

H. L. DEDEN.
KEYED VIOLINS, CELLOS, &c.

Patented July 4, 1876.

No. 179,530.

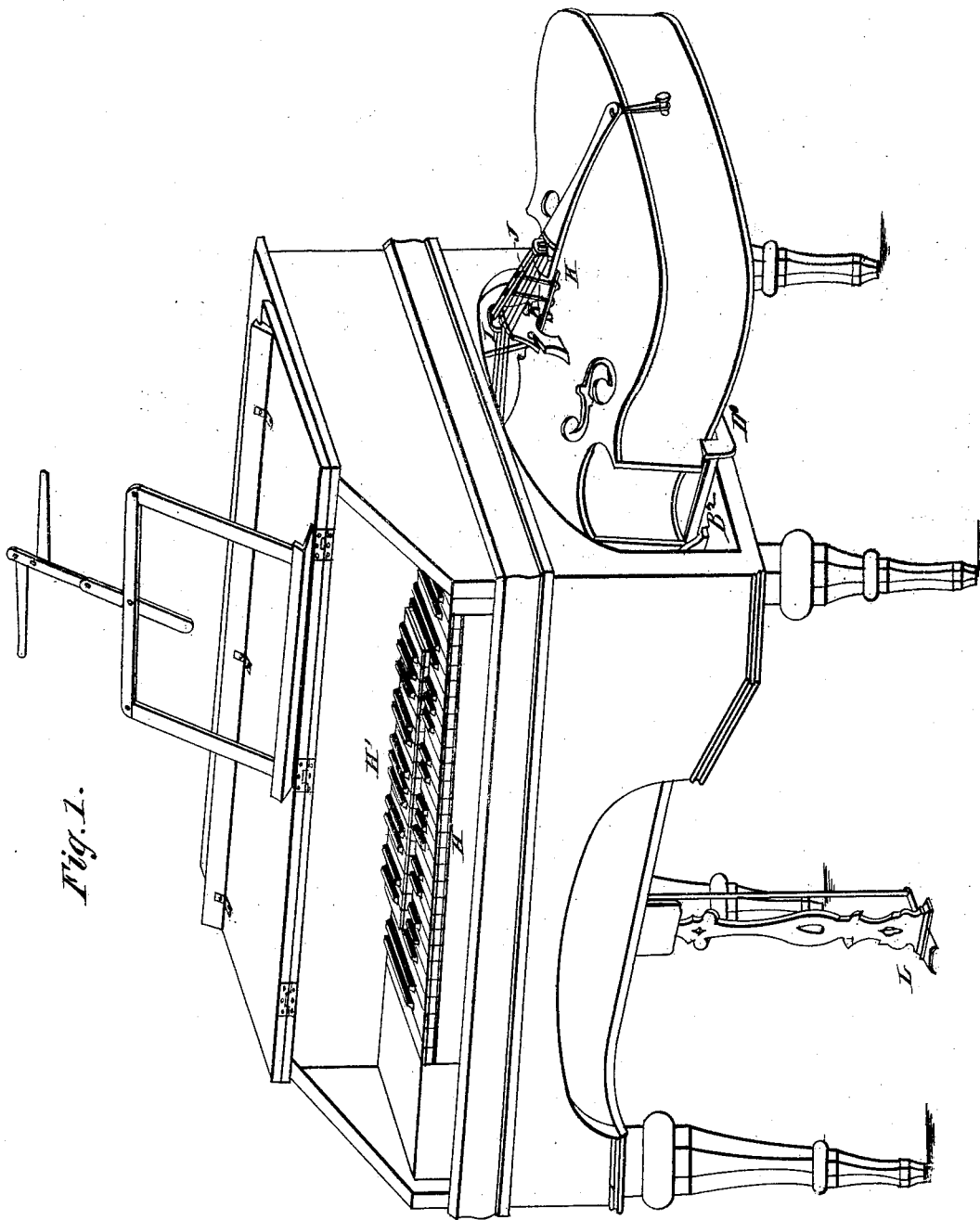


Fig. 1.

