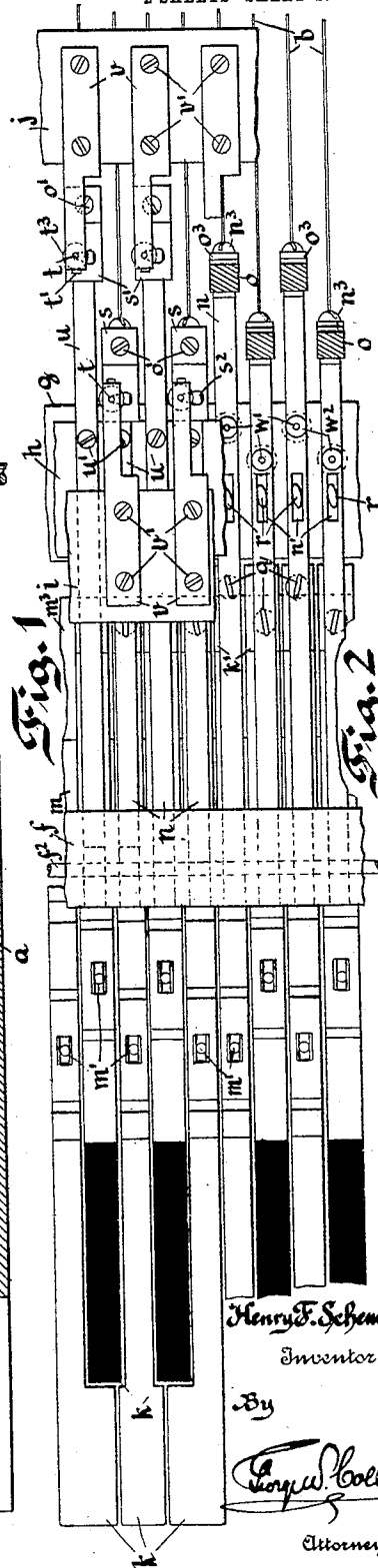
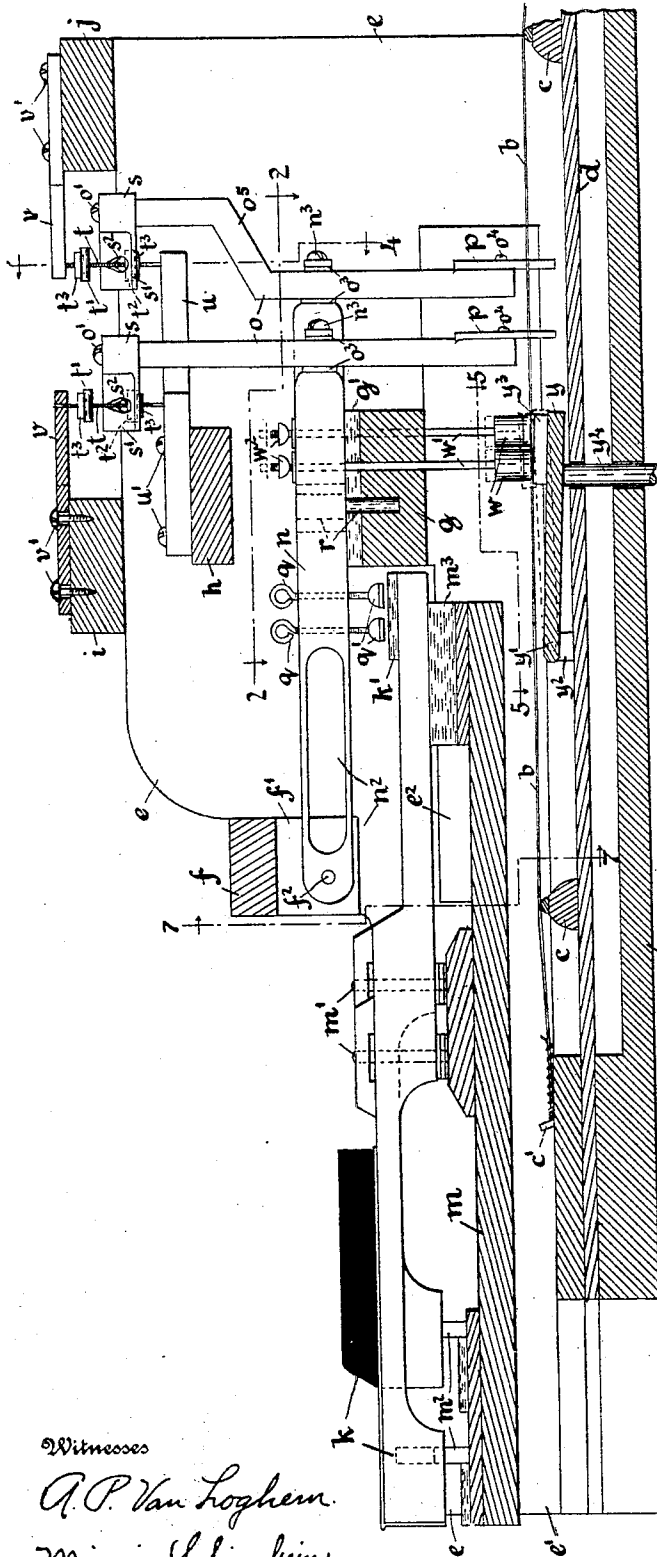


