Jan. 2, 1934. J. S. BURDICK 1,941,595

MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 1.

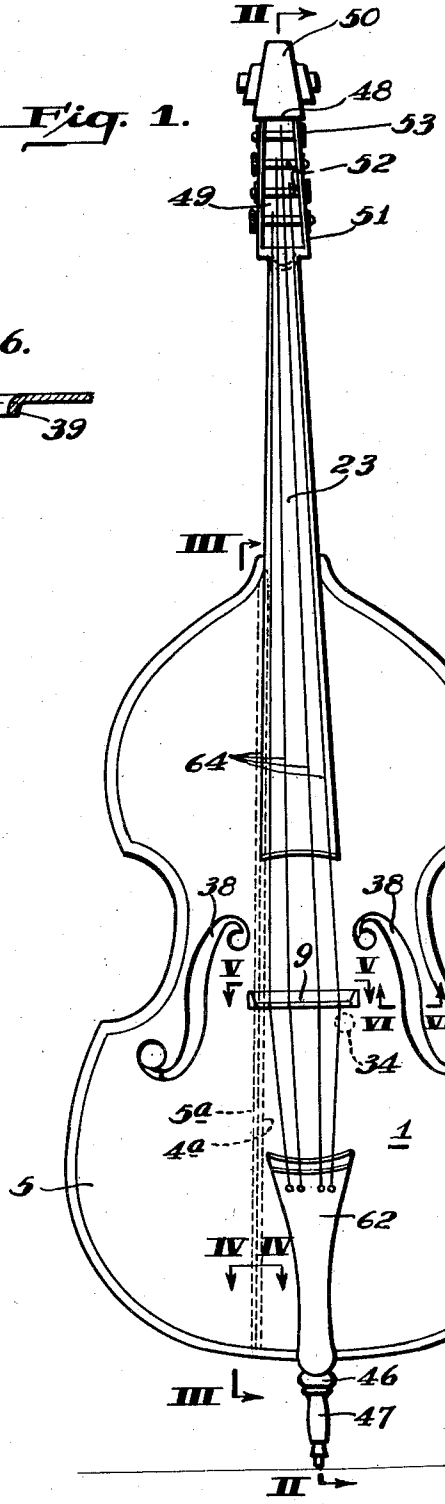


Fig. 6.

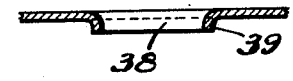
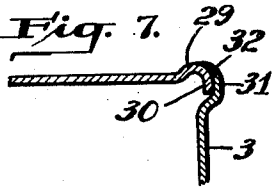


Fig. 7.



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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 2.

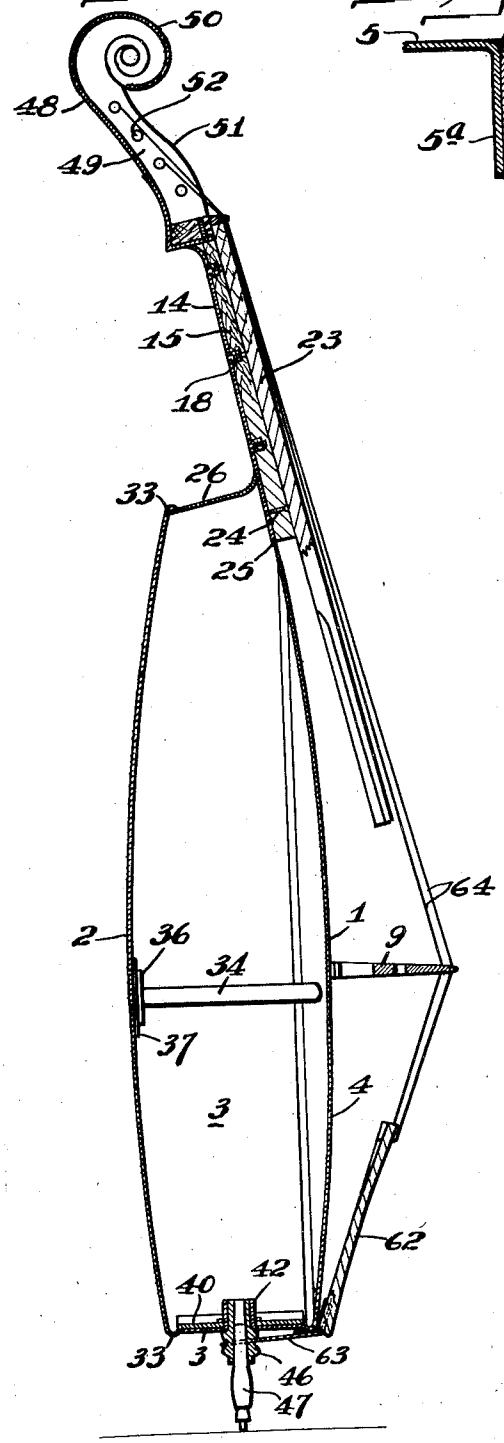
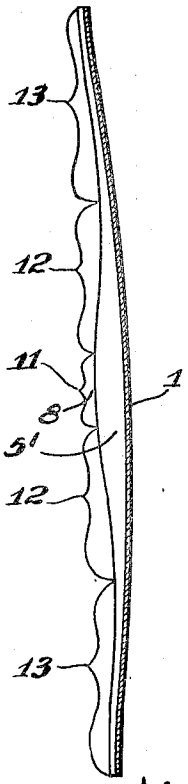


Fig. 4.

