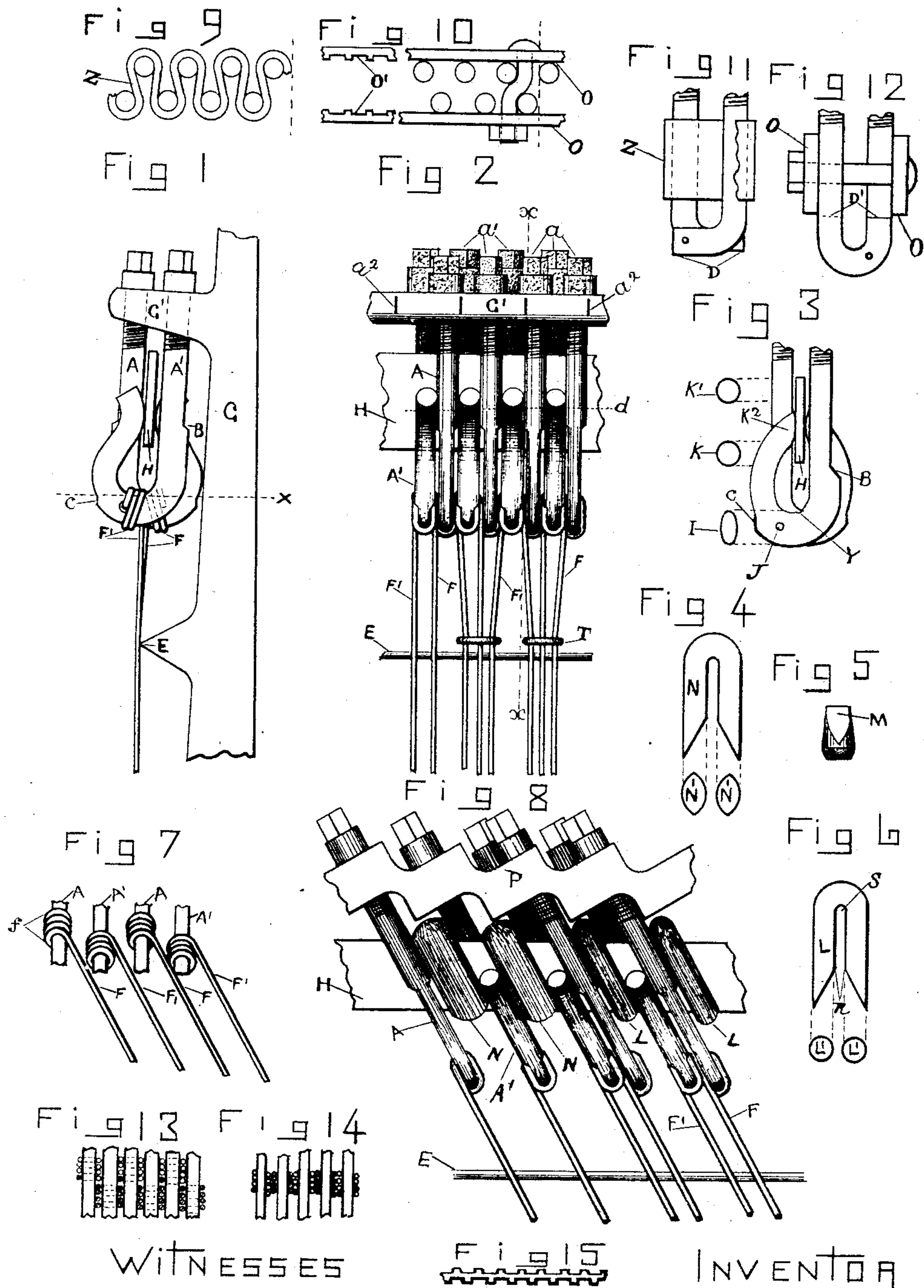


(No Model.)

R. B. WATSON.  
PIANO.

No. 471,248.

Patented Mar. 22, 1892.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## PIANO.

SPECIFICATION forming part of Letters Patent No. 471,248, dated March 22, 1892.

Application filed October 20, 1890. Serial No. 368,730. (No model.)

*To all whom it may concern:*

Be it known that I, ROGER B. WATSON, a subject of the Queen of Great Britain, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Pianos, for which I desire to obtain Letters Patent, and of which the following is a specification.