933,670.

Patented Sept. 7, 1909.

2 SHEETS—SHEET 1.



Witnesses

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933,670.

Patented Sept. 7, 1909.

2 SHEETS—SHEET 2.

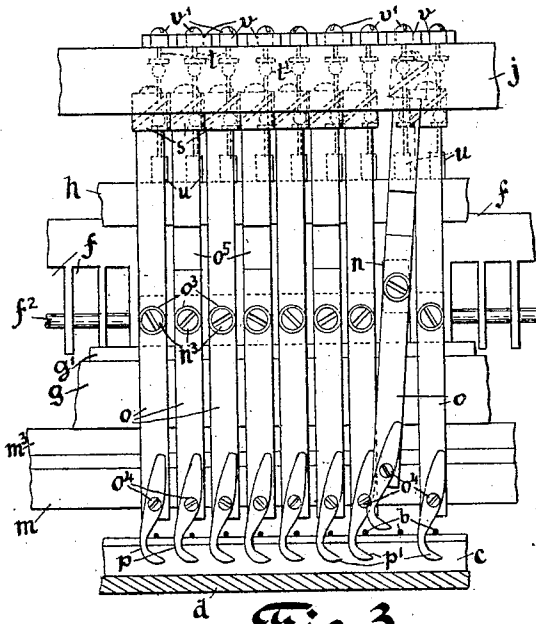


Fig. 3

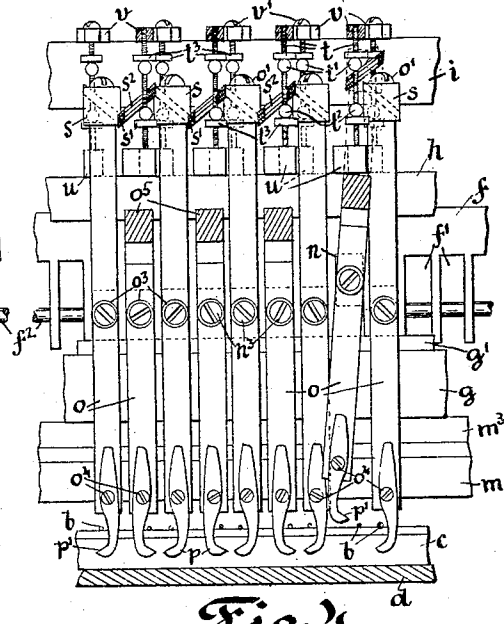


Fig. 4

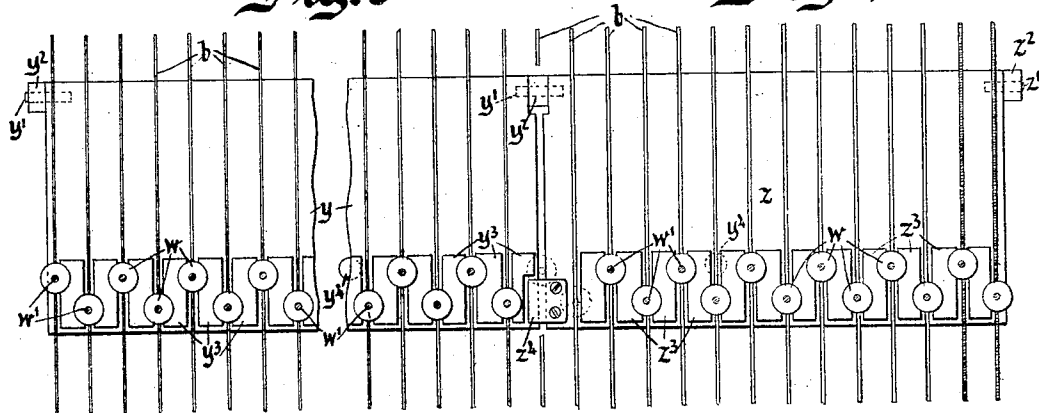


Fig. 5

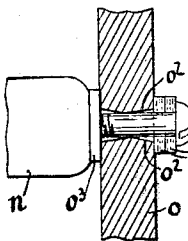


Fig. 6

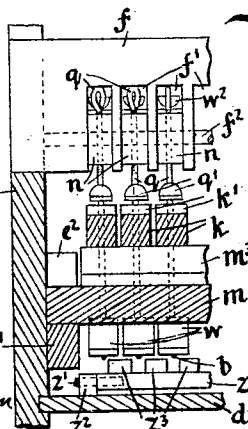


Fig. 7

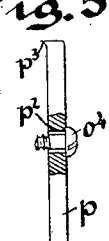


Fig. 8

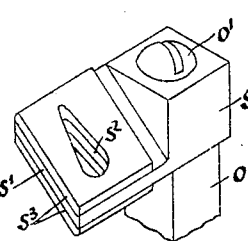


Fig. 9

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UNITED STATES PATENT OFFICE.

HENRY F. SCHENUIT, OF MILWAUKEE, WISCONSIN.

ZITHER-PIANO.

933,670.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed July 10, 1908. Serial No. 442,923.

To all whom it may concern:

Be it known that I, HENRY F. SCHENUIT, of Milwaukee, Wisconsin, have invented a Zither-Piano, of which the following is a specification.

This invention consists of an improved piano-action or key-action for keyed zithers or zither-pianos.

This application is in part a continuation of my prior application No. 387,789, filed Aug. 9, 1907.

The object which I have in view is to produce a key-action which will be infallible in its operation and shall permit the sound of the individual strings to be varied in strength by corresponding variation in the force with which the keys are struck; thus giving an instrument which shall be responsive to the touch in the effect of the music produced thereby; in other words, my object is to produce a key-action which will permit of the production of music at least equal in quality, and if possible superior in some respects, to that which can be obtained from the hand-fingering of the ordinary zither. In my instrument there is of course no modifying of the pitch of strings by shortening their effective lengths, as in ordinary hand-fingering, but each tone is produced by means of a separate string, as in the piano.