Fig. 3.



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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 8.

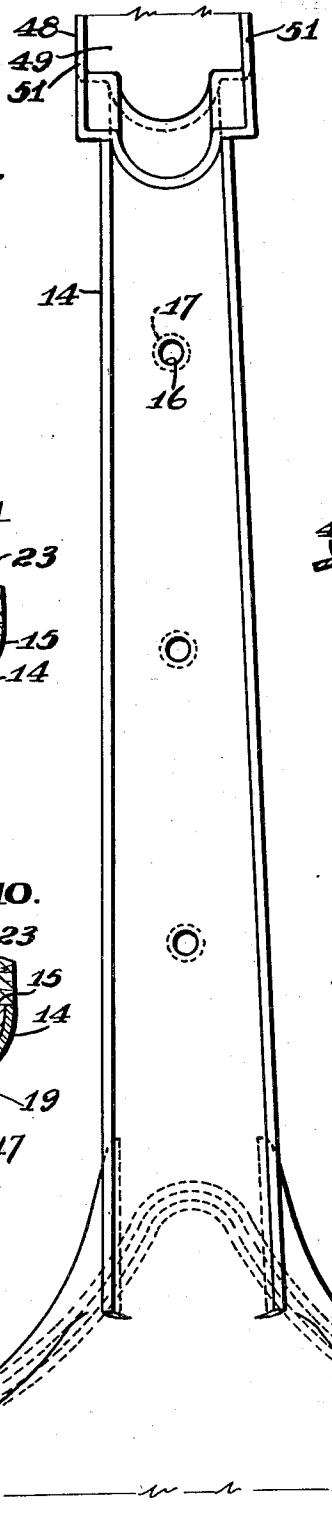


Fig. 5.

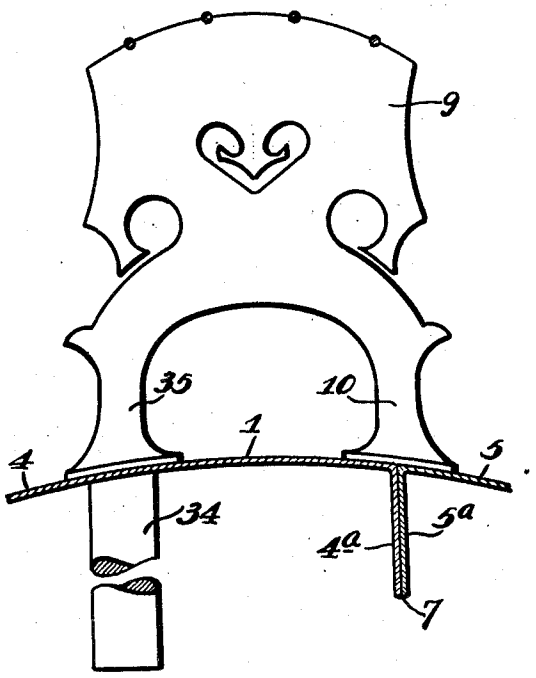


Fig. 11

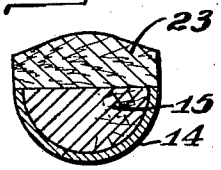


Fig. 10.

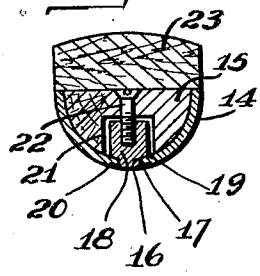
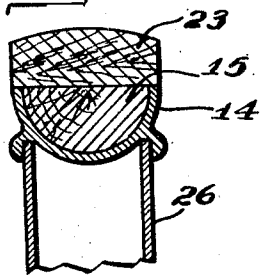


Fig. 13.



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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 14.