My improvement relates to the stringing of pianos; and its main objects are, first, to provide a simple and efficient screw device by which the upper ends of the strings may be rigidly held and adjusted in tension and pitch; second, to provide a method of winding the strings upon their stringers, whereby the space required between the stringers at this part need not exceed the thickness of one string, while it admits of the strings being practically, though not actually, in one line or plane between their fastenings and the agraffe; third, to prevent or limit the outward or inward movement of the lower parts of the stringers by causing those tending to move inward to oppose and balance those tending to move outward; fourth, to prevent or limit the lateral or twisting motion of the strings by causing the inward or outward turned parts to pass between opposite or different parts of adjoining stringers; fifth, to facilitate tuning where the tuning-nuts are equidistant by placing a distinguishing-mark upon the adjacent parts in suitable position to indicate which string is operated by any particular nut. These objects are obtained by the methods and means described herein, and shown in the drawings, in which—

Figure 1 is a vertical section of the device as taken through the dotted lines X X of Fig. 2. Fig. 2 is a front view of the device as applied to the treble part of the piano. Fig. 3 is a slightly-different form of the stringers with sections shown at three points, the difference being in the shape of the end K<sup>2</sup> only. Figs. 4 and 6 show the guide-pieces used in the bass part between the stringers. Fig. 5 shows a form of adjusting-nut having tapered squares upon its upper part. Fig. 7 shows more openly the method of winding the strings upon their stringers and their relation to each other. Fig. 8 shows the arrangement of the stringers in the bass part with the guide-pieces between them and also the form of projecting

flange in that part to suit the inclined position of the stringers. Figs. 9 and 11 show a modified form of the means of limiting the inward or outward movement of the lower parts of the stringers. Figs. 10 and 12 show another form of the same. Figs. 11 and 12 show, also, modified forms of stringers. Fig. 13 shows my method of winding the strings in relation to each other by a section taken through the string-fastenings along the dotted lines X of Fig. 1. Fig. 14 shows the usual method of winding the strings, the fastenings or windings being in one row and requiring space for two thicknesses of springs between the stringers. Fig. 15 shows a modification of the plate H, having guide-grooves on each side to receive and guide the returned or hooked ends of the stringers.

The drawings show the figures as arranged in an upright piano, and the terms used in this specification and claims are intended in this sense—that is, as seen in Fig. 2.

In the drawings similar letters refer to similar parts.

In Figs. 1 and 2, G represents the main plate of a piano, to which the projecting flange G' is cast or fixed. In this flange holes are drilled in two rows and staggered, as shown in Figs. 1 and 2, into which holes the stringers A and A' are fitted and made adjustable by the nuts a and a', Fig. 2. These stringers are identical in shape, but are reversed in position. The upper screw-threaded part is of round section, as is also the hooked or returned part, while the part between C and B is of oval or elliptic section. The oval or elliptic form of this part has the advantage of increased strength and of offering no sharp angles or flat faces to the string-windings, so that they are not liable to break at this part and will wind snug and uniform upon their stringers. The ends of the stringers are passed through the holes shown at J, Fig. 3, and also in Fig. 1, and the strings are wound about their stringers, so that the last coil will come into the required position, as shown in Fig. 1, so that when the stringers are arranged and adjusted in position the string-windings shall come quite close to but not overlap each other.

It is desirable in arranging the stringers in their places to put a few only at each end of



the bar H, or the position where it will come, and after putting a slight tension on these to place the bar in position. The stringers should then be added alternately, so as to balance each other's pressure upon the bar H. This bar may be in one or more pieces of any suitable length and curve, but not too short; otherwise the motion of one stringer (in turning) may cause it to become displaced through the insufficient pressure of the others upon it. In Figs. 1, 2, and 8 the bar H is shown plain, but may, if preferred, have grooves, as shown in Fig. 15, to guide and steady the stringers. It will be seen that the bar is not fastened to the plate G or to the flange G', but is held in position by the ends of the stringers A and A', which press against it in opposite directions. It may, however, be applied to the parts of the strings just below the stringers, somewhat in the same manner as the plates are applied to the stringers in Figs. 9 and 11, but with the curves or corrugations of the plate in Fig. 9 shallower, so that the strings may be in one line or row; or a plate may be placed upon each side of the string and attached together by suitable means; but I prefer placing the guide plate or plates upon the stringers.

