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VIOLIN PLAYING ATTACHMENT FOR PIANOS, PIPE ORGANS, OR SIMILAR INSTRUMENTS.

APPLICATION FILED MAR. 11, 1916. RENEWED APR. 18, 1921.

1,397,479. **Patented Nov. 15, 1921.**

Fig. 1

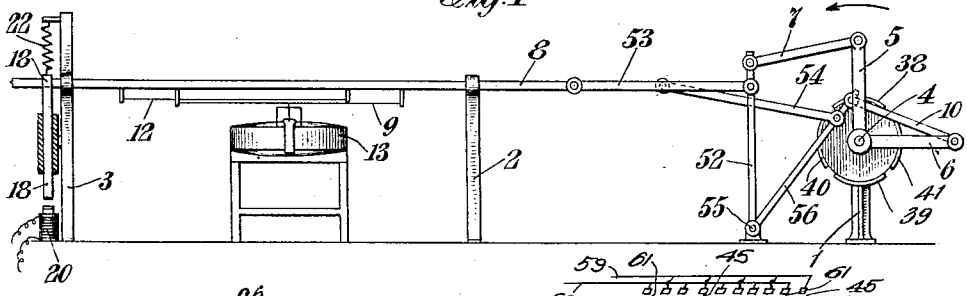


Fig. 7.

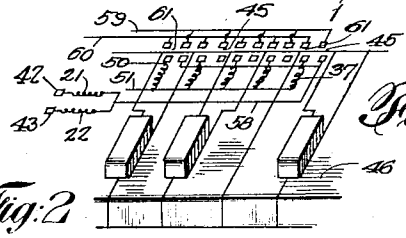


Fig. 2

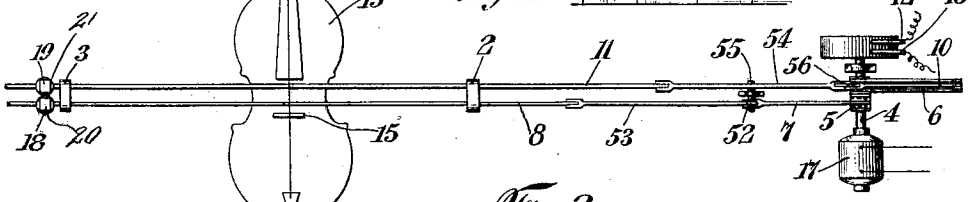


Fig. 3

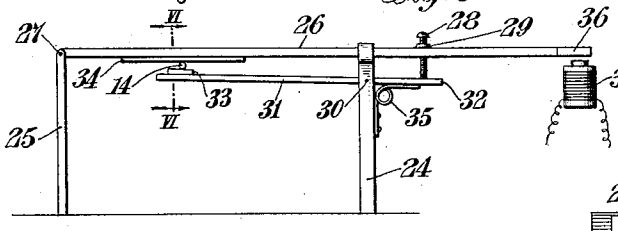


Fig. 6



Fig. 4

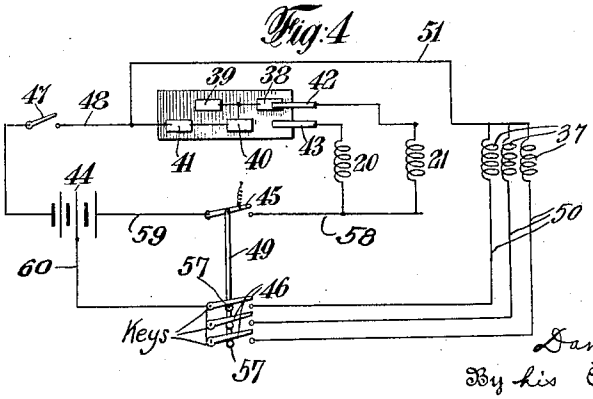
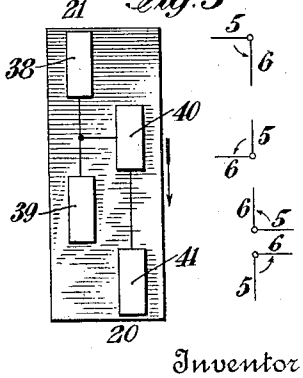


Fig. 5



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VIOLIN-PLAYING ATTACHMENT FOR PIANOS, PIPE-ORGANS, OR SIMILAR INSTRUMENTS.

1,397,479. Specification of Letters Patent. Patented Nov. 15, 1921.

Application filed March 11, 1916, Serial No. 83,561. Renewed April 18, 1921. Serial No. 462,343.

