Dec. 13, 1966 R. THIBODEAUX 3,290,981

MUSICAL INSTRUMENT

Filed July 1, 1964 2 Sheets-Sheet 1

FIG. 1

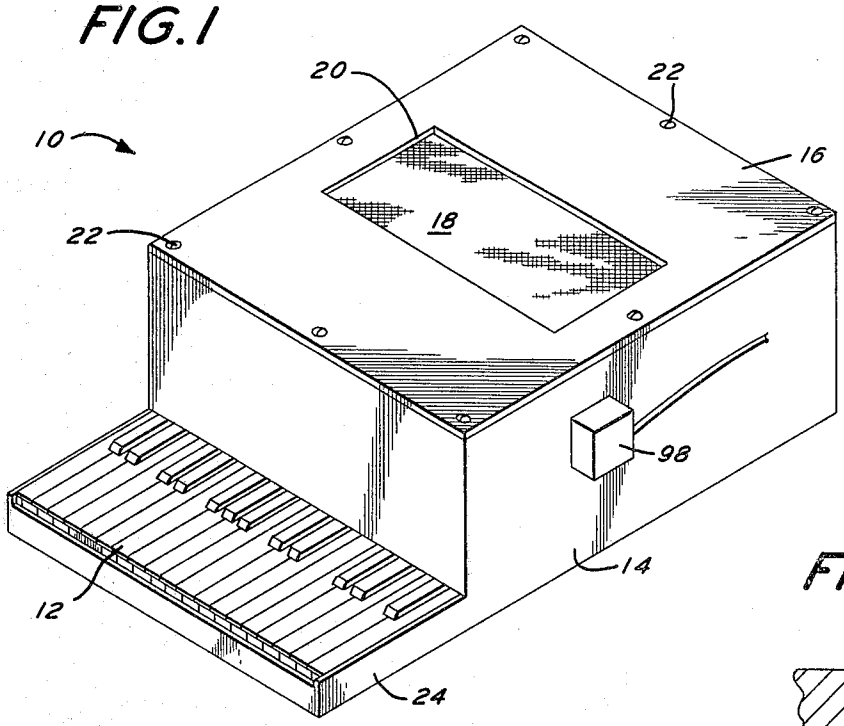


FIG. 4

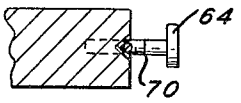
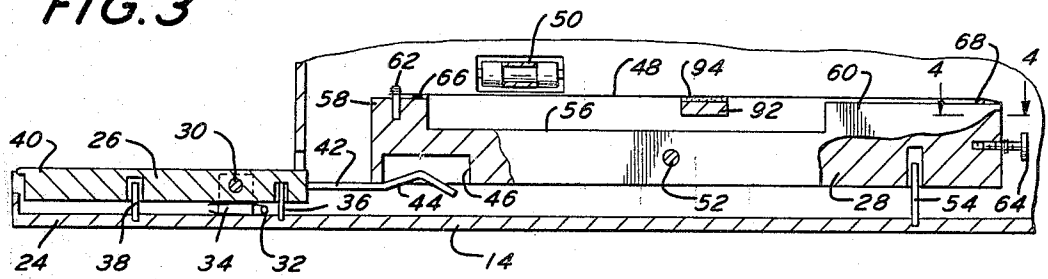