In Figs. 1, 2, 7, and 8 the strings F and F' are attached to the stringers A and A', respectively, the difference in F and F' being in position and direction of the string-windings only. The oval part of the stringers is shown as lying central with the other parts, but may, if preferred, be at one side. In Fig. 3 is shown a notch or indentation in the stringers at Y to receive and regulate the position of the last coil of the string; but unless very precise adjustment of the strings is desired it will not be required.

In Fig. 1 the stringers A are shown quite close to the plate G, and they may be allowed to bear lightly against it; but this is not necessary, and they should not in any case press hard upon it, as this would increase their resistance to motion when tuning.

As the stringers in the bass part do not come close enough together to prevent twisting motion, I employ guide-pieces, (shown in position in Fig. 8 and separately in Figs. 4 and 6,) suitable sections of which are shown at N' and L', respectively, and in order that they may grip the bar H firmly and still be capable of adjustment in relation to the stringers the width of the inside bend S should be greater than the width of the bar; but the width apart of the parts R should be less, so that when placed upon the bar H with the part S uppermost the parts R will clamp firmly upon the bar and prevent jarring or displacement of the guide-pieces.

In the treble part of the piano the hooked or returned ends K<sup>2</sup> of the stringers should just fill the space between adjoining stringers, as shown along the dotted lines d of Fig. 2, to prevent lateral motion of the stringers.

In Fig. 7, f represents the string-windings,

and it will be seen that they are in two rows and staggered and that they all wind around the stringers in the same direction; but the coils are arranged alternately inward and outward along them, so that the downwardly-proceeding parts come, practically, in one line or row. This latter is also shown in Fig. 13, where the small circles represent sections of the strings, and those that are blackened or solid represent the downwardly-proceeding parts. In this figure, however, the windings are shown a little separated for the sake of distinctness, though they may be brought quite close together, as shown in Fig. 1.

Fig. 14 is simply intended to illustrate the usual method of winding the strings in relation to each other, they being in one row and so requiring space for two thicknesses of strings between the stringers.

In the modifications shown in Figs. 9 and 12 the plate Z is shown wound round or laced between the stringers, and the plates O are placed on either side of them and held together by suitable means, such as the bolt shown in Figs. 10 and 12. These plates may also have guide-grooves, as at O', Fig. 10, to guide the stringers. In Figs. 11 and 12 D shows the oppositely-bent ends of the stringers.

I do not limit myself to the precise form of stringers or guide-plates shown and described herein, as they may be variously modified, and the different parts of the stringers may all be of round or all of oval section, except the screw-threaded parts.

The distinguishing features of my devices and methods are as follows:

First. The usual method of limiting or preventing the inward or outward movement of the lower parts of the stringers or upper parts of the strings and so regulating them in relation to each other is to allow the stringers tending to move inward to bear against the plate G or a plate attached thereto and to press the others inward by means of a plate bearing against their outer faces or against the strings just below them and screwing this plate to the plate G. My method is distinct from this, in that the devices are capable of performing their office without being attached to or in contact with any parts of the piano except the stringers or strings, the parts tending to move inward opposing and balancing those tending to move outward by means of the plate H or its equivalent. This feature includes all devices which do not require to be attached to other parts than the stringers or strings in order to perform their functions—that is, to regulate the position of the upper parts of the strings in relation to each other—even though it may be considered desirable to attach them to other parts in order to regulate the strings or stringers in relation to these other parts. They are not intended to regulate the general inclination of the upper parts of the strings to their sounding parts or to the plate G. This may readily be done by suit-



ably placing the flange G' or the holes therein or the agraffe or bridge E.

Second. In order to suit the usual construction of pianos the distance apart of the stringers along the flange G (in tuning devices of this class) must not exceed seventeen one-hundredths of an inch, or three and one-half inches for twenty stringers. Now, if the strings are fastened as shown—that is, wound about their stringers—and the coils are opposite each other in one row or line, as shown in Fig. 14, (which is the usual method of bringing the upper parts of the strings into one line or row) two thicknesses of string have to be allowed for between each pair of stringers, so that the stringers have to be very thin at this part and the strings bent very sharp, which weakens both stringer and string. I avoid these defects by placing the string winding or coils in two rows, one behind the other and alternately arranged, and by winding the coils alternately inward and outward and toward each other along their stringers I bring the last coils close together, so that the strings proceed downward to the agraffe in one line or row, or sufficiently so for practical purposes. I am aware that the string-windings have before been arranged in two rows alternately, one above the other, and having their strings proceeding downward in one line or row; but I am not aware of any tuning devices in which the fastening-coils are arranged in two rows one behind the other, alternately, or otherwise, and capable of passing without displacing each other in their up-and-down motion in tuning and having their last coils close together, so that the strings proceed downward in one line or row. My devices require less room vertically than the latter form, so that longer strings, &c., may be used in pianos of the same size.

