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(56) Documents Cited

GB 2280299 A	CH 000660252 A
DE 004134574 A1	FR 002673758 A1
US 5736660 A	US 4476770 A
US 4020730 A	US 3780612 A

(58) Field of Search
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(54) Abstract Title
Microtonal tuning mechanism

(57) A mechanism to enable microtonal tuning on hammered dulcimers, acoustic pianos and any other instruments that can incorporate the mechanism and the principle of the mechanism. The mechanism includes a sliding bridge 4 whose integral tongue 7 sits in a groove 2 which has been cut into a bed 3 and is slidable 8 between buffer 1a and buffer 1b by utilising the handle 5. The buffers 1a, 1b are fixed at specific points and angles such that sliding the bridge to the limit of movement allowed by the buffers will raise or lower the pitch of a note of a particular tuned string or strings 9 by one semitone due to that string or strings being in contact with the bridge cap 6. If the sliding bridge 4 is stopped at any point between the buffers 1a, 1b, a precise microtonal interval change of less than a semitone will be effected.

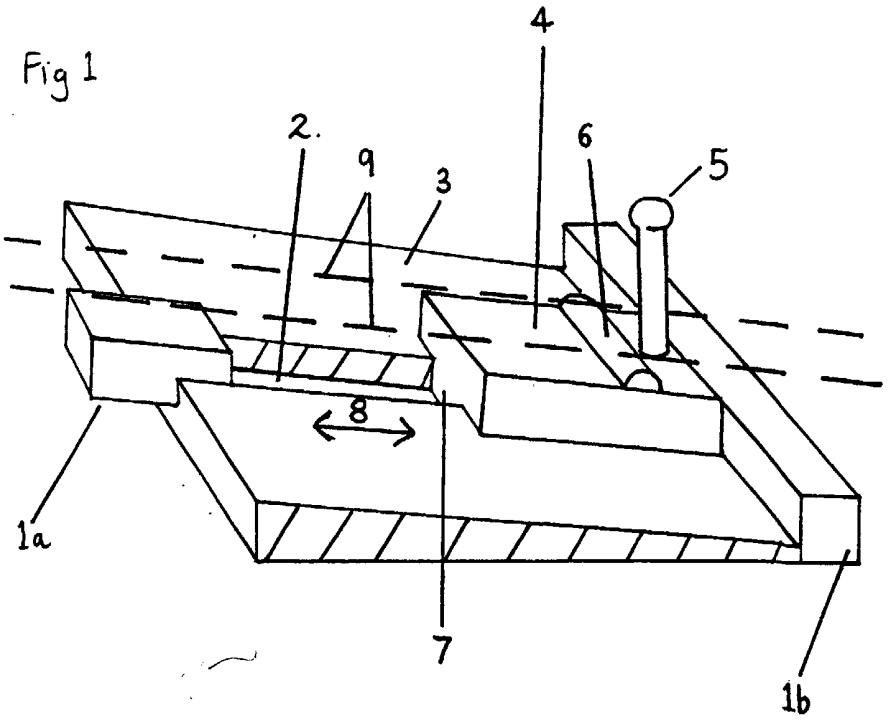

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Fig 1

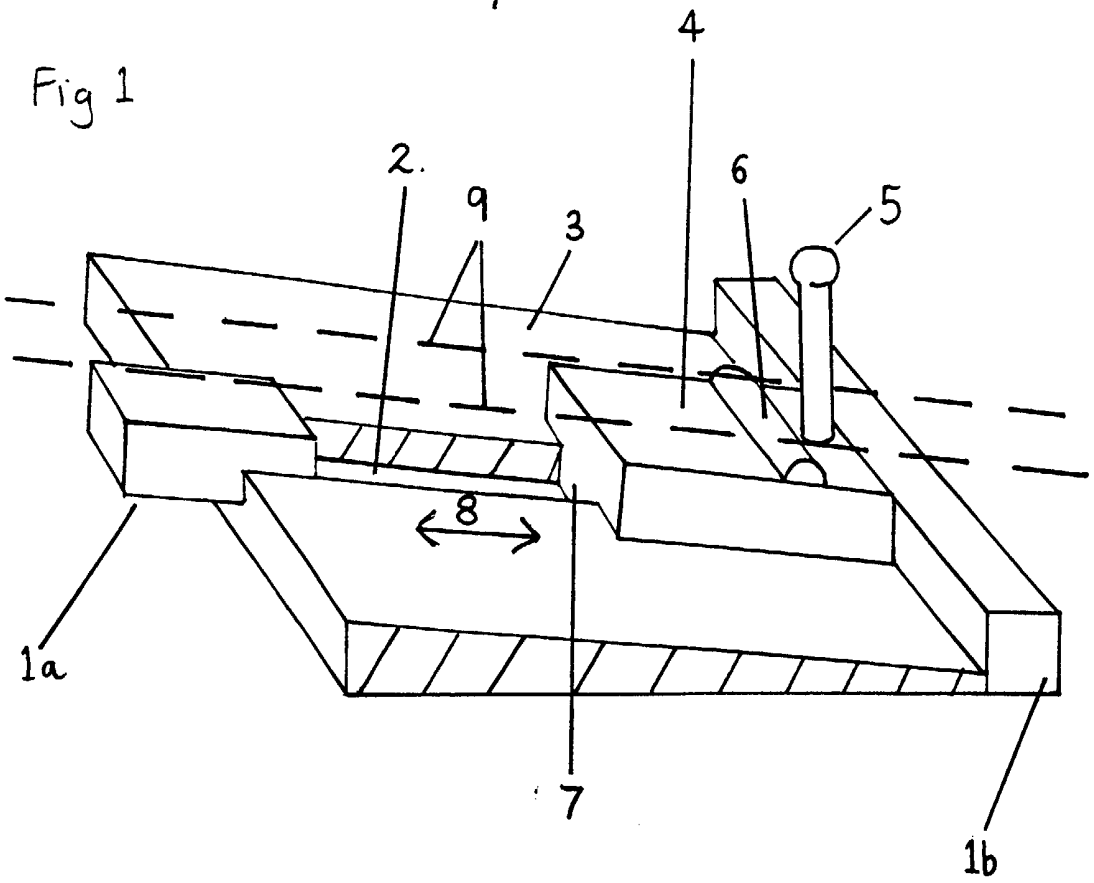
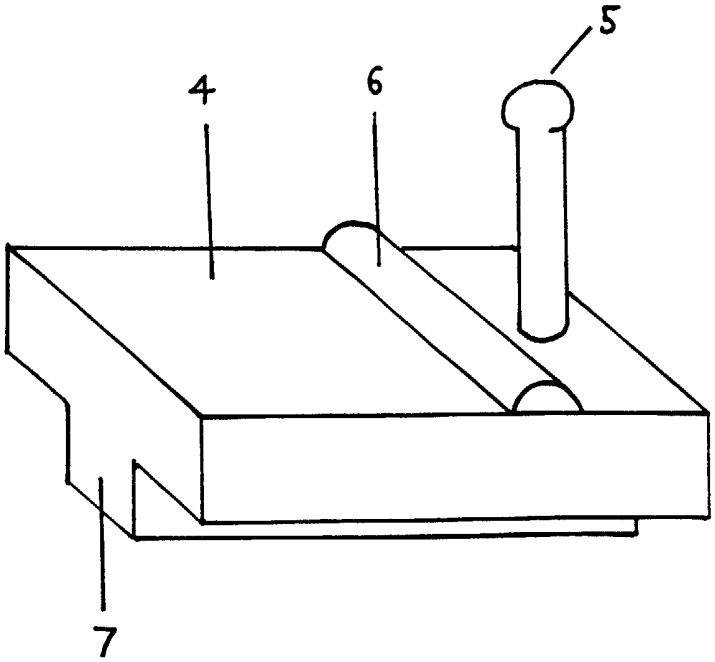


Fig 2



MICROTONAL FLUID TUNING MECHANISM

This invention relates to a Microtonal Fluid Tuning Mechanism that is fitted to notes on a hammered dulcimer and the acoustic piano as well as any instruments that can incorporate the mechanism and the principle of the mechanism.