The keyed zither has not heretofore been made a success in practice, because of certain defects in the action as hitherto made. It is a difficult matter to construct an action the keys of which will invariably act upon each depression to pick the strings properly, and will permit more particularly of a rapid "repeat". The principal difficulty lies in the mutual adjustment required of the strings and picks, and in the fact that it is practically impossible to construct them so that the picks shall be at exactly equal distances apart, as well as to space the strings themselves at an exactly equal distance apart which shall be equal to that of the picks. In my construction this difficulty has been avoided by giving to each pick a separate adjustment, that is, by arranging it so that it is adjustably mounted upon its own individual key-lever. The difficulty of causing the pick to work properly upon rapid successive depressions and elevations of the key is also avoided in my mechanism by more satisfactory and individually adjustable guiding-mechanisms for the picks. I also

provide a novel mounting for the key-board whereby the same may be removed as a whole from the instrument-base or sounding-board which carries the strings, and the latter bared for inspection, repairs or renewal.

In my invention I arrange each pick adjustably upon the end of an oscillating bar which is pivoted upon the end of an action-lever and on an axis coincident with or parallel to the center line of the lever; and I provide an oblique-faced block mounted on the upper end of said oscillating bar, with abutments above and below the oblique faces of said block which by striking the latter cause the bar to rock in one direction when the arm is raised by depressing the key, and in the other direction when the bar is allowed to fall again, so as to return the pick to its original position. These abutments may be very nicely adjusted, so as to cause the pick to strike the string at exactly the right moment, and with exactly the right amount of pressure or friction thereon, thereby producing exactly the same quality of tone in each string.

My invention consists in the constructions and combinations hereinafter described and more particularly set forth in my claims.

My invention may best be understood by a description of a particular construction thereof, although it will be understood that I do not consider it confined to the exact features and proportions of such construction.

Referring therefore to the accompanying drawings, Figure 1 is a front-to-rear section through the instrument, showing the keys, action mechanism, picks and strings in side elevation; Fig. 2 is a plan view of a number of keys, partly in section on the line 2; Figs. 3 and 4 are each a rear elevation of the pick-mechanism of a few picks arranged in two different ways; the upper part of Fig. 4 being shown in section on the plane 4; Fig. 5 is a plan view of the damper-board with parts shown in section on the plane 5; Fig. 6 is a longitudinal section on a larger scale of a portion of the pick-bar, to show the loose joint; Fig. 7 is a vertical section of one end of the instrument on the plane 7; Fig. 8 is a side elevation of one of the picks, a portion being shown in section; and Fig. 9 is a perspective of the upper end of the pick-bar.

In these drawings every reference letter and numeral refers always to the same part. The instrument is shown in the drawing

without the case, which latter may be of any suitable design and forms no part of this invention. It comprises a base or string-board *a* on which are stretched the strings *b* over the bridges *c* by means of pins *c'* to which they are fastened. A sounding-board *d* is preferably mounted on the string-board below the strings *c*; this however being a non-essential. At the sides of the base are mounted upright side-plates *e* which are joined by five bars, designated respectively *f*, *g*, *h*, *i* and *j*, across the top; these cross-bars supporting the actions. The key-board is entirely separate from the actions, and comprises a plurality of keys *k* which are mounted in the usual manner on a base-plate *m*, being fulcrumed on pins *m'* and guided by pins *m''*, and their rear ends, which are heavier than the front ends, resting upon a felt pad *m'''*. The key-board illustrated is of a common pattern and it forms no part of my invention, but only the manner of mounting, which consists in slide-blocks *e'* mounted on the sides of the plates *e* and guide-blocks *e''* above them; and the whole key-board may be removed and replaced by simply sliding it out and in on these blocks.

Each element of the action comprises a pivoted bar *n*, which I shall herein term the action-lever, and a pick-bar *o* pivoted on the end of said bar *n* and carrying a string-pick *p* on its lower end; the pick-bar being guided by devices which will be described presently. Each action lever *n* is pivoted on one of the slots *f'* of the bar *f* upon a pin *f''* which runs the whole length of the key-board, directly over one of the keys *k*, and a screw-pin *q* passes vertically through the bar *n* and carries an abutment-block *q'*, preferably felted on its lower surface, against which strikes the end of the key when depressed and raises the action-lever about its pivot. A felt-pad *k'* is preferably mounted on the end of the key under the block *q'* to suppress any noise produced by the impact. The block *q* also carries a felt strip *g'* which forms a rest for the action-levers. The action-levers are guided against lateral displacement by means of oval-headed pins *r* rotatably mounted in holes in the bar *g* and projecting into slots *n'* in the action-levers, so that the angular position of the pins *r* may be adjusted to the exact width of the slots. The action-lever is preferably cut out at *n''* to diminish its weight.