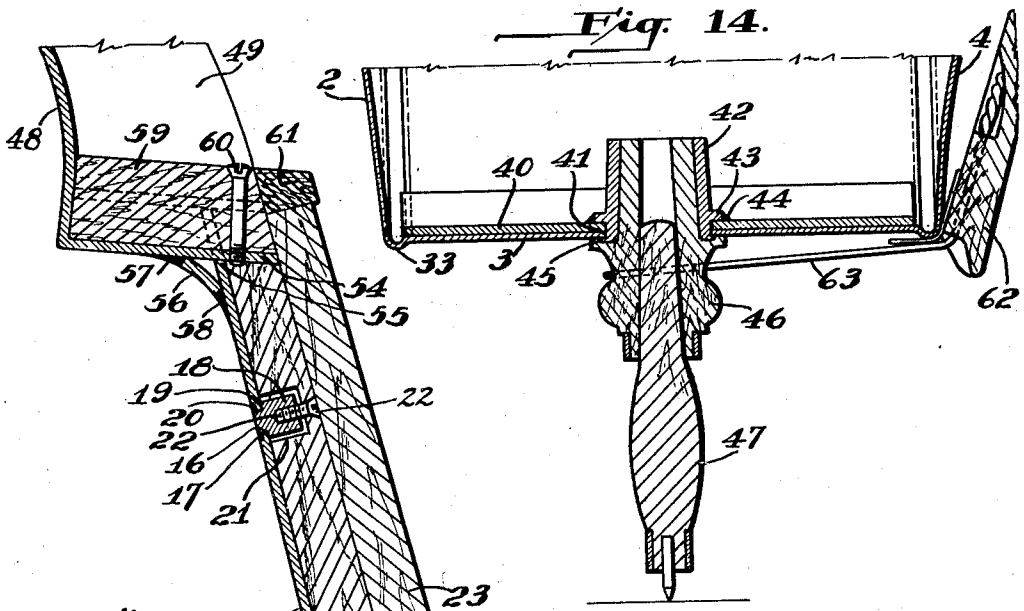


Fig. 9.

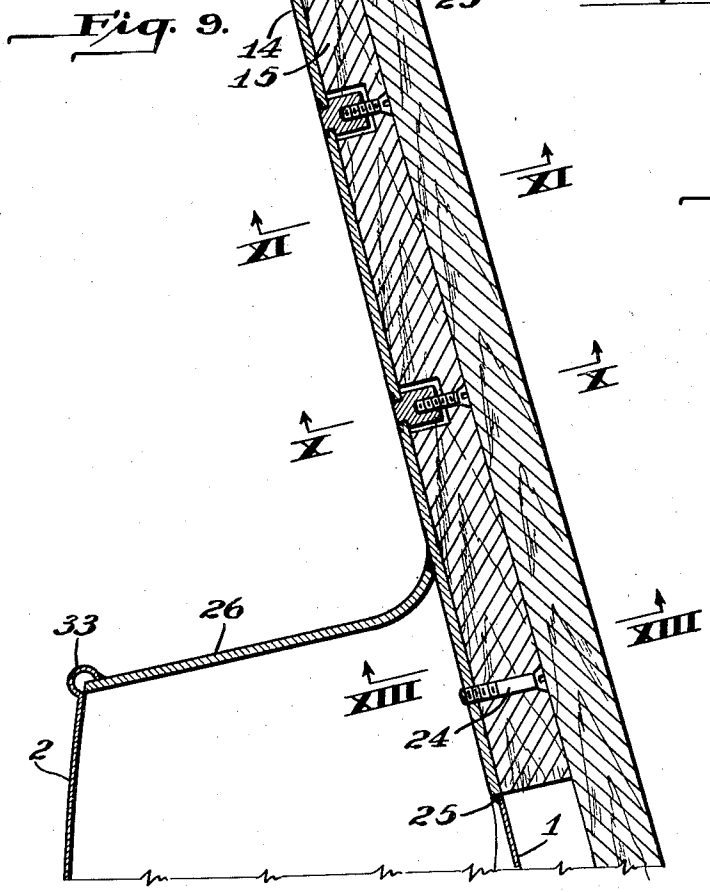
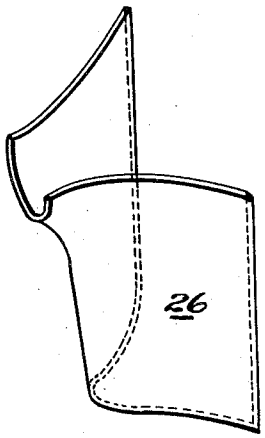


Fig. 12.



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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 15.

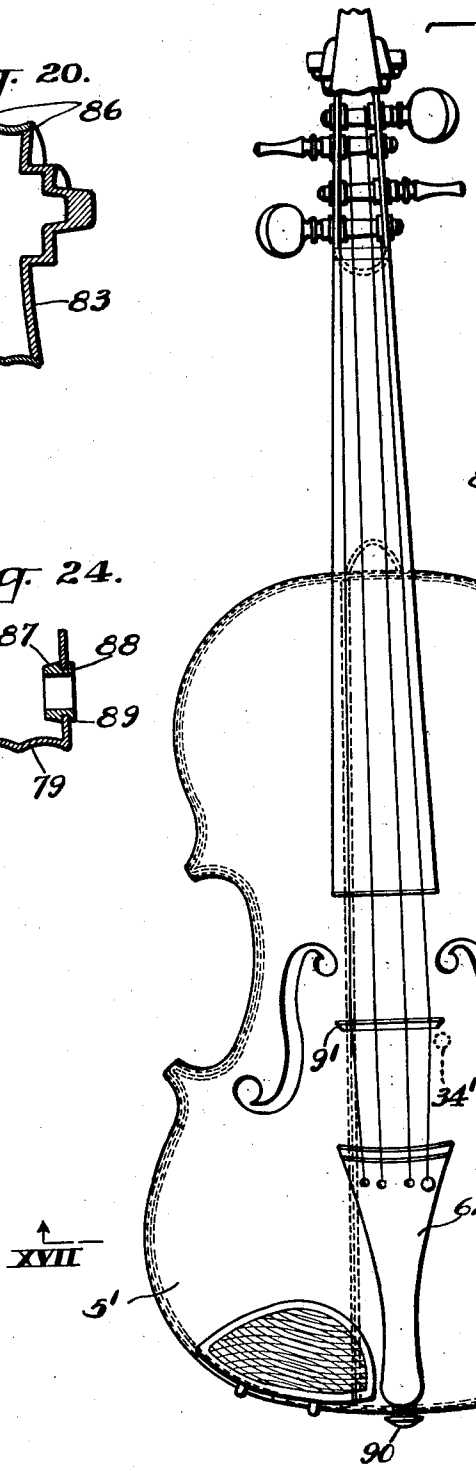

Fig. 20.