Third. I am aware that devices have before been used in which the stringers (which are not alternately arranged or reversed in position) are steadied or guided laterally by contact with adjoining stringers; but I am not aware of any tuning device in which the stringers are arranged in reversed positions and are guided or steadied laterally by a part of one stringer being in contact with other substantially different parts of the stringers.

Fourth. To enable a tuner to readily see which nut is connected with the string he wishes to tune, I place a mark upon the flange G' just in front of the tuning-nuts or upon the plate G just above and behind them. By means of such marks uniformly arranged (opposite to a corresponding nut in each set of three) it can readily be seen which nut operates any particular string—viz., if in front of the middle nut it indicates that this nut operates the middle string; if midway between two sets of nuts, as shown in Fig. 2, it indicates that the first nuts to the right and to the left are those which operate the left-hand and right-hand outer strings, respectively, of those sets.

The string-spacer T (shown in Fig. 2) is not claimed herein, it having been claimed in my application filed August 22, 1890, Serial No. 362,784.

Finally, the word "stringer" refers to that part of a tuning device to which the string is attached, and the terms "set of two" or "set of three" refer to a set of strings which form one note and have the same pitch, or to devices connected therewith.

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

1. In a piano-tuning device, the combination, with the stringers and strings, of one or more plates or pieces of metal or other suitable material suitably arranged upon and held in position by the stringers or adjacent parts of the strings and not necessarily in contact with other parts and adapted to regulate the inward or outward position of the strings in relation to each other, the pressure of those parts tending to move inward opposing and balancing those parts tending to move outward by means of said pieces or plates, substantially as described.

2. In a piano-tuning device, the combination, with the stringers and strings, of pieces or strips of metal or other suitable material adapted and applied to the lower parts of the stringers or adjacent parts of the strings and capable of limiting or regulating the inward or outward inclination of the upper parts of the strings in relation to each other without being attached to any parts of the piano except the stringers or strings, substantially as described.

3. In a piano-tuning device, the combination, with the stringers and strings, of the string fastenings or coils arranged upon their stringers in two rows, one behind the other, and having the windings or coils of each row directed toward the windings or coils of the other row, so that the downwardly-proceeding parts of the strings may be brought very nearly into one line or row or inclination toward the agraffe, substantially as described.

4. In a piano-tuning device, the hook-shaped stringers arranged in alternately-reversed positions and having their lower parts guided and their lateral motion limited or prevented by being in contact with a substantially different part of adjoining stringers, substantially as described.

5. In a piano, the combination, with the tuning devices, of suitable marks arranged in uniform positions near each set of three tuning-nuts, whereby corresponding nuts of each set may be distinguished from others, substantially as described.

6. In a piano-tuning device, the hook-shaped stringers arranged alternately in reversed positions and provided with suitable means of attachment to the piano at their upper parts and to the strings at their lower parts, substantially as described.

7. In a piano-tuning device, the combina-



tion, with the stringers, of a bar or plate placed between the two rows of stringers, substantially as described.

5 8. In a piano-tuning device, the stringers A or A', having a screw-threaded upper part, in combination with a string-receiving part of oval or elliptic section and a hooked or upwardly-turned lower end, substantially as described.

10 9. In a piano-tuning device, the combination of the stringers A', having their lower ends hooked or returned upward and inward and passing between the upright portion of the stringers A, with the stringers A having  
15 their lower ends hooked, returned upward and outward, and passing between the upright portion of the stringers A', substantially as described.

20 10. In a piano-tuning device, the stringers having their lower ends hooked or returned upward and passing between the upright por-

tion of alternate stringers, substantially as described.

11. In a piano-tuning device, the combination of the stringers A and A' with the bar 25 H, the hooked or returned ends of the stringers A pressing against the inner face of the bar in an outward direction and the hooked or returned ends of the stringers A' pressing against the outer face of the bar in an inward 30 direction, substantially as shown and described.

12. In a piano-tuning device, the combination, with the stringers and the bar, of the guide-pieces L and N, placed between the 35 stringers and on the bar, substantially as shown and described.

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Witnesses:

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