Each of the pick-bars *o* has mounted at its upper end a block *s*, which is adjustably mounted upon a screw *o'* in the top of the pick-bar so that by slightly loosening the screw said block can be rotated slightly. The block has an oblique face or wing *s'* which is perforated by a slot *s''* through which passes an upright screw-threaded wire *t* supported at its lower end in a bracket-arm *u* secured to

the bar *h*, and at its upper end by another bracket-arm *v* secured to the bar *i* or *j*. The bars *u* and *v* are secured by screws *u'* *v'* which pass through holes therein somewhat larger than the screw-shanks, so that these bars can be moved to a certain extent and thus the position of the wire *t* correctly regulated. On the wire *t*, respectively above and below the oblique-faced block *s*, are mounted nuts *t'* *t''* which, although they may be of any shape, are preferably cylindrical as here shown, so that they strike flat upon the oblique faces of the wing *s'*, or rather upon the facings *s'''* of leather, felt, etc., with which it is preferably provided to deaden noise. The nuts *t'* and *t''*, if made cylindrical as shown, cannot become displaced by turning on their stems, since the action prevents them from turning when struck by the blocks *s*, but to further support them and lock them in place they may be backed by lock-nuts *t'''*. The slot *s''* is preferably made wider at its lower end to prevent noise due to the wire *t* striking the side of the slot when the pick-bar is raised; but this is nonessential. Also the pivot-joint upon which the bar *o* turns is, as shown in Fig. 6, made such that the bar *o* can have a slight oscillatory motion at right angles to the axis of the pivot; so that the bar *o* remains substantially upright as seen in the side-view, Fig. 1, when raised, and does not partake sensibly of the angular movement of the bar *n*. The pivot-joint as shown comprises a screw *n''* in the end of the bar *n* passing through a hole *o''* which is enlarged on each end, and felt washers *o'''* are placed on each side of the bar which permits the slight oscillation at right angles to the axis of the screw.

The form of the picks *p* is shown more particularly in Figs. 3, 4 and 8. The nose *p'* of each pick has a face which makes a certain angle to the vertical, and the movement of the pick-bar produced by the contact of the upper nut *t'* with the upper face of the wing *s'* is such as to give the active face of the pick an oblique draft when in contact with the string. As each pick requires individual setting upon the pick-bar to correspond with unavoidable irregularities in the position of the strings and pick-bars, the hole *p''* in the center thereof through which passes the screw *o''*, securing it to the end of the pick-bar, is made slightly larger than the shank of the screw, so that the pick can be moved around in any direction to a limited extent; and a projecting bur *p'''* is formed on the inner side of the upper end, which, when the pick has been correctly set in position, is caused to bite into the material of the pick-bar by screwing up the screw *o''* and thus hold the pick in fixed position. To avoid interference with one another the pick-bars *o* are set alternately in two rows, the action-

levers n being made alternately longer and shorter and half of the pick-bars being offset intermediately as shown at o^5 to give free room for the blocks s at the upper end and also to provide ample space for getting at the bars in setting and adjusting.