FIG. 3



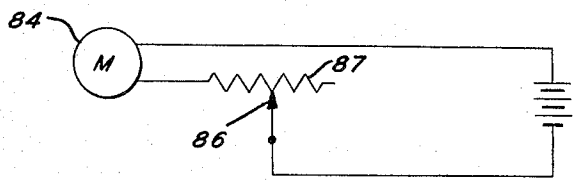


FIG. 5

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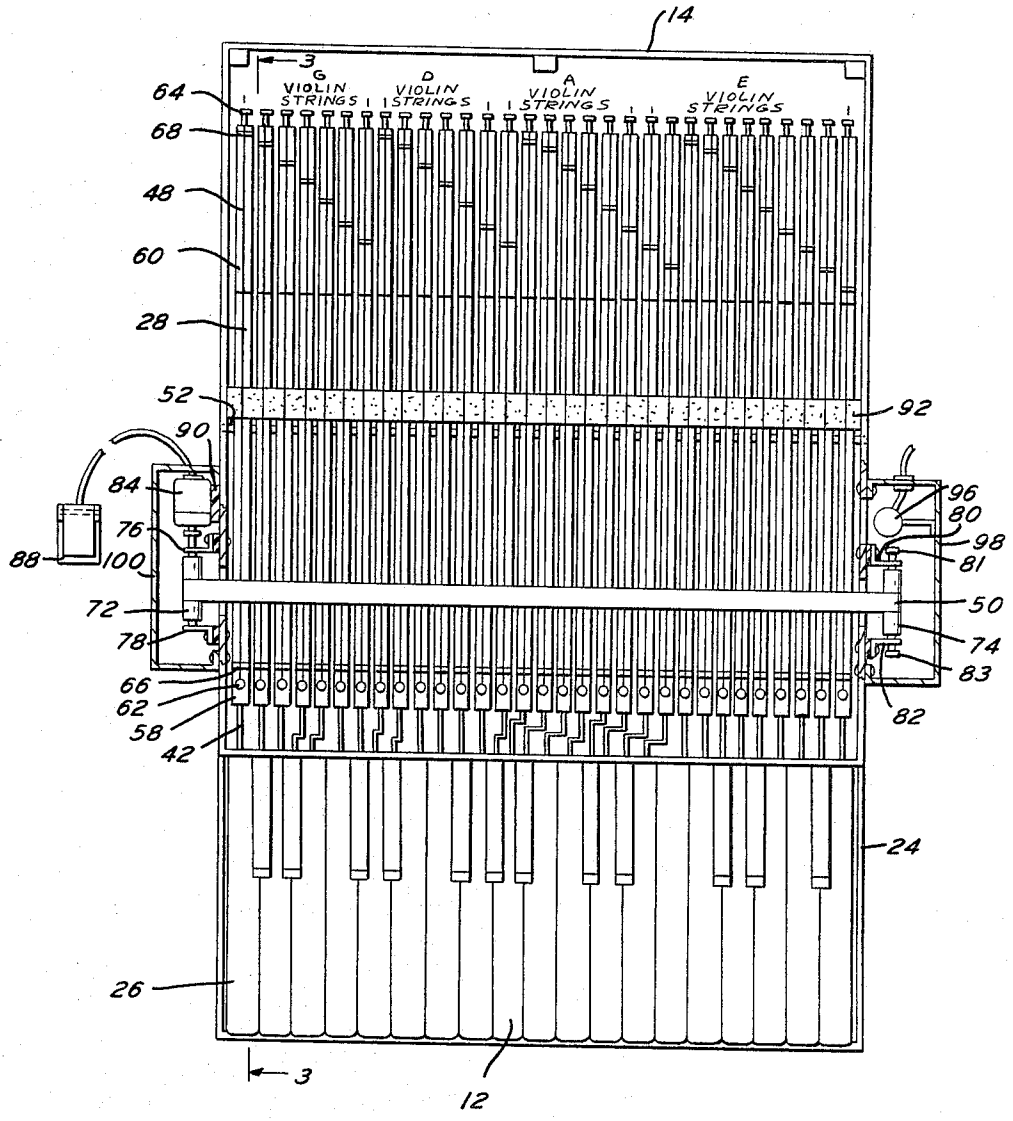
ATTORNEYS.

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MUSICAL INSTRUMENT

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FIG. 2



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United States Patent Office 3,290,981 Patented Dec. 13, 1966

3,290,981

MUSICAL INSTRUMENT

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Filed July 1, 1964, Ser. No. 379,620
12 Claims. (Cl. 84—326)

This invention relates to a musical instrument. More particularly, it relates to a keyboard instrument for producing the musical tones of a viol type instrument.