Fig. 23.

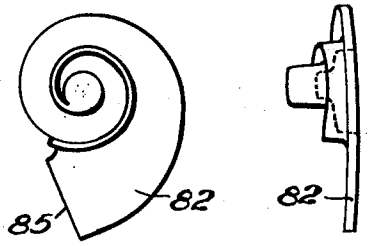

Fig. 24.

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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 17.

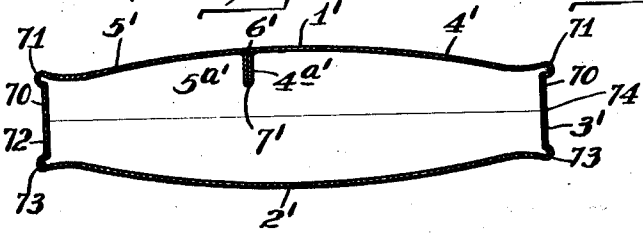


Fig. 16.

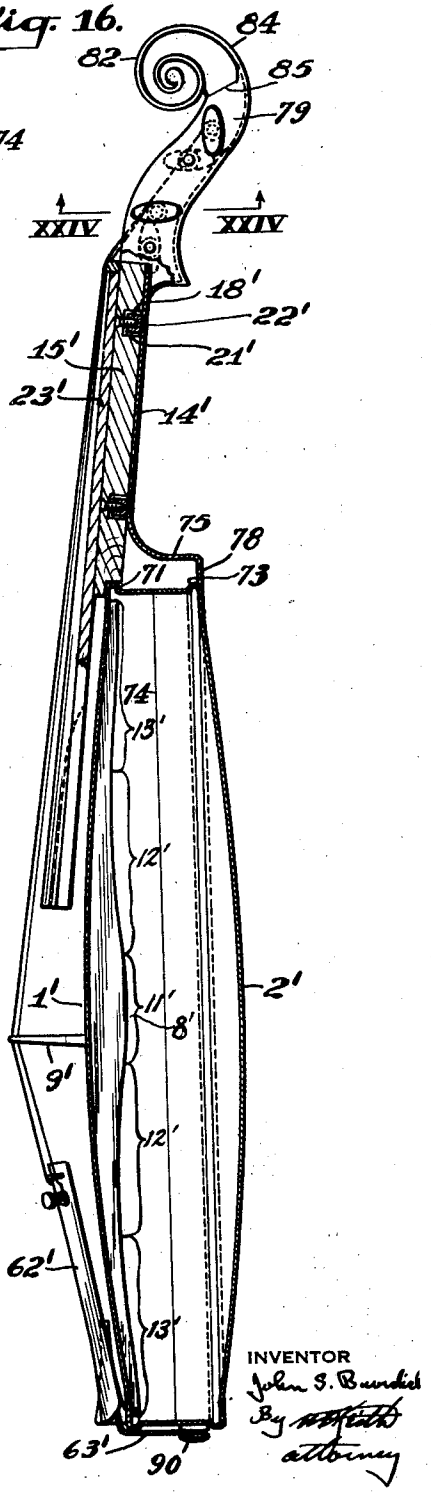


Fig. 21.

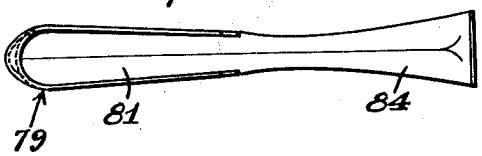
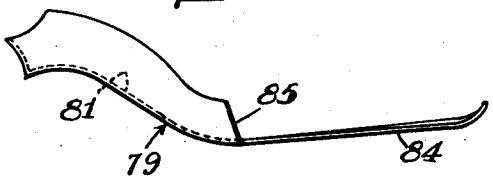


Fig. 22.



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MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

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Fig. 18.

