

[54] **METHOD AND APPARATUS FOR
INSTRUCTION OF STRINGED
INSTRUMENT BOW POSITIONING**

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[51] Int. Cl.G09b 15/06

[58] Field of Search.....84/281, 283, 465,
84/325, 470

[56]

References Cited
UNITED STATES PATENTS

1,603,371 10/1926 Zahn84/283
1,703,724 2/1929 Crispin.....200/16 R X

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[57]

ABSTRACT

A bow position sensor is secured to a stringed instrument and an indicator responsive to the sensor provides indication to the student of each departure of the bow from desired positioning during play.

9 Claims, 7 Drawing Figures

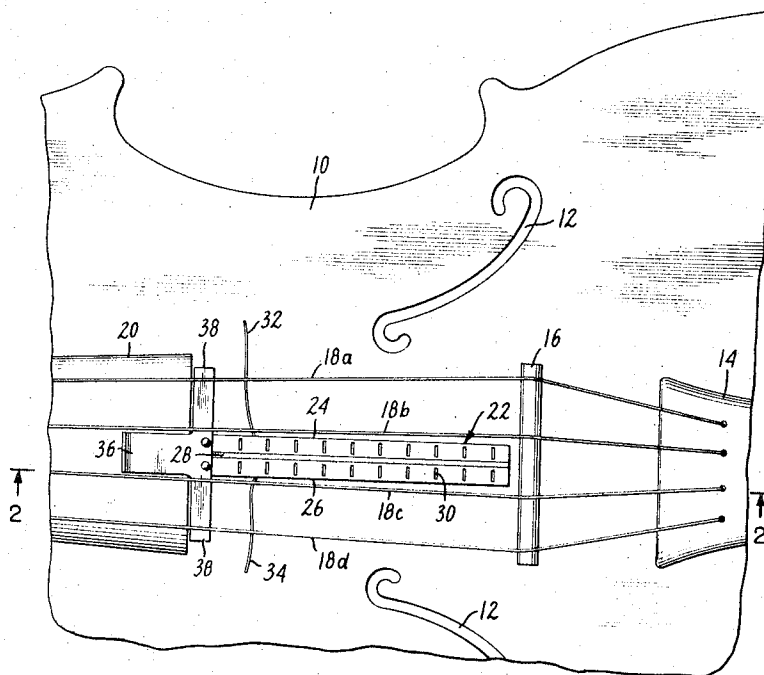


FIG. 1

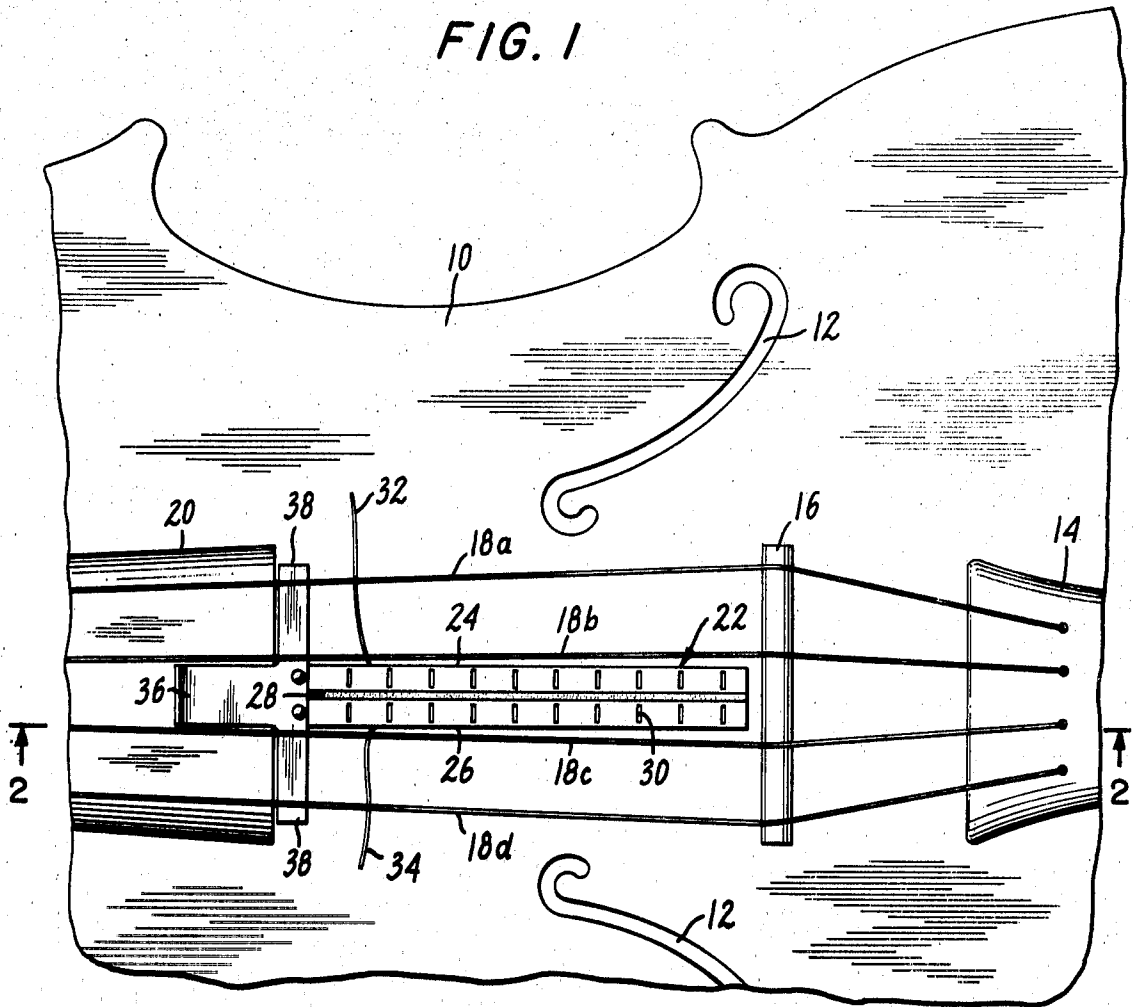
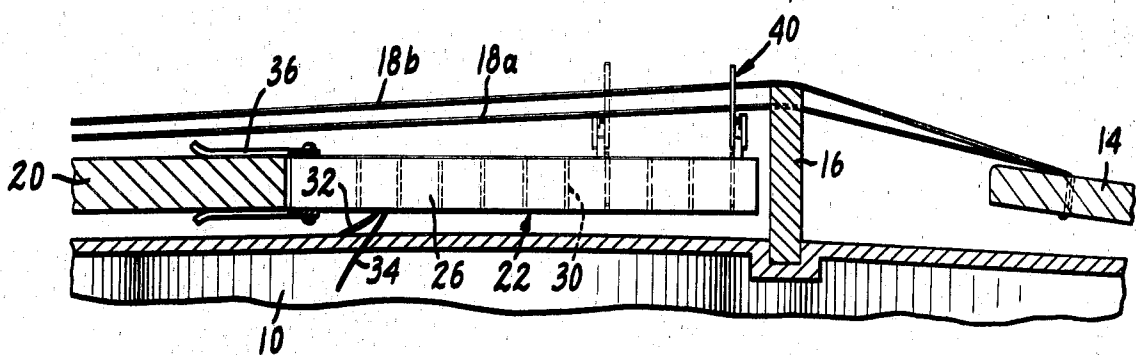


FIG. 2



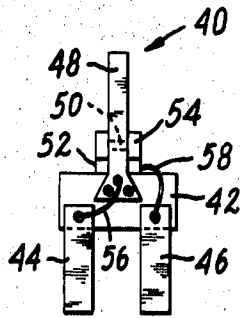


FIG. 3

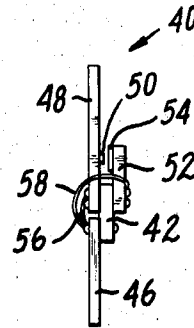


FIG. 4

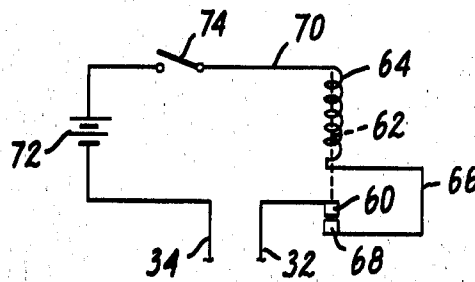


FIG. 5

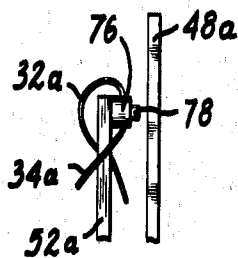


FIG. 6

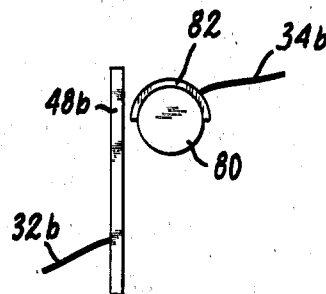


FIG. 7

METHOD AND APPARATUS FOR INSTRUCTION OF STRINGED INSTRUMENT BOW POSITIONING

FIELD OF THE INVENTION

This invention pertains to music education and more particularly to methods and apparatus for instructing students in the art of playing stringed instruments.