Heretofore, viol string instruments, adapted to be played with the use of a keyboard, have been constructed using complicated pneumatic systems and controls. Such prior instruments are bulky, difficult to maintain, and expensive. The musical instrument in accordance with the present invention, described herein, overcomes the disadvantages of the prior keyboard instruments.

Thus, in accordance with the present invention, a bow string instrument of the viol family, played by depressing the keys on a keyboard, is provided.

It therefore is a general object of the present invention to provide a novel musical instrument.

It is another object of the present invention to provide a novel string instrument for producing tones normally associated with the viol family of instruments.

It is still another object of the present invention to provide a novel bowed string instrument that is played by depressing the keys on a keyboard.

It is yet another object of the present invention to provide a musical keyboard instrument with a novel action means.

It is a further object of the present invention to provide a novel musical keyboard instrument which is compact, relatively easy to maintain and relatively low in cost.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a perspective view of the keyboard musical instrument in accordance with the present invention.

FIGURE 2 is a top sectional view of the musical instrument.

FIGURE 3 is a partial sectional view of the musical instrument shown in FIGURE 2, taken along the line 3—3.

FIGURE 4 is a partial sectional view of the musical instrument shown in FIGURE 3, taken along the line 4—4.

FIGURE 5 is a schematic diagram of the bowing control mechanism.

Referring now to the drawings, wherein like numerals indicate like elements, there is shown in FIGURE 1 a musical instrument for producing the tones of a bowed string instrument designated generally as **10**.

As shown, the instrument comprises a keyboard **12** disposed adjacent the front of a housing **14**. The housing **14** is a box-like structure, which may be made of wood or plastic. The top **16** of the housing **14** is provided with a sound opening **18** across which an acoustical cloth **20** may be provided. The top **16** may be adapted to be removably attached to the housing **14** by such means as screws **22** or other forms of fasteners. A shelf **24** extends from the forward face of the housing **14** to provide a supporting structure for the keyboard **12**. As shown, the shelf **24** is an integral part of the bottom wall of housing **14**.

Referring now to FIGURE 2, the keyboard **12** comprises an assemblage of individual black and white keys

arranged in the same physical positions as in a typical piano. Further, the keys are pitched in the same manner as piano keys. That is, progressing from the key furthest to the left, the keys represent the notes G, G♯—A♭, A, A♯—B♭, B, C, etc. However, the strings which the keys actuate are viol strings. The violin has been chosen as the instrument by which the present invention is to be illustrated. Therefore, in all, there are 32 strings, representing seven G violin strings, seven B violin strings, seven A violin strings and eleven E violin strings.

Each key is connected to an individual string by a mechanism to be described. When a key is depressed it causes the string to move into contact with a continuously moving bow thus producing the clear open tones of a violin or viol instrument. In accordance with the present invention notes can be played one at a time or, if desired, several notes can be played at the same time. It is to be understood that although the present invention is described with regard to producing the tone of a violin, other bowed string instruments are possible.

In order to simplify the description of the invention and because the construction of each string and key is similar, only the lefthand key and string will be described in detail. It is to be understood that unless otherwise described, each key is constructed in the same manner.

Referring now to FIGURE 3, there is shown a sectional view of a key **26** and a string mounting mechanism or action bar **28**. The key **26** is pivotally mounted on a rod or pivot pin **30**. The pivot pin **30** is mounted in the sides of shelf **24** and extends transversely through all of the keys on keyboard **12**.

A spring **32** is mounted beneath key **26** and held in place by a pair of plates, on either side of each key. Only plate **34** is shown. The spring action of spring **32** biases key **26** so that the end beneath housing **14** normally moves downwardly until it is stopped by stop pin **36**. Stop pin **36** is mounted in shelf **24** and extends into an enlarged hole in key **26**. The interior of hole **26** may be lined with felt to reduce keying noise.