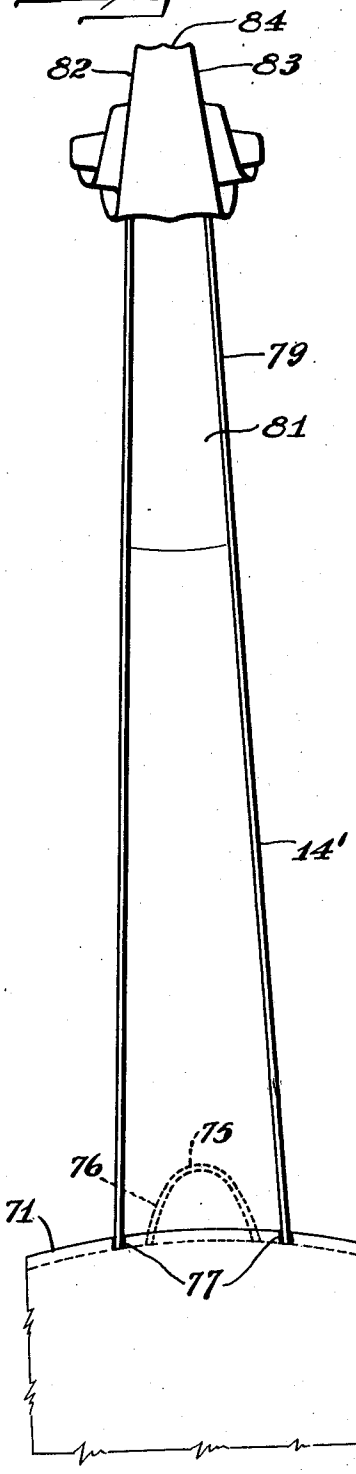
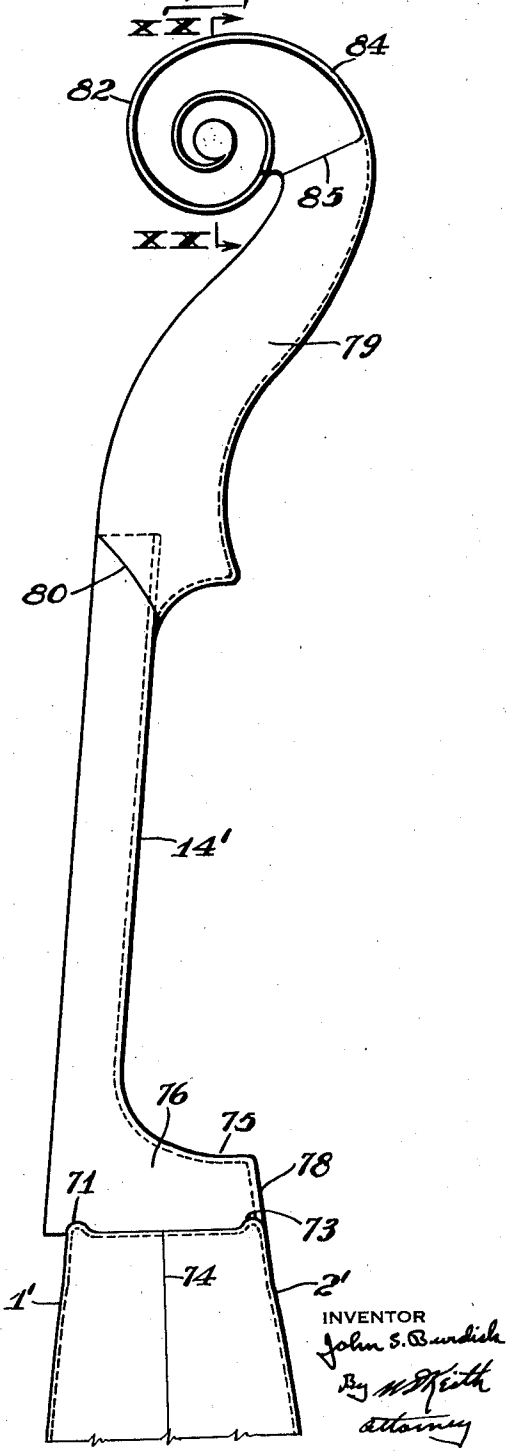


Fig. 19.



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Patented Jan. 2, 1934

1,941,595

UNITED STATES PATENT OFFICE

1,941,595

MUSICAL INSTRUMENT OF THE VIOL AND VIOLIN TYPE

John S. Burdick, Hamburg, N. Y., assignor to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

Application May 31, 1932. Serial No. 614,424

19 Claims. (Cl. 84—274)

The invention relates to improvements in the design and construction of aluminum instruments of the violin and viol families and is particularly directed to improvements in the violin, viola, violoncello and double-bass viol, the modern representatives of these types.

The disadvantages and limitations of the wood instrument have long been recognized and the art pertaining to the development of the viol and violin types has been characterized by infrequent and sporadic attempts to overcome these limitations by devising metal counterparts of these instruments. It has been heretofore proposed that aluminum is the metal which could be best adapted to the requirements of a metal instrument. Prior attempts have proceeded chiefly along two lines of development. The first was the obvious but unsuccessful substitution of aluminum for wood without contemplation of its own special characteristics and simply following the conventional and approved designs of their wooden predecessors. The other line of development, equally unsuccessful, was characterized by radical departure from conventional design, and the instrument so conceived did not reproduce the tonal qualities of the wood instrument.

It is an object of the present invention to provide an aluminum instrument of the class described which overcomes certain limitations of the wood instrument but which, at the same time, has the playing qualities of the wood, with unexcelled tone and volume.

A further object is the provision of a metal instrument which is sturdy and simple in construction and capable of resisting rough use. Another object is to provide an instrument which combines durability with fine tone quality and volume, being unsusceptible to atmospheric changes and possessing the desirable characteristic of remaining in perfect tune. A particular object is to provide a moderately-priced, high grade instrument which will withstand rough usage. Other objects and advantages will appear upon consideration of the following description and the drawings referred to therein. The invention will be described with reference to two particular embodiments, the violin and the double-bass viol, but it is to be understood that the invention is not limited to these two instruments but is equally applicable to other instruments of the viol and violin class.