One difficulty I have experienced is in providing sufficient room for the movement of the pick between the strings without contacting with the adjacent string, and it will be seen from Fig. 3, in which one of the picks is shown raised, that on the descending movement the back of the pick is apt to strike the adjacent string and thus produce dissonance. I avoid this by the arrangement in Fig. 4, whereby the strings b are placed at alternately wider and narrower distances and the picks are arranged to act in alternately opposite directions, each pick being set in the wider interval between two adjacent strings as shown, and the obliquity of the wings s' being correspondingly in alternately opposite directions. Thus ample space is gained for the movement of the pick without striking the adjacent string. This arrangement is however more necessary in those actions where the key and action-lever are combined in one piece than in the improved arrangement above described, since the width of the keys, and consequently the spacing of strings in the former case, is irregular, some of the strings being therefore closer set than others; but by making the action-levers separate from the keys they can be spaced regularly and this difficulty avoided.

The operation of the action will be clear from the above description. The depression of the key k raises the action-lever n , which in turn raises the pick-bar o , this latter movement taking place in a vertical direction until the pick p strikes the string b , at which moment the upper nut t' also strikes the upper face of the wing s' and by so doing causes the pick-bar to turn about its pivot as it rises, thus drawing the nose of the pick obliquely across the string and causing it to vibrate. On its descending movement the pick does not strike the string, the pick-bar remaining tilted until the lower nut t^2 strikes the under face of the wing s' and turns the pick-bar back to its original position. The pivot of the bar o being at its approximate center of gravity, the friction of the felt-washers o^3 is sufficient to hold the bar in its angular position until positively moved back. It will be understood of course that the nuts t' t^2 are to be set for each pick-bar until the pick strikes the string properly. I also prefer to provide each string with a damper consisting of a felted block w mounted on the lower end of a rod w' passing through holes in the bar g and action-lever, the upper end of said rod being threaded and having a nut w^2 thereon whose position is adjusted until the damper-block

is raised by the action-lever although allowing its weight to rest upon the string normally. The damper block is raised from the string by the action-lever before the pick strikes it, and is returned to its position after the string has been sounded. As a forte device I provide a universal damper-board, in two parts y and z , respectively for treble and bass which are pivoted between the strings and sounding-board upon pins y' z' mounted in blocks y^2 , z^2 . Each board has mounted on its face a plurality of blocks y^3 , z^3 which are adapted to pass between the strings without striking the latter and to raise the blocks w off the strings when the board is tilted into the position shown in dotted lines in Fig. 1, thus allowing all the strings to sound. The damper-board z for the lower strings is provided with a small clip or plate z^4 secured to its edge and overlapping the edge of the board y , so that the raising of the board z removes the lower dampers without affecting the upper ones, but the raising of the board y removes all the dampers; this enables me to secure a varied effect by producing resonance of all the strings or of the bass-strings only, as desired. The raising of the damper-boards may be effected by any preferred means, as by vertically moving pins y^4 operated through the medium of pedals or in like manner.

While I have hereinabove shown the most improved form of my invention, I wish it understood that not all of the features are essential thereto or necessarily made in the exact form shown, but various changes and modifications in the constructions as herein shown may be made without departing from the spirit of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a keyed stringed instrument, the combination with a string and key-operated bar of a second bar pivotally mounted on the end thereof, a pick mounted on said second bar in position to rub against said string, a member having an oblique-faced wing mounted on said second bar, a stem passing vertically through a slot in said wing, and a pair of abutment-pieces adjustably mounted on said stem respectively above and below said wing.

2. In a keyed stringed instrument, the combination with a string and key-operated bar of a bar pivotally mounted on the end of the key-bar, a pick mounted on said second bar in position to rub against said string, a piece having an oblique-faced wing mounted on said second bar, a screw-threaded stem passing vertically through a slot in said wing, and a pair of bar-shaped cylindrical nuts adjustably mounted on said stem respectively above and below said wing.

3. In a keyed stringed instrument, the combination of a string-board carrying a plurality of strings, a plurality of action-levers substantially parallel to the string-board and pivoted at their front ends, a key-board carrying a plurality of keys substantially parallel and adjacent to the respective action-levers, a set of adjustable abutments on the respective action-levers which are struck by the respective keys to oscillate said levers, a set of pick-bars pivotally mounted on the ends of the respective action-levers at right angles thereto, picks carried by the respective bars in position to sound said strings, oblique-faced blocks carried by the respective pick-bars, and abutments above and below said blocks adapted to oscillate the pick-bars in one direction when raised and in the other when depressed.