A front rail pin **38** is mounted in shelf **24** and extends into a felt lined hole in key **26**. The front rail pin **38** serves as a limit-stop to arrest the motion of key **26** when it is struck or depressed. When key **26** is released, the biasing action of spring **32** returns the key to a position resting against stop pin **32**. Key **26** may be made of wood, plastic, or metal. If wood or metal is used the exposed top portion of key **26** may be provided with an ivory or plastic cover. Such cover resists wear, particularly in the area of finger plate **40**.

A connecting rod **42** extends from the end of key **26** and moves up and down therewith. As shown, the bent portion **44** of rod **42** extends beneath action bar **28**. The bent portion is received in a slot **46** provided in action bar **28** to thereby assure that there is no lateral movement between the rod **42** and bar **28**.

The action bar **28** serves to mount the violin string **48** and, when actuated, moves it into contact with the bow **50**. Action bar **28** is pivotally mounted on a rod or pivot pin **52**. The pivot pin **52** is attached to housing **14** and extends transversely through all of the action bars. A slide pin **54** is mounted on the bottom of housing **14** and extends into a felt lined hole in action bar **28**. Slide pin **54** limits the pivotal movement of action bar **28** and holds it in position on pin **52**.

The action bar **28** comprises a main body portion **56** and integral upwardly extending end portions **58** and **60**. The action bar **28** may be made of laminated wood or metal. However, laminated wood is preferred because it combines the best qualities of strength and quietness.

String **48** is mounted on action bar **28** by means of peg **62** and tuning peg **64**. Tuning peg **64** is rotatably mounted on the end of action bar **28**. The string **48** is at-

tached to said peg 62 and tuning peg 64 in the well known manners for attaching violin strings. By rotating tuning peg 64 the tension on string 48 is increased or decreased and therefore the frequency of vibration of said string can be adjusted. In this manner, string 48 may be tuned to produce the correct note.

As shown in FIGURES 3 and 4, the string 48 does not make direct contact with the top of upright portions 58 and 60. Rather, string 48 extends from peg 62 over an upwardly jutting strip of material 66 on upright portion 58 and over another upwardly jutting strip 68 on upright portion 60. Further, a V-groove 70 has been cut in the end of upright portion 60 to receive a string 48. The strips 66 and 68 may be made of a hard substance such as plastic which is glued or otherwise attached to the top of upright portions 58 and 60. Similarly the V-groove 70 may be lined with a hard plastic substance.

Strips 66 and 68 provide fixed ends for vibrating string 48 by biasing it upwardly. According to well known laws of physics, the distance between the strips will in part determine the frequency at which the string 48 vibrates. Therefore, since a musical instrument is a function of the frequency at which its tone generator vibrates, a note or tone produced by strip 48 can be varied by changing the position of strip 68 on upright portion 60.

Thus, as shown in FIGURE 2, each key on the keyboard 12 is associated with a particular action bar upon which is mounted either a G, D, A or E violin string. The note produced by each string, if it is other than an open G, D, A or E, is determined by the position of a plastic strip similar to strip 68 on action bar 28. These strips are in effect the same as the finger positions of a player playing a conventional violin. In FIGURE 2 the strips are shown as a staggered series for each of the four types of violin strings, progressing toward the keyboard 12.

The bow 50 extends transversely across the strings. It is made of hair, just as the typical violin bow is made. However, bow 50 is formed as a continuous belt of hair extending through the sides of housing 14 and over pulley 72 and pulley 74. Pulleys 72 and 74 are journaled in supporting brackets 76, 78, 80 and 82. Brackets 76–82 mount the pulleys at a slight angle so that bow 50 is at a slight angle with respect to string 48.

Pulleys 72 and 74 may be provided with a slight V-shape so as to maintain the bow 50 centered thereon. Further, pulleys 72 and 74 may be provided with a roughened or textured surface so as to insure good frictional contact between them and bow 50. Brackets 80 and 82 are provided with slots (not shown). The journal bearings for pulley 74 are held in place in the slots by thumb screws 81 and 83. In this manner, the tension on bow 50 can be adjusted.

