

APPLICATION FILED JUNE 21, 1905. RENEWED JAN. 13, 1909.

Patented Aug. 10, 1909.

2 SHEETS--SHEET 2.

Fig. 3.

Inventor
Frank X. Audet
by his Attorneys
Phillips Van Coven & Fish

UNITED STATES PATENT OFFICE.

FRANK X. AUDET, OF BOSTON, MASSACHUSETTS.

MUSICAL INSTRUMENT.

No. 930,825.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed June 21, 1905, Serial No. 266,243. Renewed January 13, 1909. Serial No. 472,129.

To all whom it may concern:

Be it known that I, FRANK X. AUDET, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to musical instruments and more particularly to stringed musical instruments of the harp or zither type.

The objects of the present invention are to improve the construction and arrangement of the various parts of this class of instruments and particularly the arrangement of the strings so as to simplify the execution of musical compositions and to increase the scope or range of the instruments without unduly increasing their size or adding to the number of strings.

Zithers are now commonly constructed with a melody section and an accompaniment section comprising several distinct groups of strings, each group of strings being tuned to form a chord. This arrangement of the strings of the accompaniment section in chord groups permits the use of but a comparatively few chords even in the largest instruments, and the necessary duplication of the strings in the different chord groups adds to the cost of the instrument and increases the distance through which the hand must move in passing from one chord to another.

In accordance with the principal feature of the present invention all or a portion of the chord strings of the accompaniment section are arranged in a single group and are tuned in two series of fifths, the strings of one series of fifths alternating with the strings of the other series. This arrangement of the chord strings permits the strings of each chord to be brought into close proximity to each other, permits the same string to be used in forming a part of two or more chords, permits the common chords of each key to be arranged on the instrument in the same relative positions to each other, and brings the chords of each key adjacent to the key having an additional sharp or flat. The arrangement of the chord strings in two series

of fifths with the strings of one series alternating with the strings of the other series is believed to be broadly new and any instrument having chord strings so arranged is considered to be within the broad scope of the invention. In order to bring the strings belonging to a chord into close proximity to each other the strings are preferably arranged so that each string is next to a string which forms part of a common chord therewith and in the preferred form of the invention the strings are so arranged that any three successive strings form a common chord. In the embodiment of the invention hereinafter specifically described, the chord strings are tuned in two series of fifths and the strings are so arranged that the interval between the successive strings is alternately a major and a minor third. This arrangement of the chord strings brings them into the closest possible relation, enables the chords of the various keys to be played in a simple manner and gives a large number of chords with comparatively few strings.

The present invention also contemplates the provision of bass strings tuned to the fundamental notes of certain of the chords. These bass strings may be arranged in any suitable or convenient manner upon the instrument, but are preferably so arranged that each string is adjacent to the chord strings which are tuned to harmonize therewith.

Another feature of the present invention contemplates arranging the chord and bass strings in intersecting planes so that the two sets of strings cross each other. This arrangement of the chord and bass strings enables the chord strings to be played at one portion of the instrument without danger of striking the bass strings, enables the bass strings to be played at another portion of the instrument without danger of striking the chord strings, and also enables the chord and bass strings to be played simultaneously at the point where they cross. The arrangement of the chord and bass strings in intersecting planes so that the two sets of strings cross each other is believed to be new and is considered to constitute a feature of the invention whether or not the chord strings are tuned in two sets of fifths with the strings of one set alternating with the strings of the other set. It is also believed to be new to arrange the strings of a musical instrument in different planes with a string

in one plane tuned to harmonize with the string in the other plane to which it is adjacent so that at one point on the instrument strings in both planes can be played conveniently to produce chords and at other points the strings in one plane can be played independently. Such an arrangement is therefore considered to constitute a feature of the present invention. To still further decrease the liability of a bass string being struck simultaneously with the chord strings, the bass and chord strings are so arranged that they cross the line of intersection of the planes at different angles. This arrangement of the strings allows the bass and chord strings to be properly spaced where they cross each other and at the same time brings the bass strings at their ends more nearly above or below the adjacent chord strings.

In the instrument hereinafter specifically described the chord and bass strings are supported in intersecting planes by means of two bridges each of which is provided with upper and lower string supports, the chord strings passing over the upper support and the bass strings over the lower support of one bridge, and the bass strings passing over the upper support and the chord strings over the lower support of the other bridge.