BACKGROUND OF THE INVENTION

In the playing of stringed instruments, where the bow is disposed transversely to the string axis, the point of contact along the string axis of the bow hair on a string defines a particular tone quality, also dependent upon the fingering of the string. Hereinafter, such arrangement of the bow in a position providing the described point contact of the bow hair on a string is referred to as bow position. One of the most challenging of the problems confronted by a student of the stringed instruments is the interrelationship of desired tonal reproduction with his bow position, both along and transverse to the string axis. In that playing within predetermined segments of the string axial expanse is also necessary to accomplished playing, above and beyond mere identification of rudimentary bow positions, the demands on a student, whether beginning or remedial, are extensive. While the student may readily place his bow in a given position, he characteristically fails to maintain such position during playing and, more importantly, characteristically fails to return to such position following a requisite excursion therefrom. By the term playing, I include private practice, concert, rehearsal or practice at a lesson.

Oral instructional efforts customarily undertaken to influence the student in properly positioning the bow during his playing of the instrument are less effective than is desired, and are effective to such extent only during practice at a lesson. Whereas deficiencies in tonal reproduction may indicate improper bow positioning to the skilled artist, such deficiencies do not so inform the beginning student and, accordingly, are not a source of corrective influence.

Violin instructional devices in the nature of harnesses effective to constrain a student to desired positions as shown, e.g., in U.S. Pat. Nos. 1,906,584 and No. 2,240,696, are not seen as providing any such corrective influence. These devices are effectively crutches providing unnatural assistance not likely to continue their limited effectiveness when dispensed with. Furthermore, during use thereof, these devices prevent experimentation by the student, thereby eliminating the possibility of error on his part. Evidently, these devices cannot assist the student in developing a sense of guidance independent of the devices. Bow position instructional devices generally of this type, shown in U.S. Pat. Nos. 1,694,786 and above-mentioned No. 2,240,696, are believed to be of such limited effectiveness.

SUMMARY OF THE INVENTION

I have observed that the attention of the stringed instrument student is diluted by the variables he is required to control to such an extent that the attention he in fact directs to any particular variable, e.g., bow positioning, is inadequate. He thus does not generate requisite self-corrective influence. Accordingly, I have

concluded that instructional method and apparatus likely to provide improved corrective influence must have the effect of focusing the attention of the student on distinct variables and develop in him an independent sense of guidance. Such method and apparatus are the primary objects of this invention.

A more particular object of the invention is to provide instruction relative to proper positioning of a stringed instrument bow, along and transverse to the instrument string axis, and dependent thereon, to provide instruction relative to proper bowing arm movement.

It is an additional object of this invention to provide instructional method and apparatus for use in private practice independently of an instructor.

A further object of the invention is to provide instructional apparatus which interferes minimally with the freedom of movement of the student.

In the attainment of the foregoing and other objects, the invention provides apparatus, including bow position-sensitive signal generating means secured to the instrument, effective on deviation from predetermined bow positioning to direct the student's attention to his manner of positioning the bow. In accordance with the method of the invention, such apparatus is provided and secured to the instrument.

The foregoing and other objects and features of the invention will be evident from the following detailed description thereof and from the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a violin partially equipped in accordance with the invention.

FIG. 2 is a side elevational view of the arrangement of FIG. 1 and including a bow position sensor in accordance with the invention.

FIG. 3 is a front elevational view of the bow position sensor of FIG. 2.

FIG. 4 is a side elevational view of the bow position sensor of FIG. 3.

FIG. 5 is a schematic diagram of a circuit suitable for use with bow position sensors of the invention.

FIGS. 6 and 7 illustrate further embodiments of apparatus for use in practicing the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 depict a violin of standard construction comprising a top 10 defining F-holes 12 and supporting tail piece 14 and bridge 16. Strings 18a-18d are stretched across finger-board 20 over the bridge and are secured to the tail piece. The finger-board is supported by the violin neck.

