Title of the Invention: ACOUSTIC GUITAR SADDLE
Abstract Title: Multi-compensated saddle for a twelve string guitar

A multi-compensated saddle (G), for use with a twelve string guitar and any other twin-strung instrument, comprises a series of precise slanted notches cut into the top of the saddle (G). This allows a shorter seating distance for the thin octave strings (E) and a longer seating distance for the thicker base strings (F) within each of the last four courses used on a twelve string guitar, to improve intonation. The saddle may be retro-fitted and utilized in conjunction with existing bridges.
Figure 6
This invention relates to solving intonation problems inherent with 12 string guitars and any other 'twinned' strung instrument.

**Background.**
For many years the guitar has remained basically unchanged in its design. A design that has in most cases worked extremely well. Until the inception of the twelve-string guitar. The twelve string guitar has all the basic components of its traditional six string predecessor and is constructed and played like a regular 6-string model, but on a 12-string guitar there are six pairs, or courses, of strings. Each course of two strings are placed very close to each other then played as one string and is usually tuned to the corresponding string on a 6-string guitar; however, the last four courses on the twelve string guitar have an octave spread within each course, comprising of a thick string and a thinner string, while each course of strings in the two treble courses are tuned in unison.

The set of strings on all guitars vary in thickness to attain the correct note as the player plays up and down the scale. So the first or top treble string is thin then the next string down is slightly thicker and so on until the last string which is thickest.

The strings span from the 'nut' to the 'bridge'. Whilst the 'nut' and 'bridge' sits at 90 degrees to the strings, the actual seating point of the strings on the bridge, known as the 'saddle' sits in a slot cut into the bridge and at a slight angle. This is because the distance required for the thicker string needs to be longer than the distance required for the thinner strings so as to maintain correct pitch and intonation.

This arrangement works fine on a traditional six string guitar but is found wanting on a twelve string guitar because the octave spread within the last four courses requires a thick and a thin string placed closely together but the seating distance between the 'nut' and the 'bridge', using a traditional 'saddle' are almost identical. Therefore, when the twelve string guitar is tuned to pitch, and the strings are played in the open position, i.e. played without the player pressing the strings down onto the fret board or fingerboard, as it is sometimes known, all is well, but when the player presses the strings down onto the fret board, especially on the last four courses with the octave spread, the thinner string of the course is no longer to pitch and renders the guitar out of tune.

**Statement of invention**
To overcome this problem, the present invention proposes a multi-compensated saddle using a series of precise notches cut into the saddle to allow a shorter seating distance for the thin octave strings and a longer distance for the thicker base strings within each of the last four courses. Thus maintaining pitch and intonation along the fret board for the player.

It will be made from existing materials used in the manufacture of traditional saddles, i.e. bone or plastic, and no modification what-so-ever is required to existing bridges in use on twelve string guitars.
An example of the invention will now be described by referring to the accompanying drawings.

Fig.1 shows a traditional guitar saddle used on modern day twelve string guitar and other 'twin-strung' instruments and the string seating arrangement.

Figure.2 shows the seating points of contact on a guitar.

Figure.2a shows a side-on cutaway view of how a traditional saddle sits within the bridge on a guitar.

Figure.2aa shows a plan of the bridge with traditional saddle plus string arrangement.

Figure.3 shows the string seating points of contact and the string arrangement of a twelve string guitar.

Figure.4 shows the invention. The multi-compensated saddle and string arrangement of a twelve string guitar.

Figure.5 shows a multi-compensated saddle according to the invention for a twelve string guitar without the string arrangement. Plus side-on view in position in the bridge.

Figure.6 shows a traditional compensated saddle without string arrangement. Plus side-on view in position in the bridge.

Figures 7 to 20 shows different variations of the invention with and without string arrangements and side-on views in position within the bridge.

The 12 string guitar is constructed and played like a regular 6-string model. On a 12-string guitar there are six pairs, or courses, of strings, (fig.1 items E,F,D). Each course is tuned to the corresponding string on a 6-string guitar; however, the last four courses (fig.1 items E/F) on the twelve string guitar have an octave spread within each course, while each course of strings in the treble courses (Fig.1 item D) is tuned in unison.

The bass strings (fig.1 item F) in each of the base courses (fig.1 item E/F) are thicker than the treble strings (fig.1 item E) in each of the base courses (fig.1 item E/F) and because of this and to achieve the correct pitch on each of the strings, the distance the strings require between the seating points on the 'nut' (Fig. 2 item A) and the 'saddle' (fig.2 item C) need to vary, i.e. the bass string course (fig.3 item E/F) seating distance required is longer than the seating distance required on the treble string course (fig.3 item D).
Note that whilst the ‘nut’ (fig.3 item A) is sitting at 90 degrees to the strings, the ‘saddle’ (figure 3 item C) is inclined to allow for the difference in string thickness and to maintain pitch.
This arrangement works perfectly well on a traditional 6 string instrument but is found wanting on a 12 string guitar or other twin-string instrument.

With the traditional saddle (fig.1 item C) on a twelve string guitar the intonation problem arises on the four base courses (fig.3 items E/F) because the base string (fig.1 item F) is much thicker than its treble string counterpart (fig.1 item E) but are seated at a similar length. Hence when the base string (fig.1 item F) is tuned to pitch and its treble string counterpart (fig.1 item E) is also tuned to pitch but an octave higher, and then played in the ‘open’ position, (i.e. when the strings are not depressed down onto the fretboard) the strings are in tune. But when the player depresses the course along the fretboard, the base string (fig.1 item F) remains in tune but the treble string counterpart (fig.1 item E) is immediately out of pitch and therefore out of tune.

The invention (fig.4 item G) varies the seating point of the base courses (fig.4 item E/F) within each course. Hence the base string (fig.4 item F) seats further back on the invention (fig.4 item G) and its thinner treble counterpart string (fig.4 item E) sits forward. This reduces the treble string seating length within each of the four base courses (fig.4 item E/F) thus maintaining correct pitch when the base courses (fig.4 item E/F) are depressed along the fretboard.
Claims

1. A multi-compensated saddle for twelve string guitar and any other twin-strung instrument comprising a series of precise notches cut into the top edge of the saddle to allow a shorter seating distance for the thin octave strings and a longer seating distance for the thicker base strings within each of the last four courses used on twelve string guitars and any other twin-strung instrument.

2. A multi-compensated saddle according to claim 1 which will utilize existing guitar bridges
Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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<tr>
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<tbody>
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<td>A</td>
<td>-</td>
<td>US 5455381 A (GIBSON GUITAR CORP) - See especially figures 2 to 4 &amp; 8 to 10 and columns 1 to 7</td>
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<thead>
<tr>
<th>Subclass</th>
<th>Subgroup</th>
<th>Valid From</th>
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</thead>
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<td>0003/04</td>
<td>01/01/2006</td>
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<td>0003/12</td>
<td>01/01/2006</td>
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