The melody section of the instrument hereinafter specifically described is provided with a set of strings tuned to the natural notes of the scale and with a set of strings tuned to sharps and flats. These two sets of strings are arranged in intersecting planes and are supported by bridges similar to those which support the chord and bass strings. The two sets of strings are also arranged to cross the line of intersection of the planes at different angles in the same manner as the bass and chord strings, in order to permit either a natural or a sharp or flat string to be struck without liability of striking the adjacent string.

The various features of the present invention will be clearly understood from an inspection of the accompanying drawings in which—

Figure 1 is a plan view of a zither embodying the same in its preferred form. Fig. 2 is a view in side elevation of the instrument illustrated in Fig. 1 with the lower end of the casing broken away and with the upper string supporting bridge shown in section, and Fig. 3 is a diagram illustrating the arrangement of the chord strings of the accompaniment section of the instrument.

The construction of the instrument will be apparent to those skilled in the art from an inspection of Figs. 1 and 2 in which *a* represents the sounding-board, *b* the usual hand rest, *c* the tuning pins for the strings, *d* a bridge for supporting the strings of both the melody and accompaniment sections at

their lower ends, and *e* and *f* bridges for supporting the strings of the melody and accompaniment sections at their upper ends. Each bridge is provided with upper and lower string supports, shown as wires *g* and *h*, the bass strings of the accompaniment section, indicated by the heavy lines in Figs. 1 and 2, passing over the upper wire *g* of the bridge *e* and the lower wire *h* of the bridge *d*, the chord strings passing over the wire *h* of bridge *e* and wire *g* of bridge *d*, the natural strings of the melody section with the exception of the string marked *c'* passing over the wire *g* of the bridge *d* and wire *h* of bridge *f*, and the sharp and flat strings of the melody section passing over the wire *h* of bridge *d* and wire *g* of bridge *f*. The bass and chord strings are thus supported above the sounding-board *a* in intersecting planes and cross each other about midway of their length, this arrangement of the chord and bass strings permitting the bass strings to be struck alone at the upper portion of the instrument, the chord strings to be struck alone at the lower portion of the instrument, and the chord and bass strings to be struck simultaneously at the center of the instrument. The natural strings of the melody section and the sharp and flat strings are also arranged in intersecting planes and cross each other so that the strings can be placed nearer together than would be the case if they were arranged in the same plane, and either a natural string or a sharp or flat string can be struck without danger of striking the adjacent string. In order to still further decrease the liability of a bass string being struck simultaneously with the chord strings or a natural string being struck simultaneously with a sharp or flat string the bass strings as viewed in Fig. 1, are arranged obliquely with relation to the chord strings, and the sharp and flat strings are arranged obliquely with relation to the natural strings. The arrangement of the strings may be defined by stating that the two sets of strings in each section of the instrument cross the line of intersection of the planes in which the strings lie at different angles. As will be apparent from an inspection of Fig. 1, this arrangement of the strings permits the strings to be properly spaced at the points where they cross each other and brings one set of strings at their upper and lower ends more nearly above or below the other set of strings.

The arrangement of the strings on the instrument is indicated by the letters and numerals which appear in Fig. 1 upon the sounding-board beneath the strings. The strings of the melody section are tuned to the notes of the full chromatic scale, the strings being arranged in regular order. In Fig. 1 the strings which are tuned to the natural notes of the scale are indicated by letters and nu-

merals, while the letters and numerals for indicating the sharp and flat strings are omitted.

The chord strings of the accompaniment section, indicated by the light lines in Fig. 1, are arranged to give all the common chords in all the keys and are tuned in two series of fifths with the strings of one series of fifths alternating with the strings of the other series. In Fig. 1 the notes to which the strings of one series of fifths are tuned are indicated by the upper row of letters beneath the chord strings and the notes to which the other series of strings are tuned are indicated by the lower row of letters beneath the chord strings. The numerals beneath the chord strings indicate the common chords of the keys in which zither music is usually written. The two series of chord strings are so arranged that the interval between two successive strings is alternately a major third (or a minor sixth) and a minor third (or a major sixth.) Any three successive strings therefore form a common chord and when all the notes of the chromatic scale are used in each series of fifths, as in the instrument illustrated in Fig. 1, the chord strings give all the chords in all the keys both major and minor. The bass strings, as indicated by the letters on the sounding-board beneath these strings, are tuned to the fundamental basses of the major chords and are arranged adjacent to the chord strings forming these major chords, each bass string at the center of the instrument being located between the first two strings of its major chord.