To all whom it may concern:

Be it known that I, DAVID R. ADAMSON, a subject of the King of Great Britain, and a resident of the borough of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Violin-Playing Attachments for Pianos, Pipe-Organs, or Similar Instruments, of which the following is a specification.

My invention relates to a violin playing attachment for pianos, pipe-organs or other similar instruments, whereby a stringed instrument may be played from the keyboard of the piano or organ or such instrument.

Particularly my invention is directed to the playing of a stringed instrument by the use of a reciprocating bow and performing this function automatically from the piano or organ keyboard.

Devices for playing stringed instruments from the keyboard of a piano or organ have been devised heretofore, but have been complicated and impractical of commercial operation for various reasons.

I have applied my invention by making use of two separate bows so arranged as to move in opposite directions to each other, and have provided means whereby only one of the bows would be in contact with a string at a time, the bow which is in contact with a string at any given time being the bow which is then moving in the region of its maximum speed.

I have illustrated one embodiment of my invention in the accompanying drawing forming part of this specification, and reference is had thereto, in which—

Figure 1 shows an elevation of the mechanical features of the invention;

Fig. 2 shows a plan view of Fig. 1;

Fig. 3 shows a detail on a large scale of the fretting or stopping device;

Fig. 4 shows a diagram of the electrical circuits involved;

Fig. 5 shows a chart giving the proper relation between the driving means and the commutator for operating the electrical circuits; and

Fig. 6 is an enlarged detail section on the line 6—6, Fig. 3, looking in the direction of the arrow.

Fig. 7 shows a piano keyboard embodying certain features of my invention.

In Fig. 1 are shown standards 1, 2 and 3. Mounted in the standard 1 is a shaft 4 having cranks 5 and 6, mounted thereon at 90° from each other. Attached to the crank 5 is a rod 7 which is pivotally attached to a member 52 which is pivoted at 55, and to this member 55 is pivotally secured a connecting rod 53, and to the connecting rod 53 is pivotally attached a reciprocating member 8 which acts as the supporting member for the bow 9. Similarly connected to the crank 6 is a rod 10 pivotally connected with the member 56, which is also pivoted at 55, and to the member 56 is pivotally attached the connecting rod 54 which in turn is pivotally attached to the reciprocating member 11, as best shown in Fig. 2. The member 11 acts as a support for the bow 12 in the same manner that the member 8 acts for the bow 9. The members 8 and 11 are suitably mounted in the guides 2 and 3 so that they will easily reciprocate therein.

Suitably mounted and supported beneath the bows 9 and 12 is a stringed instrument 13 having a string 14 thereon. The particular construction of the stringed instrument forms no part of my invention and it is shown merely in outline. This instrument has the usual tail-piece 14ª, bridge 15 and key 16 for tuning it. If an instrument having a single string is used, I prefer to make the neck longer than the usual violin so as to increase the range of pitch.

A suitable motor device is shown at 17 for driving the shaft 4. This motor device may be an electric motor, or any other suitable device, or the shaft 4 may be hand-operated if so desired.

On the side of the standard 3 away from the shaft 4 are guides 18 and 19 through which the members 8 and 10, respectively, are freely movable. These guides are adapted to be drawn down by the electro-magnets 20 and 21, respectively. When the guide 18 is drawn down against the action of the spring 22, the member 8 is drawn down so as to bring the bow 9 in contact with a string. Likewise, when the guide 19 is drawn down in opposition to a corresponding spring (not shown), the member 11 is drawn down to bring the bow 12 into contact with a string. As hereinafter explained, these guides 18 and 19 are never drawn down simultaneously.

In Fig. 3 is shown an enlarged view of the apparatus for stopping or fretting the

string. This has standards 24 and 25. To the upper end of the standard 25 is pivoted a member 26 at the point 27. Through the member 26 is fastened an adjustable screw 28 having a lock-nut 29 thereon. Attached to the standard 24 at the point 30 is a member 31 having a projection 32 on one side of the point 30 adapted to contact with the end of the screw 28. The other end of the member 31 has provided thereon a suitable projection 33 of the shape shown in the detail view in Fig. 6. On the member 26 is a corresponding projection 34. These projections are for the purpose of getting a point contact or grip on the string 14 so that the same may be fretted truly and accurately.

Provided on the standard 24 is a coil-spring 35 having one end rigidly fastened to the standard 24 and the other bearing against the end 32 of the member 31. This spring normally keeps the projections 33 and 34 out of contact with the string.

Arranged on the end of the member 26 is an armature 36 arranged to be attracted by the electro-magnet 37 at a suitable time, as will be hereinafter explained. When the magnet 37 is energized the armature 36 will be drawn down, which, in turn, will move the member 26 around the pivotal point 27 and at the same time, the screw 28 will strike the end 32 of the member 31 and move it around its pivotal point 30, thereby raising the end having the projection 33 thereon and causing the projections 33 and 34 to rigidly clamp or fret the string 14 without moving the string away from the bow or varying the tension on the string.