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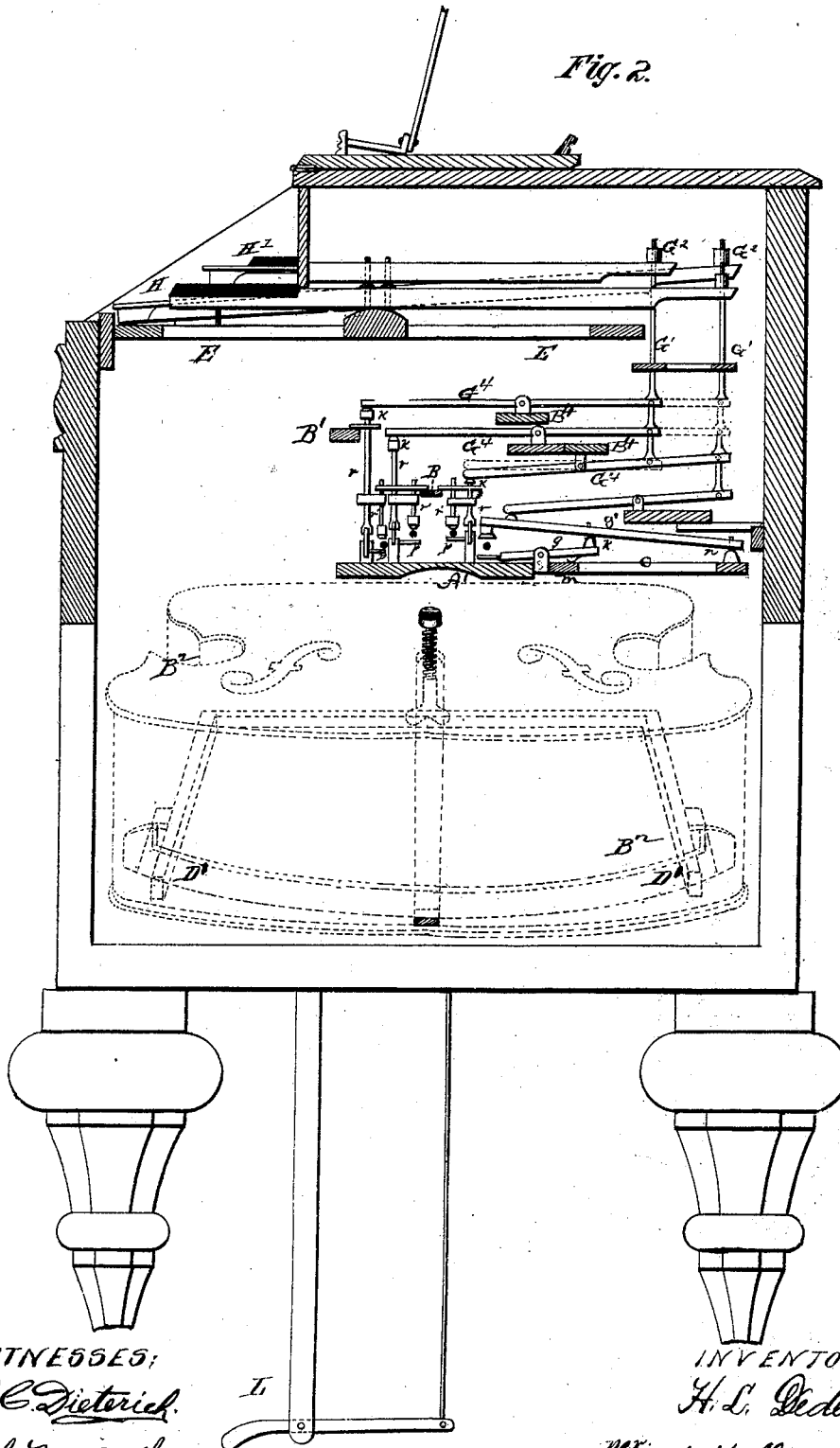
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Fig. 2.