The relation of the chord strings to each other and the relative position of the common chords in each key will be more clearly understood from an inspection of Fig. 3. In this figure the letters indicating the notes to which the chord strings are tuned are arranged in the order indicated in Fig. 1 with an additional note at each end to complete the cycle, the additional notes being duplicates of the notes to which the outside strings of the accompaniment section, illustrated in Fig. 1, are tuned, these additional strings being omitted from the instrument illustrated in Fig. 1 to avoid multiplication of the strings. As indicated in Fig. 3, the arrangement of the chord strings in two series of fifths with the strings of one series alternating with the strings of the other series is such that the interval between successive strings is alternately a minor third or a major sixth and a major third or a minor sixth, giving all the chords in all the keys by the use of twenty-four strings, the additional strings at each end, indicated in Fig. 3 by the letters C and E flat, being unnecessary to produce the cycle of chords, and being added to the figure merely for the sake of clearness. It will be noted that any common chord can be produced by striking three successive strings so

that all the chords can be played in precisely the same way and in the simplest manner possible. It will also be seen that the tonic chord of each major key is located between the subdominant and the dominant chords so that the hand is moved in precisely the same manner in passing from one chord to another in playing each key. The tonic chord of each major key is located between the tonic chords of keys having one more sharp or flat so that no difficulty is experienced in changing from one key to another when a modulation occurs, as the modulation most frequently occurring is to a key containing an additional sharp or flat. The chords of all the major keys have the same position on the instrument with relation to each other, and the chords of each key are arranged in close proximity to each other. The tonic and subdominant chords of the minor keys are arranged in the same manner as the tonic and subdominant chords of the major keys. The dominant chords of the minor keys are at a distance from the tonic chords. As indicated in Fig. 3, the dominant chords of the minor keys of C, G, D, A, E, B, F sharp and C sharp have the same position on the instrument with relation to the tonic chords of the keys, and the dominant chords of the minor keys of G sharp, D sharp, B flat and F have the same position on the instrument with relation to their tonic chords.

The arrangement of chord strings, as indicated in Fig. 3, brings the strings into the closest possible relation and gives the greatest possible number of chords with the least number of strings. In addition to the advantages hereinbefore set forth, this arrangement of the chord strings has the further advantage that the strings which are tuned to the thirds of the major chords may be tuned nearly if not exactly true. It is a well-known fact that on the piano and all other instruments with fixed notes, with the exception of the double action harp, the third of every chord, owing to the equal temperament system of tuning, is one-seventh of a semi-tone out of tune. In the arrangement of chord strings indicated in Fig. 3 the series of strings which are tuned to the thirds of the major chords may be tuned nearer true with the result that the difference is greatly appreciated by the cultivated ear.

The nature and scope of the present invention having been indicated, and a preferred form of the invention having been specifically described, what is claimed is:—

1. A musical instrument, having a plurality of strings tuned in two series of fifths with the strings of one series of fifths alternating with the strings of the other series.

2. A musical instrument, having a plurality of strings tuned in two series of fifths with the strings of one series of fifths alternating

with the strings of the other series, and arranged with each string next to a string forming part of a common chord therewith.

3. A musical instrument, having, in combination, four or more strings arranged adjacent to each other and tuned to intervals of alternate major and minor thirds whereby any three successive strings may be sounded to form a chord.
4. A musical instrument, having, in combination, two sets of strings located in intersecting planes and crossing the line of intersection of the planes, the strings of the two sets being arranged at different angles to the line of intersection of the planes.
5. A musical instrument, having a plurality of strings tuned in two series of fifths with the strings of one series of fifths alternating with the strings of the other series, and strings of lower pitch located adjacent to said first mentioned strings and tuned to harmonize therewith.
6. A musical instrument, having, in combination, a group of melody strings and a group of chord strings, the chord strings being tuned successively to alternate intervals of major and minor thirds whereby any three successive strings produce a chord.
7. A musical instrument having, in combination,

strings tuned to the intervals of harmonic chords arranged in a plane and strings tuned to harmonize therewith arranged in a different plane with each string adjacent a string in the other plane with which it is tuned to harmonize.

8. A musical instrument having, in combination, strings located in different planes with each string of one plane tuned to harmonize with the string of the other plane adjacent thereto.

9. A musical instrument having, in combination, strings located in intersecting planes and crossing at the line of intersection of the planes with each string of one plane tuned to harmonize with the string of the other plane adjacent thereto.

10. A musical instrument having, in combination, a plurality of strings tuned to the intervals of a harmonic chord and a string tuned to harmonize therewith arranged adjacent thereto in a different plane.

In testimony whereof I affix my signature, in presence of two witnesses.

FRANK X. AUDET.

Witnesses:

FRED O. FISH,
FARNUM F. DORSEY.