4. In a keyed stringed instrument, in combination with a string-board having a plurality of strings mounted thereon, a plurality of bars carrying pick-mechanisms for sounding said strings, a plurality of dampers normally resting on the respective strings and connected with the respective bars whereby they are raised from said strings individually, and a pivoted damper-board mounted below said strings and carrying blocks which project between said strings without touching the latter and raise all of said dampers from said strings when said board is oscillated.

5. In combination with a horizontal string, a keyed stringed-instrument action, comprising an action-lever lying substantially parallel to said string and pivoted to have an oscillating movement toward and from the latter, an upright pick-bar pivoted on the free end of said oscillating bar and at the approximate center of gravity of said pick-bar, a pick carried on the lower end of said pick-bar in position to act upon said string, and mechanism at the upper end of said pick-bar for giving said pick-bar an oscillatory movement upon its pivot when moved vertically by the oscillation of said first-mentioned bar.

6. In combination with a horizontal string, a keyed stringed instrument action comprising an action-lever lying substantially parallel to said string and pivoted to have an oscillating movement toward and from the latter and an upright pick-bar pivoted on the free end of said oscillating bar; the pivot-joint of said pick-bar being adapted to permit a slight oscillating movement on an axis at right angles to the pivot.

7. In a keyed stringed instrument action, the combination of a pivoted action-lever, a member having a shank and head mounted on the free end of said action-lever, and an oscillatory bar having a hole through which said shank passes, the latter forming a pivot therefor; said bar carrying a pick

and having the diameter of the hole through which said shank passes enlarged at its ends whereby said pick-bar may have slight rotative movement in a plane perpendicular to its oscillatory movement.

8. A keyed stringed instrument-action comprising, in combination with an oscillatory member, a pick-bar pivotally mounted thereon and carrying a pick, a member rotatably adjustable on one end of said pick-bar and having abutment-faces, and fixed abutment-faces coacting with the respective abutment-faces of said member.

9. In an apparatus of the class described, in combination with a reciprocating member, a pick-bar pivoted thereon and carrying a pick adapted to act upon a string, a block having an oblique-faced wing rotatably adjustable at one end of said pick-bar, and a pair of stationary abutments on opposite sides of said oblique faced wing and in operative relation thereto.

10. In an apparatus of the class described, the combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, and a pair of abutment-members mounted on said elongated member on opposite sides of said plate.

11. In an apparatus of the class described, in combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, and a pair of abutment-members mounted on said elongated member on opposite sides of said plate and adjustably movable up and down thereon.

12. In an apparatus of the class described, in combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, a pair of abutment-members mounted on said elongated member on opposite sides of said plate and adjustably movable up and down thereon, and a pair of supports for the respective ends of said elongated member.

13. In an apparatus of the class described, in combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, a pair of abutment members mounted on said elongated member on opposite sides of said plate, and a support for said elongated member having an adjustable movement in a plane at right angles to the axis thereof.

14. In an apparatus of the class described, in combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, a pair of abutment-members mounted on said elongated member on opposite sides of said plate, and a pair of stationary arms supporting at their ends said elongated member and lying in planes at right angles thereto, one or both of said arms having an adjustive movement in its own plane.

15. In an apparatus of the class described, in combination with a reciprocating member, a second member pivotally mounted on the first and carrying a pick, an oblique plate carried by said second member and projecting laterally therefrom, said plate having a slot therein, an elongated stationary member (*t*) lying parallel to the movement of said reciprocating member, passing through said slot and having a free movement in said slot, a pair of abutment-members mounted on said elongated member on opposite sides of said plate, and a pair of stationary arms supporting at their ends said elongated member and lying in planes at right angles thereto, one of said arms being mounted on a pivotal fastening whereby it has an adjustive movement of rotation about said fastening to adjust the position of said elongated member.

