

May 26, 1936.

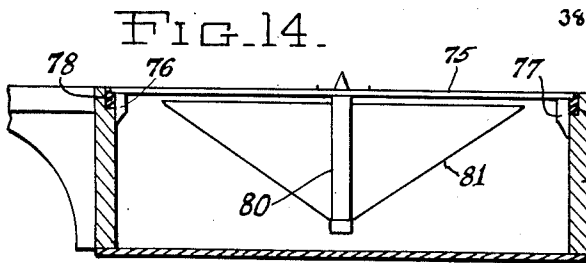
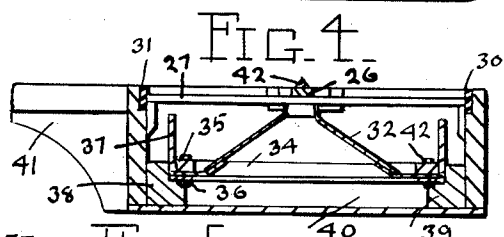
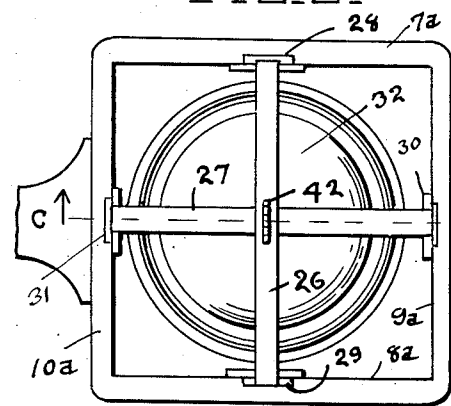
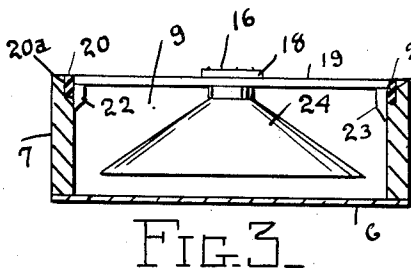
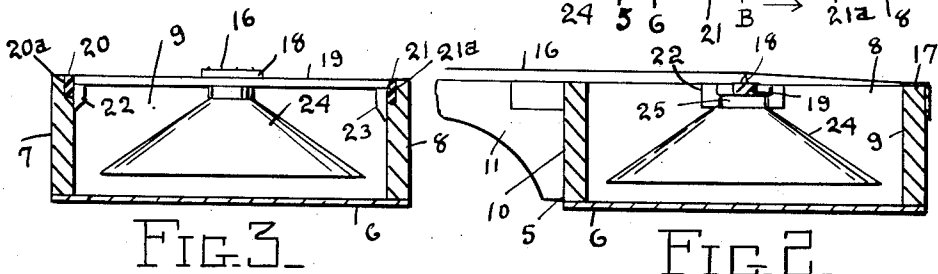
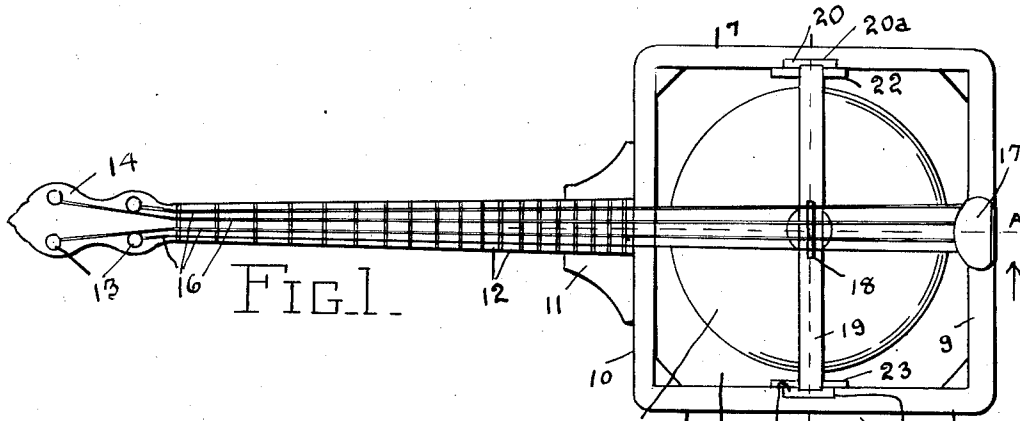
F. TURNER

