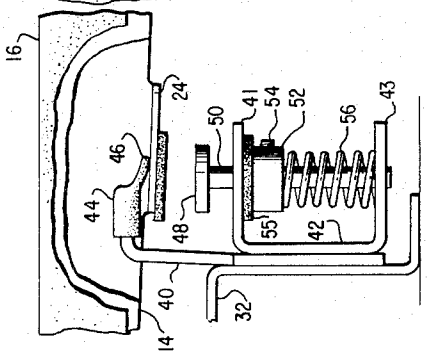


FIG. 3

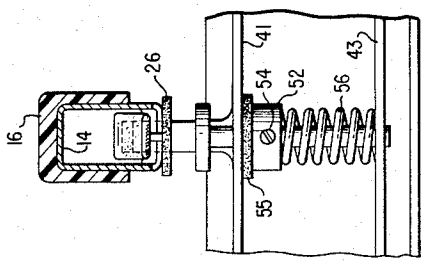


FIG. 2

INVENTOR

PAUL A. KLANN

BY Seyfarth, Rothwell, Mion and Zinn

ATTORNEYS

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DOUBLE TOUCH KEY FOR MUSICAL INSTRUMENTS

Paul A. Klann, P.O. Box 2398, Waynesboro, Va.

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This invention relates to improvements in key construction for musical instruments to allow a single key to separately actuate various sound producing mechanisms upon merely varying the "touch," i.e., the force the musician applies to the key.

In the art of musical instruments nad especially that of organs, both pipe and electric, the desire for more range and flexibility with the conventional keyboard is ever present. One particular instance is that where different "touch" applied to the keys of an organ would produce different resulting sounds for the same musical note. For example, a light touch could produce one sound, and a heavier touch on the same key could produce another sound, perhaps a different sound for the same musical note. Accordingly, it is the object of this invention to provide a double touch key for a musical instrument such as an organ, so that variations of the touch can produce variation in the music produced.

In musical instruments of the keyboard type, and organs in particular, silence of the actuated mechanical keyboard components is essential so that these parts do not create extraneous noise conflicting with the music produced. Any noisy mechanical components are especially noticeable when soft music is being played. Accordingly, it is a further object of this invention to provide a silent stop for the controlled stopping of the key when it returns to its normal position.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode which has been contemplated of applying that principle.

In the drawings:

FIG. 1 is a side elevation view of the double touch key construction of this invention with a portion of the support frame for a plurality of similar keys being shown in section.

FIG. 2 is a front elevation sectional view taken along line 2—2 of FIG. 1.

FIG. 3 is an enlarged detailed view illustrating the double touch key of this invention in its normally inactive position.

FIG. 4 is an enlarged detailed view similar to FIG. 3 showing the double touch key stop at a first stopping position after being actuated.

FIG. 5 is a detailed view similar to FIGS. 3 and 4 showing the double touch key being stopped at a second stopping position. In addition, FIG. 5 shows a modification and a preferred form of the double stopping construction.

Referring now to the drawings, there is shown in FIG. 1, a key 10 which is one of a plurality of keys on a keyboard of a musical instrument 12 which may be an organ, either pipe or electric.

The keys 10 each include a metal support frame 14 which is channel-shaped in section as can be seen in FIG. 2. The top of the support frame 14 is covered by a key cap 16 as shown. The metal frame 14 also includes a relieved notch 18 functioning as a pivot, and an extension 20 secured to the rear tip of the frame. A spring holder tab 22 may be struck down from the frame 14. In addition, frame 14 has a partial bottom closing portion 24 formed by bending in extensions of the channel sides, and this bottom closing portion 24 cooperates with upper

and lower stops as will be described. A felt pad 26 is glued to the bottom of the bottom closing portion 24.

A key support frame shown generally at 28 may include a rear support 30 and a support plate 32 extending under all of the keys of the keyboard. The support plate 32 includes a rear upwardly extending portion 34 having a cut out therein forming a fulcrum 36. A struck down tab 38 of support plate 32 functions as a spring-holder.

The front portion of support plate 32 carries an upper stop supporting bracket 40 of an inverted L-shape and a lower stop carrying bracket 42 which is C-shaped. The lower stop carrying bracket 42 includes an upper arm 41 and a lower arm 43.

The upper stop carrying bracket 40 carries an upper stop bumper 44 which has a depending resilient finger 46. Stop bumper 44 and its depending resilient finger 46 are formed from a resilient plastic such as polyvinylchloride sold under the trademark "Geon" and the thickness at contact angle of the finger 46 is chosen such that it will absorb silently most of the impact of the stopping action on the upper movement of the key 10. As an example, if the upward impact force were 3 ounces, the finger 46 would silently absorb the first two ounces and the bumper body 44 would absorb the remaining ounce.

The lower stops include a lower stop head 48 rigidly attached to a rod 50, which rod is slidably mounted within the arms 41 and 43 of bracket 42. A lower stop collar 52 is secured to the rod 50 by means of a set screw 54. A felt pad 55 may be positioned between the top of collar 52 and the bottom of arm 41 for silent action. A spring 56 is positioned between the bottom of collar 52 and the top of arm 43 so as to bias the collar 52 upwardly and therefore bias the stop head 48 to its uppermost position shown in FIGS. 3 and 4.

FIG. 5 shows a modification in the construction of the lower stop. In this modification, the stop head 48 is integral with the rod 50 with an intermediate thickened step 51 just below the head 48. Instead of a collar, there is a large washer 53 having an inner diameter to slip over the rod 50 but to abut against the lower end of thickened portion 51. The function is the same as that shown in the FIGS. 1–4 construction but with a single rod having only a thickened step and a single washer, expense can be saved over the set screw collar with substantially the same results being obtained.