Arranged on the shaft 4 is a commutator shown diagrammatically in Figs. 4 and 5. This commutator consists of a piece of insulation having mounted thereon four metallic members or segments 38, 39, 40 and 41. These metallic members are arranged to cover each approximately a quarter of the circumference of the commutator and are of equal length and equally separated, as shown in Figs. 1, 4 and 5. These segments are arranged so that they can be adjusted longitudinally so as to vary the distance between their ends. They are all electrically connected together as illustrated in Figs. 4 and 5. Brushes 42 and 43 are arranged to cooperate with the commutator and the brush 42 is adapted to engage the contacts 38 and 39 and the brush 43 to engage the contacts 40 and 41, as shown in Fig. 4. These brushes come in contact with the segments alternately and at a predetermined time depending upon the relation between the position of the respective contacts and the crank arms 5 and 6 mounted on the shaft 4. The arrangement is such, as is shown in Fig. 5, that only one of the brushes is in engagement with one of the segments 38, 39, 40 or 41 of the commutator at a time so that the bow which is controlled by that segment is at that time moving in the region of its maximum speed. The relation of these members will be best understood by referring to Figs. 4 and 5 in reading the operation of the device which is as follows:

The motor 17 is started rotating at the proper speed and thus rotates the shaft 4, the commutator and the crank arms 5 and 6, thereby reciprocating the bows 9 and 12. The circuit of the battery 44, including the magnets 20, 21, is open at the switch 45 and the circuit of magnet 37 at the contacts on keys 46. The switch 45 is controlled from the piano or organ keyboard, each key 46 being adapted to control the closure of the switch 45 and arranged to close the contacts on the keys 46, making a circuit through the magnet 37, which controls the fretting of the string 14. Placed upon the element 49 and underneath each of the keys 46 is a projection 57, so that when a key 46 is pressed downwardly, as shown in Fig. 4, the switch 45 will be closed, as will readily be understood from the drawing. It is understood that there is a separate magnet 37 for each key on the keyboard and that each one of the magnets controls a separate device, as shown in Fig. 3, for fretting the string to give different tones depending upon the key of the keyboard which is operated at that time. There may, or may not, be a plurality of switches 45 as there are only two magnets 20 and 21 which control the operative engagement of the bows on the string. When it is desired to bring the stringed instrument into operation, the switch 47, which will be accessible from the keyboard, is closed, and when the keys 46 are operated a circuit will be closed from the battery 44 through the switch 45, and through one or the other of the magnets 20 or 21 depending upon which of the brushes 42 or 43 is at that instant in engagement with a segment of the commutator. We will assume that the switch 47 has been closed and that the brush 42 is in contact with the segment 38 as shown in Fig. 4. In that instance the circuit would continue through the manget 21, brush 42, segment 38, segment 40, segment 41, line 48 to the other side of the battery. At the time the keys 46 are operated, the contacts on the operated keys 46 would be closed and the switch 45, as shown diagrammatically in Fig. 4, will be operated upon the operation of the key 46 as the switch 45 is mechanically connected to the keys 46 by the member 49. In the construction as shown in Fig. 7, the same effect will be produced by the closing of the contacts 61, one of which is on each of the keys 46. The contacts 61 are all connected together as shown in the drawing. The closure of the switch 45 or the contacts 61 will close a circuit through

a magnet 37 including only a part of the battery as follows: contacts on keys 46, line 50, magnet 37, line 51, wire 48, switch 47 to the other side of the battery. When the magnet 21 is energized the member 11 will be pulled down through the guide 19, and by reference to Fig. 5 it will be seen that the crank 6, at that time, is in such position as to move the bow 12 at its maximum speed. If the key remains down until the segment 38 passes from under the brush 42, the brush 43 will then engage with the segment 40, and the magnet 20 will be energized and thereby pull down the member 8 and bring the bow 9 into contact with the string. At the same time the magnet 21 will have been demagnetized, and the spring will have drawn the bow 12 away from the string, this change of bows having been made without interrupting the flow of the tone of the string. By reference to Fig. 5 it will be seen that when the brush is on the contact 40, the crank 5 is in position to move the bow 9 at its maximum speed. When the commutator passes so that the brush 42 engages the contact 39, the same situation as when this brush engaged the contact 38 will obtain, except that the member 6 will move the bow 12 in the opposite direction. When the commutator passes so that the segment 41 engages the brush 43 the bow 9 will be again brought into contact with a string, but at this time the crank 5 is moving the bow in the opposite direction. If at any time during this period the operator presses another key or keys, the only thing which will happen will be that the corresponding magnet 37 will be energized to vary the pitch of the string. It will be noted, also that during any part of the revolutions of the commutator whenever a key is pressed on the keyboard the bow, which is at that time moving in the region of its maximum speed, will be brought automatically into engagement with the string and will remain so until the other bow reaches an equal or greater speed at which time the bows will be shifted without interrupting the flow of the tone from the string. This is true regardless of when the operator begins, as well as regardless of which key is at first pressed. If, at any time, during this interval, the operator does not hold down a key, the circuits will be automatically interrupted by the switch 45 and contacts on the keys 46 so that no sound will be emitted from the instrument although the bows continue moving.