In the drawings, Fig. 1 represents a front or plan view of a bass viol embodying my invention; Fig. 2 is a longitudinal sectional view taken on line II—II of Fig. 1; Fig. 3 is a sectional detail of the bass bar taken on the line indicated at III—III of Fig. 1; Fig. 4 is an enlarged transverse sectional detail of the bass bar construction taken on line IV—IV of Fig. 1; Fig. 5 is a fragmentary transverse sectional view taken on the line V—V of Fig. 1, showing the manner of locating the sound post with respect to the bridge; Fig. 6 is an enlarged fragmentary sectional view taken on line VI—VI of Fig. 1, illustrating the flanged formation of the "*f*" holes; Fig. 7 is an enlarged fragmentary sectional view taken on the line VII—VII of Fig. 1, showing in detail the manner of joining the belly panel to the ribs.

Fig. 8 is a fragmentary top plan view of the head, neck and shoulders of the bass viol shown in Figs. 1 and 2, the neck filler block, neck top piece filler, fingerboard and nut being removed; and Fig. 9 is a longitudinal sectional view of the neck. Fig. 10 is a transverse sectional view taken on the line X—X of Fig. 9, showing the manner of attaching the neck filler piece and fingerboard to the neck. Fig. 11 is a transverse sectional view taken on the line XI—XI of Fig. 9. Fig. 12 is a perspective view to a somewhat reduced scale, showing the neck bottom stamping which connects the neck to the shoulders of the instrument. Fig. 13 is a sectional view taken on line XIII—XIII of Fig. 9.

Fig. 14 is an enlarged sectional view of the end pin mounting shown in Fig. 2.

Fig. 15 is a front or plan view of a violin embodying my invention. Fig. 16 is a side elevation thereof, partly in central longitudinal section. Fig. 17 is a transverse section through the body of the violin on the line XVII—XVII of Fig. 15. Figs. 18 and 19 are top plan, and side elevational, views respectively of the neck and head assembly of the violin shown in Fig. 15. Fig. 20 is a sectional view through the scroll portion of the head taken on the line XX—XX of Fig. 19. Figs. 21 to 23 inclusive are detail views of the component parts of the head prior to assembly, Fig. 21 being a plan view, Fig. 22 an elevation of the lower portion of the head, and Fig. 23 showing in side and end elevation the scroll portion of the head. Fig. 24 is a transverse sectional view through the key section of the head taken on line XXIV—XXIV of Fig. 16, but with the peg removed, showing the peg bushings and method of attaching the same.

Referring to the drawings in which, for purposes of illustration, specific embodiments have been chosen, my improved construction will be described first with reference to a double-bass viol or, as it is more commonly known, a bass

viol (the true bass viol of the viol family having been succeeded by the modern violoncello or bass violin).

The body or sounding box of the bass viol is made up of a belly panel, designated generally by the reference numeral 1, a back panel 2 and sides or ribs 3. An important feature of my improved construction resides in the manner of forming the bass bar with respect to the belly panel. In my preferred embodiment the belly panel is constructed from two separate sections 4 and 5 which will hereinafter be designated respectively as the right hand and left hand panels. The right hand panel is the one which lies at the right when the instrument is viewed from the front as in Fig. 1.

The meeting edges of the right and left hand belly panels 4 and 5 are turned inwardly to form the depending flanges 4^a and 5^a respectively. The two sections of the panel, after formation, are placed with the flanges 4^a and 5^a adjacent one another and the top and bottom of the flanges are welded together throughout their entire length as indicated at 6 and 7 in Fig. 4. This type of bass bar not only makes possible the obtainment of the desired tonal qualities in instruments of the viol and violin families but also provides a construction which is easy to fabricate, enabling the instrument to be manufactured on a production scale without sacrifice of these tonal qualities. This feature of my construction is applicable to the violin, the viola, the violoncello and the bass viol. A bass bar formed separately from the belly panel an driveted, spot welded, spot soldered, screwed or bolted to the belly, leaves spaces or crevices between the inside of the belly and the bass bar which produce so-called "birdies", "wolf howls" and an inconsistent range of tonal qualities. Such difficulties have been entirely eliminated by my invention. The advantages of this construction are peculiarly manifested in the bass viol because the flanged and welded bass bar integral with the belly panel imparts the required stiffness to the belly which is so essential in the larger instruments.