An accessory device provided by the invention for use in conjunction with the described violin includes an elongate base 22 comprised of opposed electrically conductive sections 24 and 26 which are separated physically and electrically by insulative section 28. Each of sections 24 and 26 define receptacles 30 which are spaced along the violin string axis. Insulated conductors 32 and 34 are connected respectively to sections 24 and 26 and extend therefrom to a housing for the circuit elements discussed below in connection with FIG. 5.

Base 22 is secured to clip 36, which may be comprised of opposed arcuate elements of resilient spring

material (FIG. 2) for removable attachment of the base to fingersboard 20. Flanges 38 of the clip prevent tilting of base 22 relative to the string axis where the clip opposed arcuate elements do not exert sufficient pressure on the finger-board to prevent such tilting.

Referring to FIG. 2, bow position sensor 40 is supported in receptacles of base 22. Sensor 40 is depicted in FIGS. 3 and 4 and will therein be seen to comprise a support member 42 supporting a pair of seating lugs 44 and 46, an actuator 48 bearing contact member 50 and a leg 52 bearing contact member 54. Lugs 44 and 46 are spaced so as to be jointly insertable in base 22, particularly in a pair of receptacles 30 disposed opposite one another respectively in base sections 24 and 26. The various elements supported by member 42 may be riveted thereto and are preferably comprised of conductive material such that contact member 50 of actuator 48 may be electrically connected to lug 44 by conductor 56 and contact member 54 of leg 52 may be electrically connected to lug 46 by conductor 58. By friction fit thereof in receptacles 30, lugs 44 and 46 are electrically connected respectively to conductors 32 and 34 by base sections 24 and 26.

The sensor is configured such that actuator 48 extends upwardly of strings 18 in which position it may be engaged by the bow. The actuator is comprised of a flexible, resilient material, e.g., spring steel, and flexes freely upon such engagement by the bow. By this provision, physical sensation as between the actuator and the bow is minimized and the student's attention is focused by the indication provided by apparatus discussed below. Suitable protective means may be incorporated if desired to guard against damage to the sensor from forces which may be inadvertently directed onto actuator 48 transversely of the string axis.

The electrical circuit elements of FIG. 5 may be contained in a housing supported by the violin or on the body of the student. In the latter instance, conductors 32 and 34, which are insulated, are of sufficient length to permit free movement by the student.

Referring to FIG. 5, conductor 32 is connected to a contact member 60 resiliently supported in such housing and connected to the armature 62 of electromagnetic coil 64. One terminal of the coil is connected by line 66 to a second contact member 68 fixedly supported in such housing in position engaging contact member 60 when coil 64 is unenergized. The remaining terminal of coil 64 is connected by line 70 to one terminal of a battery 72 and the remaining battery terminal is connected to conductor 34. The circuit of FIG. 5 will be recognized as a conventional buzzer type annunciator. In operation thereof, conductors 32 and 34 are connected to one another whenever the bow engages actuator 48 and thereby causes engagement of contact members 50 and 54 of sensor 40. On this event, coil 64 is energized by battery 72 and thereupon displaces armature 62 such that contact member 60 is removed from contact member 68 with consequent deenergization of the coil. As the contact members are thereupon re-engaged, the coil is re-energized. This activity is cyclic throughout periods of electrical continuity between conductors 32 and 34 and gives rise to desirable sustained audible output. Where desired, a switch 74 may be introduced in the circuit of FIG. 5 so as to provide for the disabling of the buzzer at the op-

tion of the student or teacher. The housing may incorporate an actuator for such switch 74 conveniently disposed exteriorly of the housing. By this arrangement, the accessory apparatus may be readily silenced during desired periods.

In the instance described, i.e., wherein a single sensor 40 is positioned in base 22, the student is instructed in positioning the bow in positions thereof leftwardly (in FIG. 2) of bridge 16. The invention is preferably practiced by employing a pair of sensors 40, the second of which is indicated in phantom outline in FIG. 2. By this arrangement, the student is instructed in positioning his bow in the position or range of positions intermediate the two sensors. Where the sensors are closely spaced, the student is instructed, not only as respects the bow position thereby defined, but also in maintaining his bow substantially perpendicular to the string axis, since non-transverse bow positioning can itself cause engagement of the bow and one of actuators 48 with resulting indication of error. To this latter purpose, i.e., transverse bow positioning instruction, the invention contemplates the use of two bases 22, one base intermediate strings 18a and 18b and the other base intermediate strings 18c and 18d, with a pair of opposed sensors 40 supported by each of the bases. The bases may also be disposed respectively outside strings 18a and 18d.