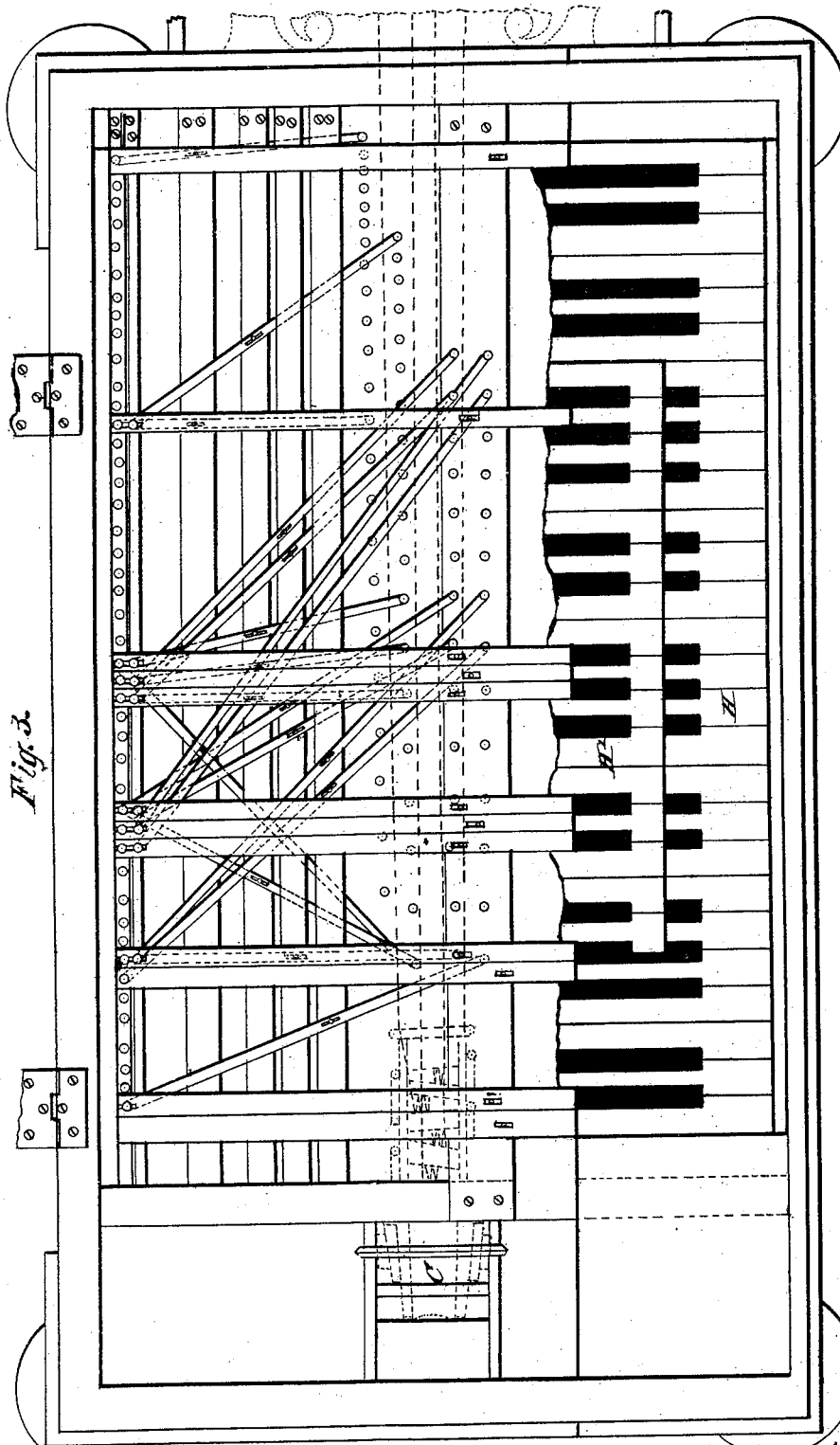
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