2,042,080

STRING MUSICAL INSTRUMENT

Filed June 24, 1932

2 Sheets-Sheet 1



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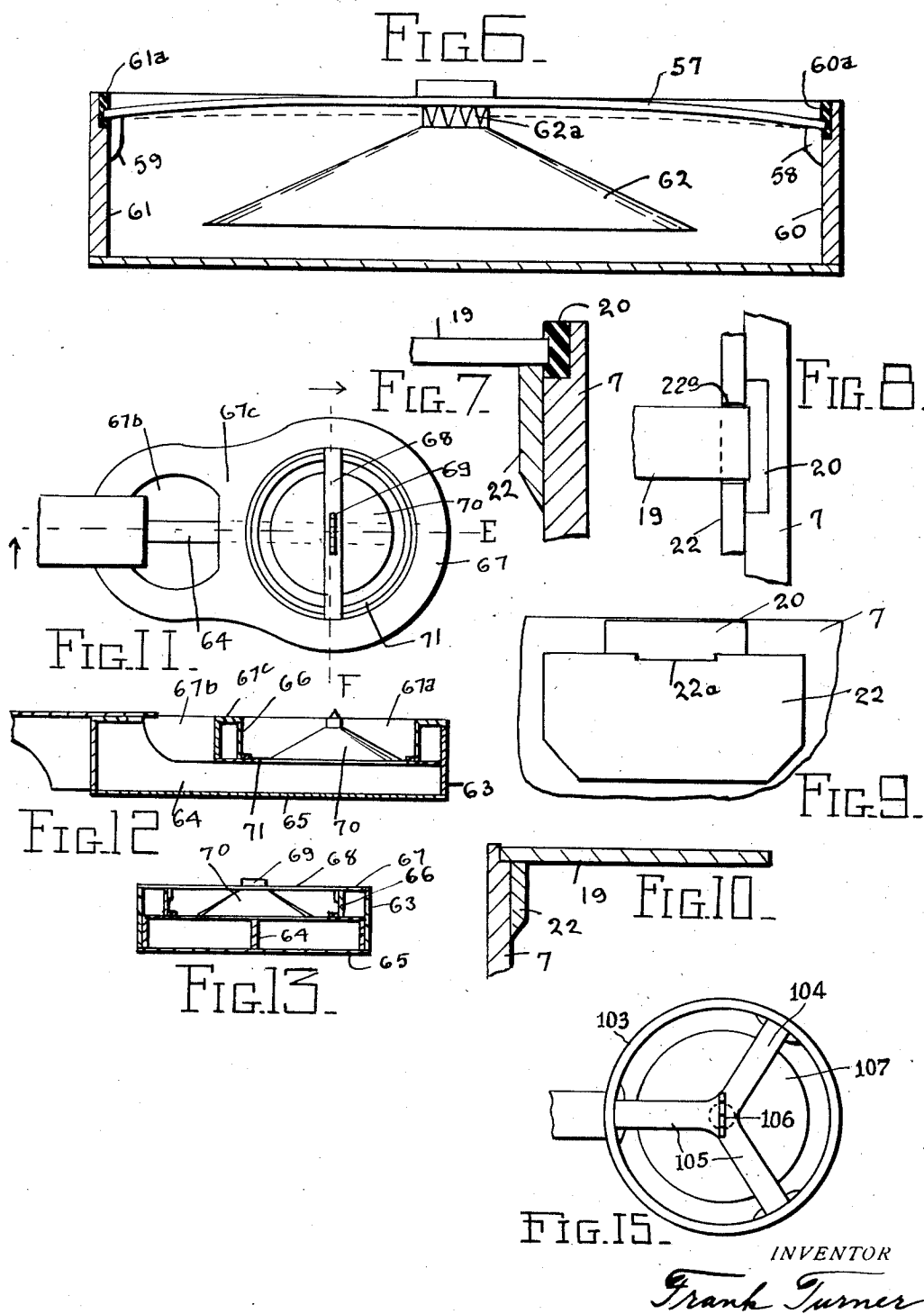
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STRING MUSICAL INSTRUMENT

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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,042,080

STRING MUSICAL INSTRUMENT

Frank Turner, New York, N. Y.

Application June 24, 1932, Serial No. 619,059

7 Claims. (Cl. 84-296)

This invention relates to improvements in stringed musical instruments, and one of its leading objects is to provide an instrument which will produce musical tones of high quality with a construction adapted to permit of low costs of manufacture, and which employs a diaphragm to amplify the tones produced.