Another feature of my improved bass bar construction resides in the contour of the lower edge thereof. As will be seen in Fig. 3 (wherein the contour is somewhat exaggerated for purposes of illustration) the maximum depth of the bass bar occurs at a point 8 which is directly under or closely adjacent to the feet of the bridge 9. The bass bar lies directly underneath the left hand foot 10 of the bridge, approximately beneath the G string (see Fig. 5). Thus the maximum depth of the bass bar according to my invention will be found to lie approximately underneath the G string at its point of contact with the bridge 9. Above and below the point of maximum depth 8 the inner edge of the bass bar curves toward the belly panel so that the depth of the bar decreases at first slowly, then somewhat more rapidly, and then again more slowly. The curve of the inner edge of the bass bar continues to approach that of the inner surface of the belly panel until at the upper and lower ends of the sounding box the depth of the bass bar is very small and the bar substantially merges into the belly panel. The portion of the bass bar over which the depth decreases slowly from its maximum is indicated at 11 in Fig. 3, and the portions over which its depth decreases somewhat more rapidly are indicated approximately at 12, 12. The portions of the bass bar over which the depth decreases somewhat more gradually again are indicated at 13, 13. The portion 11 over which the depth of the bar decreases rather gradually may, under some conditions, be eliminated so that from the point of maximum depth there would be only two principal stages of decreasing depth, first a relatively rapidly decreasing and then a relatively slowly decreasing portion arranged in the order of separation from the point of maximum depth; that is to say, the depth of the bass bar would decrease relatively rapidly from the point 8 toward the upper and lower extremities of the sound box for a certain distance, and then decrease more gradually for the remaining distance until meeting the said upper and lower extremities. I prefer, however, to employ the gradually decreasing initial portion adjacent the point of maximum depth in order to obtain a smooth and unbroken contour.

With variations in degree of curvature and in maximum and minimum depths the contour thus broadly described in the preceding paragraph is applicable to the violin, viola and 'cello.

The neck of the bass viol is formed of a semicircular section 14 provided with a wood filler block 15. The construction of the neck is shown best in Figs. 9 and 10. The neck section 14 in my preferred construction is provided with a plurality of apertures 16 countersunk as at 17 to receive the stud nuts 18 which are shouldered at 19 to bear against the inside of the neck section 14. The countersunk portion 17 of apertures 16 provides a space for the metal from the filler rod which is to be used in welding the studs 18 to the neck section 14. The metal of the weld is shown at 20 and the weld may be finished off flush with the surface of the neck by reason of the provision of countersunk portion 17.

The neck filler block 15 is provided with depressions 21 to loosely receive the stud nuts 18. Screws 22, cooperating with the stud nuts, serve to hold the neck filler block in place. The fingerboard 23 is glued to the top of the neck filler block. The use of the welded stud nut arrangement is unnecessary in that portion of the neck which lies within or opposite the sound box where the smooth under surface of the neck need not be preserved; thus the lower end of the neck filler block 15 is secured to the neck section 14 simply by the screw 24 which is threaded directly into the neck section.

The lower end of the neck section 14 is welded to the belly panel 1 at 25 (see Fig. 9). For convenience of manufacture and rigidity of construction the neck bottom stamping 26 which is shown in detail in Fig. 12 is welded to the neck section 14. I prefer to use metal of relatively heavy gauge for this part and as shown in the drawings the metal employed may conveniently be of the same gauge as that used for the neck section 14. The neck bottom stamping 26 is welded along its vertical edges to the portion of the ribs which form the shoulders of the instrument, this welded connection being shown at 27 in Fig. 8. In making the welded connection at 27 the outer surfaces of the neck bottom stamping 26 and the shoulders 28 are brought flush with one another so as to give a smooth, unbroken surface at this as at all other portions of the sound box.

It will now be convenient to describe the remaining features of construction of the sound box. The marginal edges of the belly panel 1 are flanged inwardly in the form of a raised bead 29 (Fig. 7) with a depending flange 30. The ribs 3 are provided with an outwardly and upwardly ex-

tending flanged portion 31. When the instrument is assembled, the belly panel and ribs fit together as indicated in Fig. 7 and the parts are welded together at 32 to produce a smooth outer edge blending with the bead 29. This form of joint greatly facilitates assembly and produces a good looking and rigid connection. Similarly the back panel 2 is flanged upwardly at 33 where it joins the ribs 3 and neck bottom stamping 26.

The sound-post assembly for the bass viol, which also may conveniently be employed for the 'cello, consists of a wood or metal post 34 bearing at its upper end against the right half 4 of the belly panel at a point in line with, but slightly below, the right hand foot 35 of the bridge 9, as will be seen best in Fig. 1. At its lower end sound-post 34 bears against a sound-post plate 36 which is provided with an extended base portion in the form of flange 37 welded, as by spot welding, to the back panel 2. If desired, the surface of the plate 36 may be knurled or otherwise roughened where it comes in contact with the end of the sound-post 34 so that the post will be more securely held against displacement from its true and correct position. The inner surface of the belly panel may likewise, and for the same purpose, be knurled or roughened where it contacts the upper end of the sound-post. Belly panel 1 is provided with the usual "*f*" holes 38 which are preferably formed of three separate apertures. This is not, however, considered to be an essential feature and may be dispensed with if desired, the "*f*" holes being made in the form of a single continuous aperture as is done in the conventional type of instrument. I have found that there is considerable advantage in making the "*f*" holes of flanged formation and I have, accordingly, shown in the drawings this form of hole which is provided with the peripheral inwardly-extending flange 39. This construction is particularly advantageous in larger instruments such as the 'cello and bass viol where greater strength and rigidity are required in the belly panel without sacrifice of the desired tonal qualities, such as would be occasioned by employing metal of heavier gauge than is otherwise desirable.