The arrangement shown in Fig. 7 is such that as each of the keys 46 is pressed downward, the two sets of contacts are closed, that is to say, contacts 45 and 61. It will be noted that all of the upper contacts 61 are connected together by conductor 60, and also all the upper contacts 45 are connected together by conductor 59. Each of the lower contacts 61 leads to a coil 37 for operating the fretting arrangement shown in Fig. 3, whereas all the lower contacts 45 are connected together, and all of these contacts are connected to the coils 21 and 22 by means of a conductor 58 By this arrangement, each time a key is operated a circuit is closed to the coils 21 and 22, and also a circuit is closed to the fretting coil 37 of the particular key operated.

It will be noted from the above that I have disclosed a simple form of apparatus which embodies the advantage of having a reciprocating bow in contact with a string to produce the sound and also arranged so as to have a bow going at substantially constant speed at all times when in contact with the string and that this condition exists automatically and in the proper sequence and gives the most desirable result obtainable by mechanical means. I have operated the device above described and have found that it is entirely satisfactory and practical.

While I have described my invention and have referred in the claims to the fact that the bows engage the same string, I wish it to be understood that by "the same string" is meant the same musical string as distinguished from the same physical string, as obviously, if two separate mechanical strings were exactly alike as far as their musical quality goes, they would be in effect the same musical strings, and the claims are to be read with the above meaning.

While I have shown one embodiment of my invention, I wish it to be understood that I am in no wise limited to the exact embodiment shown, but intend to limit my invention only by the claims attached hereto.

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

1. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, means for moving said bows in opposite directions, and means for causing both of said bows to engage said string but only one of said bows to engage with said string at a time.

2. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, means for moving said bows in opposite directions, means for causing said bows to successively engage said string and means for fretting the string.

3. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, means for reciprocating said bows at different speeds and means for bringing said bows into contact with said string successively, whereby both of said bows may engage the same string at differ-

ent times to produce a relatively long continuous tone.

4. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, and means for giving to said bows a reciprocating movement and means for bringing them successively into sole engagement with said string.

5. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, rotating means for giving to said bows a reciprocating movement, means for moving said bows into successive engagement with said string, and means for fretting a string while in contact with a bow.

6. In a device of the character described, the combination of a stringed instrument, two bows for operative engagement with the same string thereof, and rotating means 90° apart for giving a reciprocating movement to said bows so that each bow reaches its maximum speed in each direction when the other bow is in its region of minimum speed and automatic means for bringing the one of the bows into engagement with said string which is at that time moving in the region of its maximum speed.

7. In a device of the character described, the combination of a stationary stringed instrument, two bows for operative engagement with the same string thereof, rotating means 90° apart for giving a reciprocating movement to said bows so that each bow reaches its maximum speed in each direction when the other bow is in its region of minimum speed, means for alternately raising and lowering said bows, means for bringing said bows into contact with said string alternately, and means for fretting the string in contact with a bow.

8. In a device of the character described, the combination of a stationary stringed instrument, two bows for operative engagement with the same string thereof, rotating means 90° apart for giving a reciprocating movement to said bows so that each bow reaches its maximum speed in each direction when the other bow is in its region of minimum speed, means for pulling said bows successively into engagement with said string and means for varying the pitch of a string without changing the tension thereof while a bow is in contact therewith.

9. In a device of the character described, the combination of a stationary stringed instrument, two bows for operative engagement with the same string thereof, a crank shaft having means thereon ninety degrees (90°) apart for giving a reciprocating movement to said bows, so that each bow reaches its maximum speed in each direction when the other bow is in its region of minimum speed, magnets for pulling said bows successively into engagement with said string, magnetically operated means for fretting said string and means operated by said crank shaft for automatically maintaining the bow which is moving at a maximum speed in engagement with said string.

In testimony whereof, I have signed my name to this specification.

DAVID R. ADAMSON.