Another object of the invention is to provide a stringed instrument with which musical tones of high quality may be produced in ample volume.

Another object of the invention is to provide a musical instrument with a diaphragm, which is supported in place so that it is protected against undesirable stresses and strains, and which will be of very light and yet efficient design.

A still further object is to provide an improved means for supporting the bridge of a string musical instrument, so that more desirable musical effects are produceable from the use of the instrument.

A more particular object of the invention is to provide a musical string instrument with a vibratable member or bar, upon which the string bridge is supported, and to which is attached or connected a diaphragm for amplifying the musical tones produced, a relatively large area of the vibratable member or bar being unrestrained by contact with the body or frame of the instrument.

With the above and other objects in view the invention consists in certain new and useful combinations, constructions, and arrangements of parts, clearly described in the following specification, and fully illustrated in the accompanying drawings, in which:—

Fig. 1 is a plan view of a complete instrument, embodying my invention.

Fig. 2 is a longitudinal sectional view, taken on line A, of Fig. 1, looking in the direction of the arrow, showing the construction and mounting of the diaphragm.

Fig. 3 is a transverse sectional view, taken on line B, of Fig. 1, looking in the direction of the arrow.

Fig. 4 is a plan view of the body of another form of the instrument.

Fig. 5 is a longitudinal sectional view, taken on line C, of Fig. 4, looking in the direction of the arrow.

Fig. 6 is a transverse sectional view through another modified construction of the resilient bar.

Fig. 7 is a detail sectional view of Fig. 3, showing the means for supporting the resilient bar.

Fig. 8 is a detail plan view of Fig. 7.

Fig. 9 is a detail side elevation of Fig. 7.

Fig. 10 is a vertical sectional view showing another method of supporting the resilient bar.

Fig. 11 is a plan view of the body of an instrument shaped like a guitar.

Fig. 12 is a longitudinal sectional view, taken on line E, of Fig. 11, looking in the direction of the arrow.

Fig. 13 is a transverse sectional view, taken on line F, of Fig. 11, looking in the direction of the arrow.

Fig. 14 is a longitudinal sectional view through another modified form of the invention.

Fig. 15 is another plan view of another modified form of the invention.

Referring to the accompanying drawings illustrating the practical construction of my invention, 5 designates a body, constructed of ordinary wood or material, which of itself need not be selected for high vibrating qualities, and which comprises the relatively thin bottom wall 6, the side walls 7 and 8, the end wall 9, and the opposite end wall 10, all rigidly united to each other. The neck 11 is suitably connected to the end wall 10 and is equipped with the usual frets 12, and the string tightening members 13, mounted to turn on the head 14.

The ends of the musical strings 15 are connected to the tail piece 17, which is attached to the end wall 9, and extend across the bridge 18, which is supported on the resilient bar or member 19, and thence across the frets of the finger board, in the usual manner to connect with the adjusting devices 13 as shown.

The resilient bar 19 is constructed of wood or resilient material and is supported by the cross pieces 22 and 23, suitably attached to the side walls 7 and 8. The bar 19 is forced into place against the tension exerted by the rubber cushion blocks 20, and 21, which are located in recesses 20a and 21a, formed in the side walls 7 and 8. The yielding rubber blocks allow a slight end play of the bar, when it vibrates.

The resilient vibrating bar or member 19 carries a conical diaphragm 24, which is constructed of paper, or other light material. The small end of this conical diaphragm is mounted by suitable adhesive on the disc 25, which is formed of cork or similar material, which is attached directly to the underside of the resilient bar or member 19. The larger or open end of the conical diaphragm is spaced above the bottom wall 6, and away from the side and end walls of the sound box, so that there will be no restrain or in-

interference with its vibration, under the influence of the sound waves generated by the vibration of the music strings. This arrangement produces clear musical tones.

5 In Figs. 4 and 5, I show another construction of the sound box, the body of which is similar to that shown in Figs. 1 and 3, inclusive, except that in the showing of Figs. 4 to 5, two bars, 26 and 27 are arranged at right angles to each other, the 10 opposite ends of the bar or member 26 being supported against the rubber or resilient blocks 28 and 29, on the side walls 7a and 8a, and the opposite ends of the bar or member 27 being supported against the rubber or resilient blocks 30 15 and 31, on the side walls 9a and 10a.