The key 10 is biased to its normal inactive position by means of spring 58 secured to tabs 38 and 22 and pivoting the key upward about fulcrum 36 until the key abuts against upper stop 44.

Two separate means are actuated by the key at its two separate stop positions. As shown schematically in FIG. 1, a switch block 60 carries contacts 62 and 63. Further contacts 64 and 65 are carried by the rear extension tip 20 on key support frame 14. The making of contacts 62 and 64 corresponds to the key when it is moved downward and abuts stop 48 without compressing spring 56. The additional making of contacts 63 and 65 occurs at the second touch position corresponding to that shown in FIG. 5. Quite obviously, the contacts are only schematically illustrated and further refinements available from the switch art could be used. The contacts can be used to make electrical circuits to control sound producing mechanisms as are known in the art such that on making contacts 62–64 with a light touch, certain sounds will be made for the note while the second set of contacts 63–65 made by a heavier touch will activate additional or other sound producing mechanisms for the same note.

A résumé of the operation of the invention will now be given. In the normal condition when a musical instrument key 10 is not being played, spring 58 will bias the key to its inactivated position and the switch contacts

will be in a position shown in FIG. 1. For normal playing of the instrument with a light touch, the spring 58 is stretched as the key cap 16 is pressed down upon until the felt pad 26 contacts the stop 48. This is the position shown in FIG. 4, and at this time a stop will be felt by the musician. Also at this time, contacts 62 and 64 will be made activating the sound producing mechanism for the note corresponding to the key depressed. Assuming that an additional or other sound producing mechanism is desired to be activated for the same note, the musician need only increase his touch or the force applied to the key to overcome the bias of spring 56 and to push the stop 48 down against the upper side of arm 41 to the position shown in FIG. 5. This will cause contacts 63 and 65 to make thereby operating an additional sound producing mechanism for the particular note corresponding to the key depressed. Upon releasing the key, the spring 56 will return stop 48 to its normal position and felt 55 will prevent any undue noise of the return. The key itself will continue to travel upwardly until the upper side of bottom closure 24 abuts against the resilient finger 46 and this finger will absorb silently most of the shock of the return impact of the key. This is shown in FIG. 3. At its normal upper most position, the key will be stopped by the main body of the stop bumper 44.

It can be seen from the foregoing that this application discloses a unique and novel arrangement for providing a double touch to a key of a musical instrument keyboard while at the same time eliminating noise on the return of the key. Moreover, construction is quite simple and inexpensive and therefore easy to construct.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A double touch key construction for musical instruments to provide more than one touch, comprising;
   - (*a*) a key support frame attached to a musical instrument,
   - (*b*) at least one key pivotably mounted on the frame,
   - (*c*) a spring biasing the key to an upper, normally inactivated position,
   - (*d*) at least two separate switch devices operable by said key on movement about its pivot at separate positions in its travel from its normally inactivated position,
   - (*e*) a two position movable lower stop positioned in the path of movement of the key and beneath the key,
   - (*f*) a spring holding the stop in a normal stopping position and allowing the stop to be moved to another lower stopping position upon additional force being applied to the stop by the key,
   - (*g*) the stopping positions of movable stop being operatively related to the positions of the key to operate the separate actuated switch devices, and
   - (*h*) an upper stop for silently stopping upward movement of the key at its normally inactivated position, the upper stop including a stationary plastic member having a resilient depending finger position to first contact a returning key and silently absorb the initial impact of stopping.

2. A double touch key construction for musical instruments, to provide more than one touch, comprising;
   - (*a*) a key support frame attached to a musical instrument,
   - (*b*) at least one key pivotably mounted on the frame,
   - (*c*) a spring biasing the key to an upper, normally inactivated position,
   - (*d*) at least two separate switch devices operable by said key on movement about its pivot at separate positions in its travel from its normally inactivated position,
   - (*e*) a movable stop including a stop head attached to a movable rod,
   - (*f*) a double armed bracket mounting the movable rod,
   - (*g*) a lower stop collar rigidly set on the rod between the arms of the bracket,
   - (*h*) a spring between the collar and a bracket arm normally holding the stop in normal stopping position and allowing the stop to be forced to another stopping position determined by the stop head contacting the bracket arm, the stopping positions of movable stop being operatively related to the positions of the key to operate the separate actuated switch devices.

3. A key construction for musical instruments, to provide more than one touch, comprising;
   - (*a*) a key support frame,
   - (*b*) at least one key pivotally supported on the frame,
   - (*c*) means biasing the key to an upper normally inactivated position,
   - (*d*) at least two separately actuated means operable by said key on movement about its pivot at separate positions in its travel from the normally inactivated position,
   - (*e*) a movable stop in the path of movement of the key, the movable stop including a stop head attached to a movable rod, a double armed bracket mounting the movable rod, a lower stop collar rigidly set on the rod between the arms of the bracket, and a spring between the collar and a bracket arm normally holding the stop in a normal stopping position and allowing the stop to be forced downwardly to another stopping position determined by the stop head contacting the bracket arm,
   - (*f*) the positions of the movable stop being operatively related to the positions of the key to operate the separately actuated means,
   - (*g*) and an upper stop for silently stopping upward movement of the key at its normally inactivated position, the upper stop including a stationary plastic member having a resilient depending finger to first contact a returning key and silently absorb the initial impact of stopping.

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LEO SMILOW, *Primary Examiner.*