16. A keyed stringed instrument action comprising a horizontal action-lever having a vertical pivotal movement, an upright pick-bar pivotally mounted on the end of said action-lever, a pick carried by said pick-bar, an oblique plate carried by and extending laterally from said pick-bar, an upright bar passing through a slot in said plate and having a free movement therein permitting said pick-bar to oscillate about its pivot in a plane at right angles to said action-lever,

and a pair of abutment-members on said upright bar on opposite sides of said plate.

17. A keyed stringed instrument action comprising a horizontal action-lever having a vertical pivotal movement, an upright pick-bar pivotally mounted on the end of said action-lever, a pick carried by said pick-bar, an oblique plate carried by and extending laterally from said pick-bar, an upright bar passing through a slot in said plate and having a free movement therein permitting said pick-bar to oscillate about its pivot in a plane at right angles to said action-lever, a pair of abutment members on said upright bar on opposite sides of said plate, and an adjustable support for one end of said upright bar.

18. A keyed stringed instrument action comprising a horizontal action-lever having a vertical pivotal movement, an upright pick-bar pivotally mounted on the end of said action-lever, a pick carried by said pick-bar, an oblique plate carried by and extending laterally from said pick-bar, an upright bar passing through a slot in said plate and having a free movement therein permitting said pick-bar to oscillate about its pivot in a plane at right angles to said action-lever, a pair of abutment-members on said upright bar on opposite sides of said plate and a horizontally extending arm pivoted upon a screw or like fastening, one end of said upright bar being secured to the free end of said arm whereby the position of said upright bar may be laterally adjusted.

19. A keyed stringed instrument action comprising a horizontal action-lever having a vertical pivotal movement, an upright pick-bar pivotally mounted on the end of said action-lever, a pick carried by said pick-bar, an oblique plate carried by and extending laterally from said pick-bar, an upright bar passing through a slot in said plate and having a free movement therein permitting said pick-bar to oscillate about its pivot in a plane at right angles to said action-lever, a pair of abutment-members on said upright bar on opposite sides of said plate, a fixed transverse bar, a horizontal arm pivotally mounted on a screw therein and having an adjustive movement of rotation about said screw, the free end of said arm forming a support for said upright bar, and a fastening acting in conjunction with said screw to fix said arm in its adjusted position.

20. In combination with a string-board having a plurality of strings, a bank of action-levers parallel to the strings, and a separate and removable keyboard adapted to slide into position over said string-board, the inner ends of the keys underlying the respective action-levers; there being opposed abutments on each key and its respective action-levers; whereby said action-levers

may be made of uniform width and spacing independently of irregularities in the width and spacing of the keys and the string-board may be readily uncovered for the replating of broken strings.

21. In a device of the class described the combination of a horizontal string-board having a plurality of strings, a bank of action-levers pivotally mounted over said string-board, action-mechanism operated by said action-levers, an independent and removable key-board slidable into position over the front end of said string-board and comprising a bank of depressible keys fulcrumed at an intermediate point whereby when the front end of each key is depressed the rear end is raised, the rear ends of said keys when in position underlying the respective action-levers, and a plurality of movable abutments mounted one on each action-lever and extending below it into juxtaposition with the operative end of the

key, each abutment being vertically adjustable with relation to said action-lever.

22. In an instrument of the class described, the combination of a horizontal string-board having a plurality of strings, a horizontal bank of action-levers mounted over said string-board, one lever to each string above and parallel thereto and having an oscillating movement, a plurality of damper-pads normally resting on the respective strings and each having an upright stem passing through a hole in the corresponding action-lever and threaded on its upper end, and an adjustable nut on the threaded end of said stem.

In witness whereof I have hereunto set my hand this eighth day of July, 1908.

HENRY F. SCHENUIT.

Witnesses:

GEORGE WETMORE CALLER,
JAS. L. WARNES.