A light conical diaphragm 32 is connected at its smaller end with the lower bar 27. The larger and bottom end of the diaphragm is supported by the annular member or ring 34, which may be 20 made of thin leather, or other light flexible material, positioned between the retaining rings 35 and 36, of the inner sound box 37. This inner sound box is supported by the blocks 38 and 39 on the bottom of the outer box 40, which is provided 25 with a neck 41 of usual construction. The outer marginal edge portion of the lower end of the diaphragm is positively held in place with the aid of the screw bolts 42 which extend through the flexible connecting ring 34 and the cooperating rings 35 and 36. 30

In the construction shown in Figs. 4 and 5, the resilient member includes the two bars 26 and 27, the lower one of which carries the diaphragm, and the upper one of which carries the bridge 42. 35 These bars are preferably adhesively attached at their intersection. In this embodiment the air waves are prevented from swirling around the edge of the diaphragm, thus improving the quality and increasing the volume of the tone produced. The vertical wall of the inner sound box 37 acts as a baffle to increase the effective distance 40 between the two sides of the diaphragm. The construction of the diaphragm and its peripheral mounting is very similar to that of a radio loud speaker. I consider a diaphragm of this type 45 constructed of paper or other light material much superior to the aluminum diaphragms which have been previously used in instruments of this class. The strings and tail piece (not shown) may be 50 arranged the same as those in Fig. 1.

In Fig. 6, I show another form of the invention, wherein the resilient member or bar is formed with a rising arch, to provide an arched spring bar 57. The ends of this bar are supported by the 55 brackets 58 and 59, carried by the side walls 60 and 61. The ends of the bar 57 engage the rubber thrust blocks 60a and 61a. The neck of the paper diaphragm 62 is formed with tabs 62a, which are secured by adhesive to a circular disc of cork or light wood adhesively attached to the 60 arched resilient bar or member 57. When the strings are tightened, it will bend from an arched position to a substantially straight line position, as indicated in dotted lines in the drawing. This 65 form of bar may be used in various embodiments of the invention.

In Figs. 7, 8 and 9, I show enlarged detail views of the support for the resilient member. It will be noted that the cross pieces 22 and 23 are formed 70 with notches 22a, which receive the ends of the resilient member, and that the yielding rubber blocks or cushions 20 and 21 are subjected to slight compressive action. The notches 22a prevent lateral displacement of the resilient member, 75 while the yielding rubber cushion blocks allow

a limited end play, which permits the resilient member to more freely vibrate.

In Fig. 10, I show the resilient bar or member 19 firmly attached adhesively or otherwise on the cross pieces 22 and 23, against the end wall of the 5 body of the instrument.

In Figs. 11, 12 and 13, I show an instrument of the type of the guitar, which includes the outer wall 63 and the longitudinal stiffening member 64. A resonant bottom wall 65 is fixed to the lower 10 edge of the outer wall. A circular wall 66 is arranged within the outer wall 63, and to this circular wall the top wall 67 is secured. This top wall is provided with a relatively large opening 67a and a smaller opening 67b, separated therefrom 15 by the division bar 67c. A resilient member or bar 68 is disposed across the opening 67a at right angles to the major axis of the body of the instrument, and on this member or bar the bridge 69 is positioned or secured. The lower circular 20 edge of the conical diaphragm 70 is connected by the flexible ring 71 to the lower edge of the circular wall 66, while the neck or top of the diaphragm is connected in the usual manner to the resilient bar 68. In this embodiment the sound 25 waves from the underside of the diaphragm escape through the opening 67b. An instrument of this type will have a greater amount of resonance than the forms previously shown and described. 30

It is not necessary that the two ends of a resilient bar shall be supported in the same manner thus one end may be rigidly supported as shown in Fig. 10 while the other end may be 35 supported as in Fig. 7 to 9 also both ends may be unyieldingly supported as in Fig. 10 with little loss of efficiency.

In Fig. 14, I show a longitudinal sectional view of an instrument which includes the box-like body 74, and which is provided with the thin 40 resilient member or bar 75, supported at its ends by the cross pieces 76 and 77, and engaging the thrust rubber cushion blocks 78 and 79. The resilient bar or member 75 supports the resilient vertical rod 80, to the lower end of which the 45 apex of the conical diaphragm 81 is secured.

In Fig. 15, I show another construction of the instrument, wherein the circular body 103 is provided with a resilient member 104, provided with a plurality of radial arms 105, which may be 50 formed from thin flexible material. The meeting center of these arms supports the bridge 106 and the depending conical diaphragm 107.