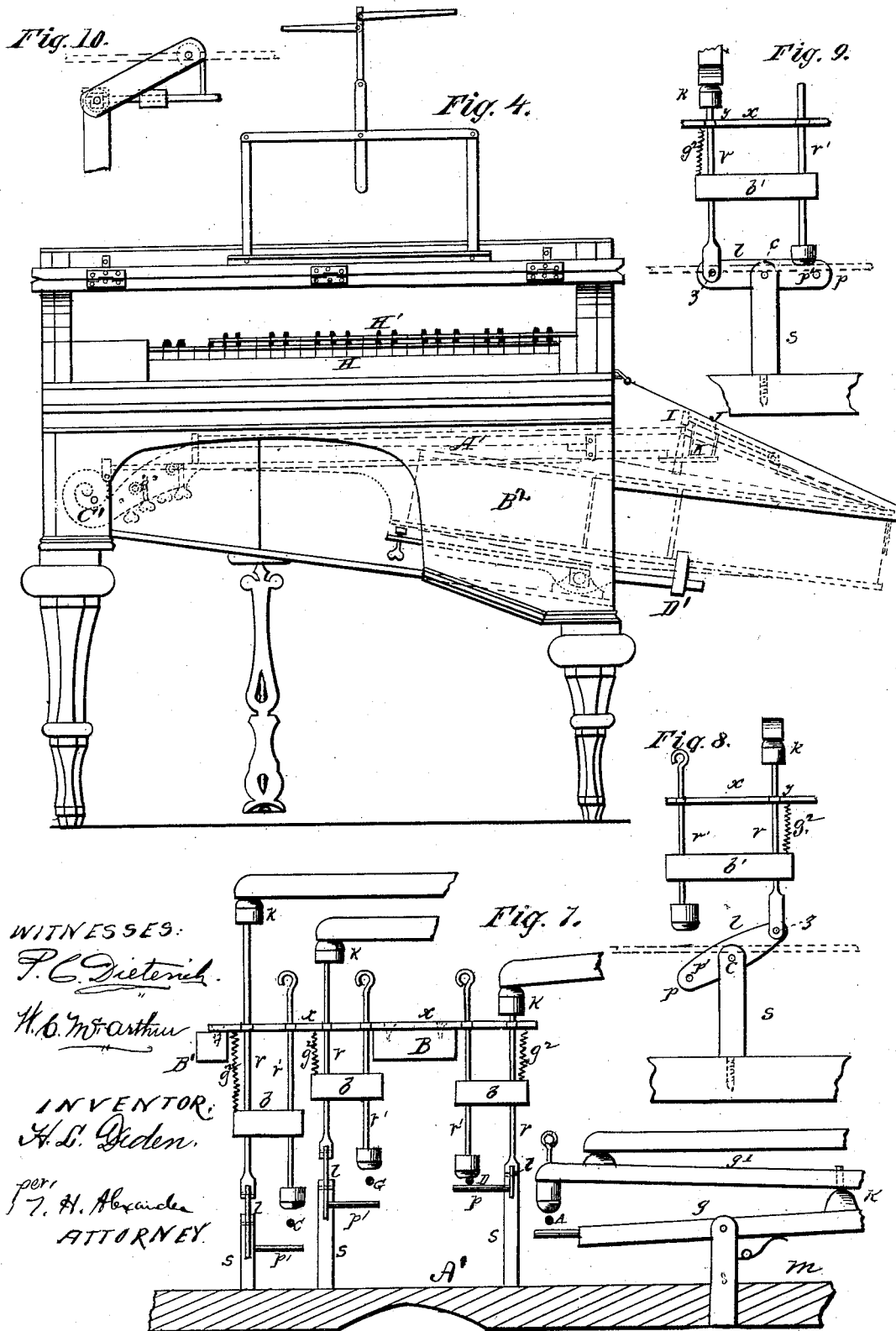
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Fig. 5.