As with the majority of musical instruments the notes of indigenous hammered dulcimers and the 'European' or 'Western' concert piano and other related keyboard instruments have fixed tuning layouts. That is, for example, that the keys on the piano keyboard activate particular notes and will continue to activate those notes unless the string or strings are retuned: If required, they can be re-tuned manually to create different tuning layouts (for example, using a tuning key).

The 'European' or 'Western' acoustic piano is a standardised musical instrument which is generally tuned to the 'western' twelve note (i.e. twelve semi-tones) chromatic octave using the principle of equal temperament.

Microtones are not commonly used in western 'traditional', 'classical' and 'popular' musical genres. Western indigenous or standardised acoustic instruments do not generally incorporate the possibility of playing microtones.

Microtones (e.g. quartertones) are commonly used in the 'traditional' and 'classical' musics of various Middle Eastern and Eastern cultures. Numerous indigenous acoustic instruments from Middle Eastern and Eastern cultures make it possible to play microtones. In general, these instruments also embody predominant fixed tuning layouts. Microtones have only been used to a limited extent in western 'traditional', 'classical' and 'popular' musical genres: It is, for example, possible for an accomplished violinist to play quartertones on a violin due to the design of this instrument. The Stoehr quarter-tone keyboard and the Grotarian-Steinweg quartertone piano, for example, made it possible to play quarter tones in conjunction with, and in addition to, the western chromatic octave: That is, the additional keys providing the quartertones resulted in the expansion of a fixed tuning layout.

So, from an International perspective both the hammered dulcimer, the piano and other instruments are restricted to and by predominant fixed tuning layouts. That is, there is no mechanical, practical and convenient means by which to create and explore either different indigenous tuning layouts, or general experimentation with tuning and tuning temperaments.

Therefore, according to the present invention there is provided a Microtonal Fluid Tuning Mechanism consisting of a sliding bridge, with an integral tongue, handle and bridge cap, a groove cut into a bed and buffers (fixed at particular angles), fitted to each note, for a hammered dulcimer and the piano, which, if used, can raise or lower each note by a maximum of a semitone or precise microtonal intervals of less than a semitone (for example a quarter or an eighth of a tone).

Updated versions of the Microtonal Fluid Tuning Mechanism will incorporate: calibrations for increased precision in achieving microtonal intervals; further increases in the maximum possible interval change affected by a Microtonal Fluid Tuning Mechanism; the Microtonal Fluid Tuning Mechanisms becoming power assisted and the addition of a means by which to activate the mechanisms from the piano keyboard.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:

Figure 1 shows an elevation of the Microtonal Fluid Tuning Mechanism.

Figure 2 shows an elevation of the sliding bridge on its own.

As shown in figure 1 the Microtonal Fluid Tuning Mechanism consists of a sliding bridge (4) (see figure 2 for a diagram of the sliding bridge only), with an integral tongue (7) as well as a bridge cap (6) and a handle (5). The tongue (7) sits in a groove (2) that has been cut into a bed (3). The sliding bridge (4) can be slid (8) from a buffer (1a or 1b) fixed at a specific point and angle along the groove (2) until it is eventually 'stopped' by meeting another buffer (1a or 1b) also fixed at a specific point and angle: At this point, if a particular gauge of musical instrument string or strings (9) have been fitted and tuned to a particular note on a hammered dulcimer or a piano while being in contact with the bridge cap (6) and running from left to right on either side of the handle (5), then the particular note will have been raised or lowered by a semi-tone. If the mechanism is slid (8) half way from one buffer (1a or 1b) to the other buffer (1a or 1b) the note will be raised or lowered by a quartertone. If the mechanism is slid (8) a quarter of the way from one buffer (1a or 1b) to the other buffer (1a or1b) the note will be raised or lowered by an eighth-tone and so on.