Pulley 72 is mechanically coupled to electric motor 84 which rotates it. Rotating pulley 72 drives bow 50 continuously over the strings and over pulley 74. The speed of which motor 84 rotates and hence, at which bow 50 moves, is controlled by a potentiometer 86 in the form of a foot treadle 88. A player controls the position of potentiometer 86 on resistor 87 by depressing foot treadle 88. In this manner, a player can control the rate at which the musical instrument is bowed.

Brackets 76–82 and motor 84 are mounted on the side of housing 12. Rubber pads 90 are inserted between the housing 12 and brackets 76–82 and motor 84 to prevent any vibration from being transmitted to housing 12.

The operation of the musical instrument 10 is as follows:

When a note is to be played, one of the keys, such as key 26, is depressed. This causes rod 42 to move upwardly thereby pivoting action bar 28 about pivot pin 52. String 48 moves upwardly and makes contact with bow 50. When this happens, the bow 50 causes the string 48 to vibrate and a musical tone is generated. As indicated above, bow 50 is mounted at a slight angle to string 48 so that only a portion of it makes contact therewith.

When key 26 is released, the string 48 moves out of contact with bow 50. In order to damp out the vibration of string 48 and to prevent sympathetic vibrations of other strings not being played, a damper 92 is provided. Damper 92 is mounted at its ends to the sides of housing 12, and it extends transversely across said housing between the string and action bar of each note. A felt covering 94 is provided on damper 92. The height of damper 92 is adjusted so that when a string is in its inoperative position it rests thereon. Thus, when string 48 drops down from making contact with bow 50 it will rest against the felt cover 94 on damper 92 and therefore cease to vibrate.

In operation a long sustained note can be produced by simply holding a key down. Short or staccato notes can be played by merely striking and releasing the key. If desired more than one note can be played at a time.

A microphone 96 is mounted in housing 98. Housing 98, together with housing 100, encloses the pulley and motor mechanisms. Microphone 96 may be connected to a reverberation unit and amplifier (not shown) to produce a concert hall effect of one or many violins. The amplifier and reverberation unit are well known and need not be described in detail.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A musical instrument comprising a keyboard having a plurality of keys thereon, first pivot means for pivotally mounting said keys, a string mounting means associated with each key, second pivot means for pivotally mounting said string mounting means, connecting means for connecting each key with each string mounting means so that pivotal movement of each key causes a corresponding pivotal movement of the associated string mounting means, a musical string mounted on each said string mounting means, each string being tuned to vibrate at a different musical frequency, a damper extending transversely of said strings, said damper being mounted so that said strings rest against it in their inoperative position, a continuous bow extending transversely of said strings, motor means for causing said bow to move continuously past said string, whereby pivotal actuation of said key causes said strings to move out of contact with said damper and into contact with said bow.

2. A musical instrument for producing string viol tones comprising a keyboard having a plurality of keys thereon, first pivot means for pivotally mounted said keys, a string mounting means associated with each key, second pivot means for pivotally mounting each of said string mounting means, connecting means for connecting each key with its associated string mounting means so that pivotal movement of each key causes a corresponding pivotal movement of said string mounting means, a musical string mounted on each said string mounting means, each string being adapted to vibrate at a different musical frequency representing the notes of a viol instrument, a damper extending below and transversely of said strings, said damper being mounted so that said strings rest against it in their inoperative position, a continuous belt-bow extending above and transversely of said strings, pulley means mounting said bow, and a motor for driving said pulleys to cause said belt-bow to move continuously over said strings, whereby pivotal actuation of said keys causes said associated strings to move upwardly out of contact with said damper and into contact with said belt-bow.