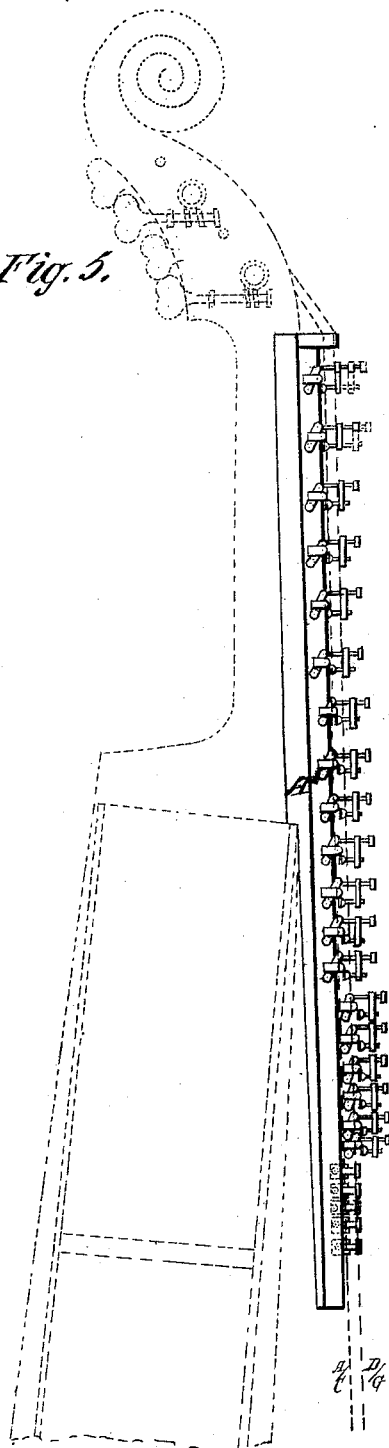
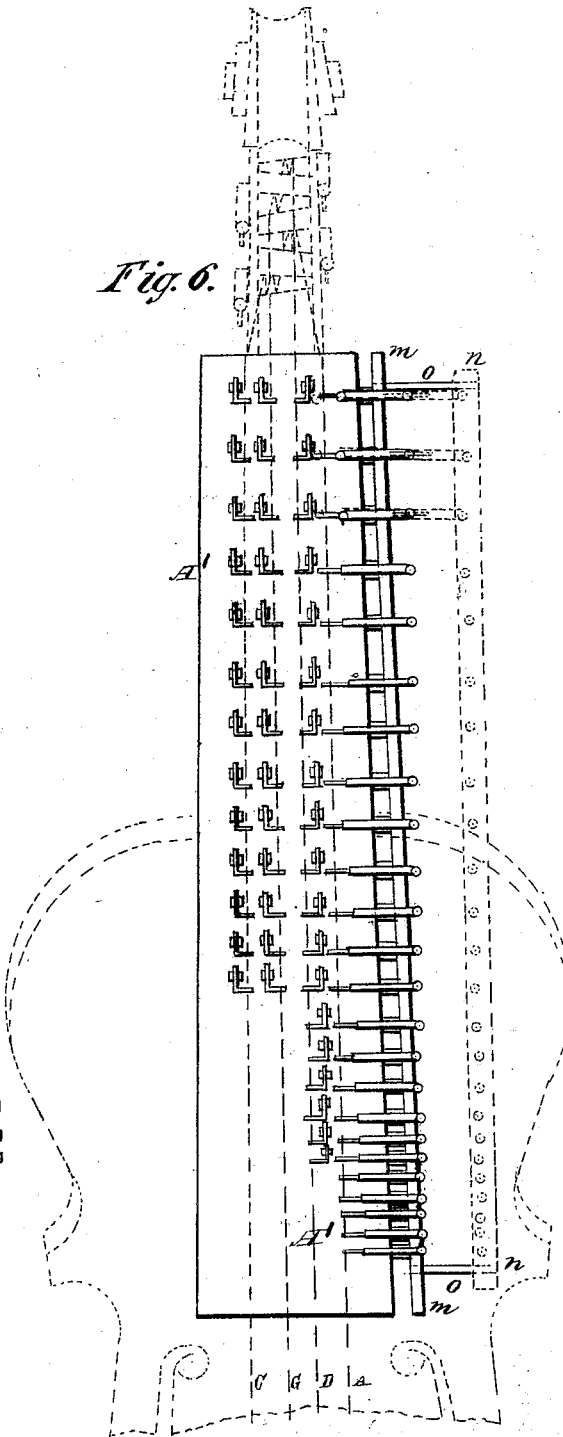