It is obvious that in the various embodiments shown and described changes may be made in the 55 type of resilient member used, thus in Figs. 1 to 3 a resilient member comprising more than one bar could be used while a single resilient bar could be substituted for the resilient member shown in Figs. 4 and 5. It is also evident that a 60 resilient member such as is shown in Fig. 15 could be substituted for the types shown in Figs. 1, 4, and 11. Also a longitudinally arranged bar as shown in Fig. 14 could be used in place of the bars shown in Figs. 1 and 11 while a diaphragm 65 arranged as in Fig. 14 could be used in the other embodiments shown, with or without a peripheral support.

The resilient members or bars may be of any 70 light resilient material, but I prefer wood which term is intended to cover woody substances, as for example cane or bamboo. The member or bar should be stiff enough to hold the centre of the diaphragm in its desired position; in some 75 embodiments it may be the sole support of the

diaphragm. At the same time it should be resilient enough to vibrate at an amplitude suitable for sound and music production. For an instrument such as is shown in Fig. 1 supposing the diaphragm to be nine inches in diameter the resilient bar of spruce wood which is very suitable may be ten inches long, three fourths of an inch wide and average one quarter of an inch in thickness being slightly thicker in the centre than at the ends though this last is not necessary. These dimensions may vary widely, thus if a smaller number of strings are used the bar may be lighter while a considerably heavier bar will give a tone of smaller volume. The phrase resilient member is intended to cover all the forms shown and described whether consisting of one or more resilient bars.

The diaphragm may be made of any suitable material, and may be other than of conical shape. In fact, any form of diaphragm which will serve the purpose, may be employed in cooperation with the resilient member.

The term frame or body is intended to include any supporting structure, which carries the resilient member.

Various changes may be resorted to, over those illustrated and described, within the scope of the invention, as defined in the claims annexed hereto.

I claim as new and patentable:—

1. A stringed musical instrument including a hollow body, string connecting and tensioning means arranged on the body, a resilient member supported on the body at its outermost portions only and having its inner portion free to vibrate, a bridge supported on an inner vibratable portion of the resilient member, strings stretched over the body and engaging the bridge, and a diaphragm positioned in the body and operatively connected to an inner portion of the resilient member adjacent to the bridge mounting.

2. A stringed musical instrument having a hollow body, a resilient bar supported by its end portions on the body and having its intermediate portion free to vibrate, a diaphragm positioned beneath the resilient bar and having its central portion connected to an intermediate vibratable portion of said bar, a bridge supported on the bar over the diaphragm connection, and strings stretched over the body and in engagement with the bridge.

3. A stringed musical instrument having a hollow body, a resilient member having its outermost portions only supported by the body and having its central portion capable of vibration in a direction substantially perpendicular to the

plane of the top of the body, a diaphragm positioned beneath the resilient member and operatively connected to a central portion of said member, a bridge supported on a central portion of the resilient member, and strings stretched across said bridge and in contact therewith.

4. A stringed musical instrument including a hollow body, a bar-shaped resilient member extending across the top of the body and having bearing therewith only at its end portions and being unrestrained from vibration at all points between said end portions, a bridge supported on a central vibratable portion of said member, strings stretched over the body and engaging the bridge, and a conical type diaphragm positioned below the resilient member and having its apex portion connected to a central portion of the resilient member.

5. A stringed musical instrument having a body providing a chamber, a resilient wood bar having end portions only supported on the body to support said bar across the chamber, a bridge mounted on substantially the center of said bar, strings stretched over the body and engaging the bridge, and a diaphragm positioned in the body, said diaphragm being operatively connected to a central portion of the resilient wood bar.

6. In a stringed musical instrument, a hollow body, a resilient member extending across the top of the body, being supported on the body at its outermost portions only and having its central portion capable of vibration in a direction substantially perpendicular to the plane of the top of the body, a diaphragm in the body beneath the resilient member and supported at its periphery on said body, means connecting the central part of the diaphragm with the central part of the resilient member, and a bridge supported on a central part of said resilient member.

7. A stringed musical instrument including a hollow body, a plurality of strings stretched longitudinally over said body, a resilient wood bar having its end portions only supported on the body and extending across the body at substantially right angles to the strings, the central part of said bar being capable of vibration in a direction substantially perpendicular to the plane of the strings, a diaphragm positioned in the body beneath the resilient bar, means connecting the central part of the diaphragm with the central part of the resilient wood bar, and a bridge supported on the central part of said bar for engaging the strings.

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