3. A musical instrument comprising a keyboard having a plurality of keys thereon, first pivot pin means extending transversely through said keys, spring means associated with each key for upwardly biasing the finger plate end of said key, a string mounting means associated with each key, a second pivot pin extending transversely

through each of said string mounting means, a connecting rod attached to each key, each said connecting rod extending below and in sliding contact with each string mounting means, each of said string mounting means comprising an elongated body portion through which said second pivot pin extends, a first upright portion adjacent one end of said elongated body, a second upright portion adjacent the other end of said body, a peg mounted on said first upright portion, a tuning peg mounted on the other end of said body, string bias means attached to said second upright portion, a musical string attached at its ends to said peg and tuning peg respectively, said string extending between said first and second upright portions, said string being mounted in overlying contacting relation with said string bias means, each of said string bias means being spaced from said other end of said elongated body by a distance sufficient to fix the frequency at which said string is to vibrate, a damper extending below and transversely of said strings, said damper being positioned so that said strings rest thereon when in their inoperative position, a continuous belt-bow extending above and transversely of said strings, drive means for causing said belt-bow to move continuously above said strings, whereby pivotal actuation of the finger plate end of a key causes an associated string mounting means and string to move upwardly out of contact with said damper and into contact with said belt-bow.

4. A musical instrument comprising a keyboard having plurality of keys thereon, said keys being pivotally mounted to pivot about a transverse horizontal axis, string mounting means associated with each key, each of said string mounting means being pivotally mounted to pivot about a transverse horizontal axis, connecting means for connecting each key with each string mounting means so that pivotal movement of each key causes pivotal movement of the associated string mounting means, each of said string mounting means comprising a body portion and a pair of upright portions adjacent the ends thereof, a musical string mounted to and extending between said upright portions, bias means on one of said upright portions for determining the effective length of each string and causing each string to vibrate at a different frequency, a damper, said damper being mounted so that said strings rest against it in their inoperative position, a continuous bow mounted transversely of said strings, drive means for causing said bow to move continuously past said strings, said bow being spaced from each of said strings so that pivotal actuation of a key and an associated string mounting means causes said string mounted thereon to move out of contact with said damper and into contact with said bow.

5. A musical instrument in accordance with claim 4 wherein said bias means comprises an upwardly projecting strip of material mounted transversely of said string.

6. A musical instrument in accordance with claim 4 wherein said connecting means comprises a rod attached

to each key at one end thereof, the other end of said rod extending below and in sliding contact with each string mounting means, an upwardly bent portion adjacent said other end of said rod, a slot in said string mounting means, said upwardly bent portion being received in said slot.

7. Apparatus in accordance with claim 4 wherein a peg is provided on one of said upright end portions and a rotatable tuning peg is provided adjacent the other one of said upright portions, and said musical string is mounted to said peg and tuning peg.

8. Apparatus in accordance with claim 4 wherein said drive means includes an electric motor coupled to one of a pair of pulleys mounting said belt-bow.

9. Apparatus in accordance with claim 4 wherein said electric motor is provided with a foot controlled potentiometer means for controlling its speed.

10. A musical instrument comprising a keyborad having a plurality of keys thereon, said keys being pivotally mounted to pivot about a transverse horizontal axis, string mounting means associated with each key, each of said string mounting means being pivotally mounted to pivot about a transverse horizontal axis, connecting means for connecting each key with each string mounting means so that pivotal movement of each key causes pivotal movement of the associated string mounting means, each of said string mounting means comprising a body portion and a pair of upright portions adjacent the end thereof, a musical string mounted to and extending between said upright portions, a damper, said damper being mounted so that said strings against it in their inoperative position, a continuous bow mounted transversely of said strings, drive means for causing said bow to move continuously past said strings, said bow being spaced from each of said strings so that pivotal actuation of a key and an associated string mounting means causes said string mounted thereon to move out of contact with said damper and into contact with said bow.

11. A musical instrument in accordance with claim 10 wherein bias means are mounted on one of said upright portions for determining the effective length of each string and causing each string to vibrate at a different frequency.

12. Apparatus in accordance with claim 10 wherein a microphone connected to a reverberation unit and amplifier is acoustically associated with said musical instrument.

References Cited by the Examiner

UNITED STATES PATENTS

210,028	11/1878	Harris	84—326
1,397,479	11/1921	Adamson	84—326
1,577,501	3/1926	Strawn	84—326
2,197,773	4/1940	Rosenfield	84—330
2,917,963	12/1959	Lucchesi	84—282

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