Fig. 6.



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UNITED STATES PATENT OFFICE.

HANS L. DEDEN, OF CHARLESTON, SOUTH CAROLINA.

IMPROVEMENT IN KEYED VIOLINS, CELLOS, &c.

Specification forming part of Letters Patent No. **179,530**, dated July 4, 1876; application filed November 20, 1875.

To all whom it may concern:

Be it known that I, HANS L. DEDEN, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in Violoncellos; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to violoncellos, bass-viol, and other four-stringed instruments played by a bow being drawn across the strings.

All musicians performing upon this class of instruments agree that the proper execution of especially difficult pieces of music offers almost insurmountable difficulties, arising from the great distance of the intervals on the finger-board, often requiring extensive shifting of the hand to where the fingers cannot reach when in ordinary position, and thereby rendering necessary great skill and rapidity of action, in order to secure a full and clear expression of the various tones, semitones, chords, figures, and passages of which such a musical composition may be a combination.

The object of my invention is to obviate the aforesaid difficulties by frustrating the possibility of an impure tone or semitone by the instruments after being properly tuned, and to entirely avoid the difference between the highest and lowest position of the left hand on the finger-board, thus reducing all positions to a common medium, and permitting the execution of tones, semitones, chords, figures, and passages in all positions with equal ease and infallible exactness. To accomplish this end, and to meet at the same time all the requirements of a perfect musical production, the nature of my invention consists in the construction and arrangement of an apparatus to be adjusted to bass-viol, violoncello, or other similar instrument, said apparatus being a combination of key-board, keys, levers, stops, and other mechanical devices, placed in a suitable case calculated to receive the special instrument on which the apparatus is intended to be used. To such an apparatus I have given the name of "violoncello-clavier," or "bass-viol

clavier," according to the instrument on which it is used. The accompanying drawings, which fully illustrate my invention, show the same applied to a violoncello.

My invention, when complete, comprises four principal parts—viz., first, violoncello proper; second, apparatus on and about the finger-board; third, the exterior case with cello-lever, receptacle of cello-head, and support for cello-center; fourth, the operating mechanism.

The violoncello comprises within the limits of its four strings, C G D A, forty-six semitones, which, beginning with the tones of strings C G D A open, (the sharps of C G D A being the first in the order of progression,) gradually diminish in distance between one another as they approach the termination of the finger-board. The same scale of this diminishing progression applying equally to each of the four strings C G D A, it follows that a line drawn from the point of intersections of any one interval on either of the strings, and at right angles with the finger-board, will show the points of intersection of the corresponding intervals on the other strings. An imaginary line through the point expressed by the common figure in the scale of progression, drawn at right angles to the center line of the finger-board, gives exactly the relative distance from the nut of the finger-board for the four intervals—say, C sharp, G sharp, D sharp, A sharp.

Therefore, laying a succession of imaginary lines through the consecutive points of the progressively-diminishing scale, common to the four strings C G D A we have, first, pitch of tone at point or note G on string C, seven semitones above C, equal to pitch of tone of the open string G; second, pitch of tone at point or note D on string C, seven semitones above G, equal to pitch of tone of the open string D; third, pitch of tone at point or note A on string D, seven semitones above D open, equal pitch of tone of the open string A; fourth, pitch of tone at point or note E on string A, seven semitones above A. Hence, by adding to this series of tones those that lie on string A above point or note E, we receive the entire register proper to violoncello, comprising from C open to double octave of A, forty-six

semitones, or three and three-fourths octaves. Further progressing on string C, above imaginary line giving pitch of tone of open string G, we have other seven semitones up to D, or to open string D. Likewise, on string G, from point D, progressing seven semitones, we reach A, the same as open string A; and progressing on string D, above the point A, we can go as far as on string A, the pitch of tone on string D at the same point of any imaginary line with A always being seven semitones lower than on string A. These supernumerary positions on the strings C G D give to the musician an opportunity to play double notes, &c. In accordance with this scale or gamut of the violoncello, the mechanical apparatus is constructed as hereinafter described.

In order to secure the mechanism on the finger-board, the original finger-board of the cello is taken off, and a new and larger board, A', Figs. 5 and 6, inserted, measuring at the nut three inches in width, and at the lower end, toward the bridge, four and one-half inches. The nut must be raised to three-eighths of an inch above the finger-board, the distance of the strings from each other at the nut being five-eighths, and at the bridge three-fourths, of an inch, to give room to the reacting levers fastened to the finger-board. On the side of the finger-board next to the string A runs a ledge or lath, *m*, which, when screwed firmly on, presses the supports *s* of the reacting levers tight to the finger-board. (See Fig. 2.) Another lath, *n*, Fig. 6 and Fig. 2, is screwed onto the finger-board parallel with the ledge, at a distance of about two inches, through brackets or arms *o*, to fasten on it the acting levers *g'*, Fig. 2, for the string A.