CLAIMS

(1) A Microtonal Fluid Tuning Mechanism for hammered dulcimers and pianos (as well as other related instruments) that consists of a sliding bridge, a groove and buffers fixed at specific points and angles, fitted to each note which, if used, by being slid along the aforementioned groove can affect precise microtonal and semitonal interval changes (as outlined in the description).

(2) Each mechanism can raise or lower each note by a maximum of a semitone, by arriving at a buffer, or by precise microtonal intervals of less than a semitone if fixed at a point before reaching a buffer.

(3) The distance that each mechanism has to travel to affect different microtonal interval changes to each note varies, depending on the pitch of the note and the gauge of string or strings.

(4) A piano or hammered dulcimer fitted with the Microtonal Fluid Tuning Mechanisms are no longer restricted to the western twelve note octave, so the Microtonal Fluid Tuning Mechanisms, if chosen to be used, enable the instrument to be mechanically retuned to incorporate, for example, indigenous scales and modes from a wide variety of cultures and vice versa.

(5) The Microtonal Fluid Tuning Mechanisms enable experimentation in tuning.

(6) The Microtonal Fluid Tuning Mechanisms enable a hammered dulcimer or piano that has been tuned using the principle of equal temperament to be re-tuned making use of the principles of other types of temperament and vice versa.

(7) The Microtonal Fluid Tuning Mechanisms offer the choice of using microtonal fluid tuning (i.e. the pitch of notes can be changed by microtones or semi-tones but the corresponding hammered dulcimer strings or piano keys will remain in the same position).

(8) If the Microtonal Fluid Tuning Mechanisms fitted to a piano or hammered dulcimer are not used then the particular instrument's tuning layout or usual predominant tuning layout will remain unaltered.

(9) A Microtonal Fluid Tuning Mechanism substantially as herein described and illustrated in the accompanying drawings.

Amendments to the claims have been filed as follows

CLAIMS

(1) A Microtonal Tuning Mechanism for hammered dulcimers and pianos (as well as other related instruments) that consists of a sliding bridge, a groove and buffers fixed at specific points and angles, fitted to each note which, if used, by being slid along the aforementioned groove can affect precise microtonal and semitonal interval changes.

(2) A Microtonal Tuning Mechanism substantially as herein described and illustrated in the accompanying drawings.

Application No: GB 0200785.4 5 **Examiner:** Wayne Fleet
Claims searched: 1, 2 & 9 **Date of search:** 20 August 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): G5J (JCLX, JCKA, JCKX, JCTA, JSS, JST)

Int Cl (Ed.7): G10C 3/00, 3/04, 3/10

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2280299 A	(YAMAMOTO) Note bridge of stringed musical instrument movable within groove	1
A	CH 660252 A	(SALZMANN) See WPI Abstract Accession No. 87-101592/37	-
Y	DE 4134574 A1	(VOELZ) See WPI Abstract Accession No. 92-193273/24 (note saddle movable within groove)	1
A	FR 2673758 A1	(MARTIN) See WPI Abstract Accession No. 92-367901/39	-
Y	US 5736660	(FRANKEL) Note piano with movable bridges to raise or lower pitch of notes	1
A	US 4476770	(McGOWAN) Micro tuning pianos	-
Y	US 4020730	(HILL) Note piano-type instrument with sliding bridges	1
A	US 3780612	(ROBINSON) Stringed instrument with movable bridges to affect pitch of notes	-

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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E Patent document published on or after, but with priority date earlier than, the filing date of this application.