In FIG. 6, an alternate form of sensor 40 is shown wherein actuator 48a does not bear a contact member as in the case of actuator 48 and wherein leg 52a supports a switch 76 operated by push-button 78 on engagement of the bow and actuator 48a. Conductors 32a and 34a are connected in place of conductors 32 and 34 for connecting the FIG. 6 sensor to the circuit of FIG. 5. Evidently, actuator 48a need not be conductive and, as in the case of FIG. 7 below, base 22 need only physically support the sensor in this instance and does not provide electrical connection as above discussed.

In FIG. 7, a further embodiment of sensor 40 is shown wherein member 48b is conductive and is connected to conductor 32b. Leg 52 is not employed. Rather, the bow stick 80 carries a conductive sheath 82 adapted to engage member 48b on improper bow positioning. Conductor 34b is connected to sheath 82 and conductors 32b and 34b are employed in place of conductors 32 and 34 in interconnecting the FIG. 7 sensor with the circuit of FIG. 5.

The methods of the invention, whereby the attention priorities of the student are conformed to the interests of the teacher, involve the steps of providing the accessory apparatus and equipping the instrument therewith. Preferably, the method is practiced by providing the apparatus, determining a desired position or range of positions of the bow and equipping the instrument with the accessory apparatus in such manner as to insure that an indication is provided to the student on each occurrence of his positioning of the bow outside such position or range.

In the use of the apparatus and method of the invention, it has been observed that the average student is instructed as respects his positioning of the bow in desired position or ranges of positions in relatively short order and thereafter plays without energizing the accessory apparatus, despite that the same is active and prepared to provide indications of deviation from

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proper positioning. It has been observed further that on the removal of the accessory apparatus after limited use thereof, the student exhibits a mature habit of consistently returning at will, in bow positioning, to positions and ranges which he has come to recognize through the method and apparatus of the invention, evidence of his development of an independent sense of guidance.

While the apparatus and method of the invention have been described by way of a particularly preferred embodiment thereof, numerous changes in the described apparatus will be readily evident to those skilled in the art. Thus, the bow position sensor may readily employ proximity switches or the like. The housing containing the FIG. 5 circuit elements may be secured to the instrument ribs, to the scroll, etc., in fixed manner. Furthermore, the electromechanical buzzer described above may be substituted for by a host of indicators, e.g., piezoelectric annunciators, etc. The embodiment particularly disclosed is thus intended in a descriptive and not in a limiting sense. The true spirit and scope of the invention is defined in the following claims.

What is claimed is:

1. In combination, support means securable to a stringed instrument playable with a bow, sensor means supported by said support means in juxtaposition with an extent of the string axis of said instrument and operative, while permitting bow positioning in said string axis extent and therebeyond to sense predetermined positioning of said bow along said string axis extent and indicator means operatively responsive to said sensor means to provide an indication on the positioning of said bow in said predetermined position.

2. The invention claimed in claim 1 wherein said instrument includes a finger-board, said support means being securable to said finger-board.

3. The invention claimed in claim 1 further including an elongate base disposed along said string axis, said base supporting said sensor means in sensing position relative to said predetermined position.

4. The invention claimed in claim 3 wherein said sen-

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sor means comprises a switch member operated upon said positioning of said bow in said predetermined position, said indicator means being operatively responsive to said switch member.

5. The invention claimed in claim 1 wherein said indicator means comprises an electromechanical buzzer.

6. A method for teaching a student to maintain the bow of a stringed instrument in a preselected position range during the playing of the instrument including the step of equipping the instrument with apparatus both permitting bow positioning beyond said preselected position range and providing an indication to the student upon each occurrence of his positioning of the bow in a position having a predetermined relation to said preselected position range.

7. The method claimed in claim 6 wherein said apparatus provides an audible indication on each said occurrence.

8. A method for teaching a student to maintain the bow of a stringed instrument in preselected positions along the string axis of said instrument during the playing thereof including the steps of:

- a. determining a range of said preselected positions for the student;
- b. providing a voltage source, indicator means and sensor means connected to said source and said indicator means for sensing said bow positioning having predetermined relation to said preselected positioning range and thereupon connecting said indicator means to said voltage source; and
- c. securing at least said sensor means to said instrument.

9. In combination, support means securable to a stringed instrument playable with a bow, sensor means including an electrical switch supported by said support means in predetermined position along the string axis of said instrument, said switch being operated upon the positioning of said bow in said predetermined position, and indicator means operatively responsive to said switch and energized on each such operation of said switch.

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