To support a part of the mechanism for the strings C G D, two bars are fastened to the finger-board in the following manner: One bar, B, runs above the finger-board, parallel to it, at a height of two inches, between the strings D and G, and is fastened with screws in the nut, and at the lower end of the finger-board. Another bar, B¹, for the string C is fastened exactly in the same manner on the outer side of the string C.

For each of the strings C G D there is a series of reacting levers, constructed in the following manner: A support, *s*, is screwed on the finger-board exactly at the point of intersection of the string to produce the respective semitone, which support is made of metal, and bears in an incision the balancing or reacting lever, *l*, fastened with a pin at the point *c*, Fig. 8. At the lower end *p* of the balance-lever a pin, *p'*, is riveted at right angles, standing out horizontally, which pin is cushioned, and touches the string from below when acted upon.

The mechanism acting on the said balancing or reacting lever is as follows: A thin brass rod, *r*, is screwed in the block *b'*, and its lower end catches with a hook in the other end of the balance-lever *l* at the point *z*. This

rod slides above through a hole in the bracket *x* at the point *y*, and is surmounted by a knob, *k*, which receives the pressure from the lever *l*, worked upon by the key-board. In block *b* another thin brass rod, *r'*, is screwed, to the lower end of which a leathered knob is fastened, which, when pressed down, (by the block *b* being pressed down through the rod *r*), touches the string from above, while at the same time the balance-lever pressed down at *z* rises at *p*, and touches the respective string from below, both levers working like pinchers. Any tone over the whole gamut of the instrument produced in this manner is as pure, round, and full as those of the open strings. As the second rod *r'* is a screw, the knob, at its end, can be regulated so as to touch the string at the same time as the balance-lever, and with equal force. A spring, *g²*, Fig. 8, throws the knob and lever back again to rest.

The bracket *x*, which serves as a guide for the rods *r*, is fastened to one of the bars B B¹ for the strings C G D. There are fourteen of these devices for the string C, fourteen for the string G, and nineteen or more for the string D.

The mechanism for the string A is as follows, and has the following parts, viz: A support, which bears in an incision a balance-lever, one arm of which must be equal to the other, is held firmly to the finger-board on the side of the string A by the ledge *m*. One arm of the lever is steel-pointed and leathered, and reaches under the spring. The other arm has at its end a knob, *k*, with a projecting pin, which slides into another lever, *g¹*, above it, forming its support. The right end of the lever *g¹* is movably fastened to the lath *n*, (see Fig. 2,) and the left arm reaches above the string, and has a leathered knob with a regulating-screw, to press on said string when set in motion from above, while the pointed and leathered end of the lower lever presses upward, working like pinchers. The string is held thereby, and gives, when played upon, as clear a tone as when open.

The violoncello, being provided with the above-described mechanism, is placed in the chamber B² of the outer case, constructed for its reception, and elevated on four upright posts. The head of the violoncello is placed in this receptacle, and rests upon a block, O', cut out to receive it, and a spike driven through the cello-head to hold it firmly in said block. The large part of the cello is placed on the cello-lever D', constructed in the form of a frame. This frame or cello-lever swings on each side of the cello in blocks fastened to the bottom of the case, and has a screw in it to support and regulate the position of the cello. The cello-lever also extends as far out of the case as to support the cello against any pressure from above by the bow when played upon. By these means the instrument may be adjusted and held firmly in the right position, and cannot move in any direction.

The front of the chamber B² is suitably cut

out or broken open to gain admittance to the turning screws or keys of the violoncello.

In the case is a frame, E, to receive the supporting-bars for the acting levers, and to form a base for the key-board.

For the string A, the supports B⁴ are under the bottom of the frame E. G⁴ are the acting levers, which are balanced equidistant on the supports, one end pressing against the stops of the finger-board below for the string A. The other end has an incision, in which is fastened the wire G¹, that connects it with the lever of the key above, or key proper. This wire passes up through a guide, and has on its upper end a knob, G², under which the forked rear end of the key slides, in order to lift up this wire and act on all the levers connected therewith below.

The acting mechanism for the other strings (D G C) is constructed substantially in the same manner as that described for the string A, but is located above the same and attached to a bar in the frame, that is fastened therein in such a manner that it can be readily removed when desired to get at the mechanism for the string A.

The key-board H is exactly like that of a small piano, having the white keys for C major, and the rear ends of the key-levers, slit open to receive the connecting-wires, as above described.

H' is a second key-board, slightly elevated above the board H, and nearly like those on organs, and is for the use of the supernumerary semitones. This upper key-board has for string C its seven supernumerary semitones, the same for string G, and twelve or more for string D, making twenty-six or more keys, while the lower key-board represents in its forty-six keys the regular chromatic scale or gamut of the violoncello.

The white keys for the open-string tones G, D, and A on the lower key-board have a different color from the others, so that the performer can, with facility, distinguish the passage from one string to another.

I have also added a "mute" or "damper" to the cello, to give the greatest variety of tones to the performer for expressing his feelings on the instrument.

This mute works on the strings somewhat as a sordino, and is constructed in the following manner: I is a wooden block, cut out to fit the upper part of the bridge and touch the surface thereof in all its parts. This block is attached to a hammer-like handle, J, which is hinged in the tail-piece of the cello. Two springs, K, hold the block or mute proper I up from the bridge. This damper or movable mute is set in motion by a pedal, L, fastened under the bottom of the cello-chamber B, and connected by a rod and suitable levers with the mute. When the pedal is worked by the foot of the performer the mute is pressed down on the bridge, giving a sound and tone to the strings that cannot be reached by the artists on the plain violoncello.

The advantages of my invention (the violoncello-clavier) can be briefly stated as follows: The strings are never stretched by the grasp, but pressed firmly without breaking their straight line, or, in other words, remain always in the same plane, thus preventing much breakage and variations in pitch. After the instrument has been properly tuned, the gamut, or chromatic scale, is ever perfect, and the tones always pure. Running passages, requiring the greatest skill when executed on violoncello proper, can be executed on the violoncello-clavier with equal facility as on the piano. Double notes and chords of three and four notes in any position can be executed through the agency of this invention with the same ease as the left hand can perform them on the piano. The trill, most difficult to execute on the violoncello proper, becomes by my invention as easy as on the piano. The mute gives a variety of sound that cannot be executed on other instruments. The so-called flageolet sounds, or harmonics, can be executed perfectly in every tone, and even another flageolet, one octave higher, as pure and perfect as the first.

In view of these important advantages of my invention it will be seen that I have cleared away the obstacles that heretofore impeded the increase of popularity of the violoncello, and have opened to lovers of music that sphere of executions heretofore known only to very few amateurs, and not very many professional musicians.

Any one desirous to play upon this instrument, and gifted with taste for music, and in possession of two pliable hands, can acquire command over the instrument in a short time, after having surmounted the difficulties in the leading of the bow, and thus become able to satisfy the demand of the mechanical part of a musical composition, which, without the medium of my invention, would lie beyond one's reach even after years of studious application.

By my invention, therefore, the violoncello may be introduced in amateur parlor music with violin, piano, flute, and other instruments, for, after being once tuned to the pitch of the piano, it will become, by its steadfastness and never-failing purity of tone, the prop of all the other instruments combined in the production of a musical composition.

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

1. In combination with a violin or similar stringed instrument, a holding-case adapted to receive and partly inclose the same, and provided with keys and stop mechanism, to operate upon the strings of said instrument at different points, substantially as and for the purposes described.

2. The combination, with a violoncello or other similar instrument, of an exterior case, in which the instrument is held, a key-board, an intermediate actuating mechanism, and a

mechanism on the finger-board of the violoncello for operating on the strings thereof when the keys are struck.

3. The combination, with a violoncello, of a mechanism secured on the finger-board, operated by means of keys, and constructed to act like pinchers, or to grasp the strings on opposite sides, substantially as and for the purposes herein set forth.

4. The combination, with a violoncello or other similar instrument, of a movable mute,

operated by a pedal or its equivalent, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of three witnesses.

HANS LUDEWIG DEDEN.

Witnesses:

WM. C. MCARTHUR,

H. A. HALL,

C. L. EVERT.