The foot or end pin assembly for the bass viol (also adapted to the 'cello) is shown in Fig. 14 of the drawings. A reinforcing plate 40, which corresponds in depth to that of the ribs 3, is provided with an aperture 41 to receive a sleeve or socket 42 which, near its outer end, is provided with a flange 43 which forms a shoulder adapted to bear against the inside of the reinforcing plate 40 and which is welded thereto at 44. The outer end of the sleeve 42 is swaged or spun over the edge of the aperture in the ribs 3 at 45. The end plug 46 and end pin 47 may be of the usual form.

The head 48 of the bass viol may conveniently be formed as an aluminum casting or stamping with a hollow key section 49 and a scroll 50. The side walls 51 of the key section of the head are provided with a series of apertures to receive the pegs 52 which may be provided with the usual worm and gear adjustment 53.

The head is welded to the neck of the instrument where the curved portion of its lower upstanding wall 54 meets the correspondingly curved upper end of the neck section 14 at 55 (Fig. 9). A fillet member 56 completes the connection between the head 48 and neck 14, being welded thereto at 57, 58.

The neck top piece filler 59, shaped to conform with the lower end of the head casting 48, is secured to the lower wall 54 of the head casting by means of a screw 60. The fingerboard having been glued to the neck filler block 15, the nut 61, of ebony, is secured to the upper end of the fingerboard as shown in Fig. 9.

The tail piece 62 may be of conventional design and is secured in the usual manner to the end plug by means of a loop of wire or gut 63. The strings 64 are applied in the usual manner. It will be noted that the bass bar formed by the welded flanges 4^a, 5^a of the belly panel is located approximately underneath the G string, whereas the sound-post 34 is located approximately beneath the E string of the instrument. In this respect I have followed the design of the usual wood bass.

I shall now describe my invention as applied to the construction of a violin which, apart from the novel features which I have devised, follows the well known Stradivarius model. In the description of this instrument reference numerals applied to members which correspond in general design and function to those described hereinabove with reference to the bass viol construction will correspond with the reference numerals of Figs. 1 to 14 inclusive but will be distinguished therefrom by the designation prime (′). It would be possible to construct the violin in the same manner as the bass viol, simply changing the design, size and proportions but using the same method of assembling the various parts. I have, however, found it preferable, both from the standpoint of simplicity of construction and the obtainment of perfection in tonal qualities, to alter the construction somewhat. The principal difference is that in the violin shown in Figs. 15 to 24 inclusive I have made the sound box in three parts, the belly panel and back panel being formed with inwardly-extending meeting flanges which together form the ribs of the instrument. As in the case of the bass viol, the belly panel 1′ is made up of right and left hand sections 4′ and 5′ respectively, the meeting edges of which are flanged inwardly to form a bass bar. This construction is shown best in Fig. 17 where it will be seen that the bass bar flanges $4^{a'}$ and $5^{a'}$ are welded together at 6′ and 7′. This should be a continuous seam weld and the weld metal of the top weld 6′ is smoothed off flush with the outer surface of the belly panel. For purposes of illustration the contour of the bass bar has been considerably exaggerated. It is similar to that of the bass viol previously described.

The belly panel 1′ is formed with inwardly-extending marginal flanges 70 which, at the point of juncture with the belly panel, form a projecting bead 71. Likewise the back panel 2′ is formed with inwardly-extending marginal flanges 72 with a projecting bead 73. The meeting edges of flanges 70 and 72 are welded together at 74 to complete the sound box assembly. I prefer to make the flanges 70 and 72 of substantially equal depth so that the weld will be on the center line of the sound box, although this is not essential and it will be readily understood that one or the other of flanges 70, 72 could be made to extend for the full depth of the ribs of the instrument, being welded directly to the back panel or to the belly panel as the case might be.

The manner of assembling the neck section 14′ and the neck filler block 15′ by means of the welded stud and screw connection at 18′ is the

same as described in connection with the bass viol and need not be repeated in detail at this point. I have, however, chosen to show a somewhat different manner of connecting the neck to the body and head of the instrument. This construction is clearly illustrated in Figs. 18 and 19. The neck section 14' is formed at its lower end with an integral flange 75 the side walls 76 of which extend to meet the edge of the sound box to which they are welded. The beads 71 and 73 are slotted at 77 to receive the side walls 76 of the neck. A neck bottom piece 78 is welded to the sound box and to the neck, forming an extension of the back panel at the point of attachment of the neck.

The head 79 is welded to the neck along the line 80 (Fig. 19).

The construction of the head 79 is illustrated in Figs. 20 to 23 inclusive. It is built up of three separate members, namely, the key section member 81 shown in Figs. 21 and 22 and two scroll members 82, 83, the right hand scroll member 82 being shown in detail in Fig. 23. The peripheral wall portion 84 of the scroll members 82, 83 is formed integrally with the key section member 81 as will be seen in Figs. 21 and 22.

In assembling the head, the scroll members 82, 83 are welded at 85 to the side walls of the key section member 81 and the peripheral portion 84 of the scroll is wrapped around the scroll members 82, 83 and welded thereto along its marginal edges as shown at 86 in Fig. 20. I have found this construction quite advantageous from the standpoint of ease and economy of manufacture in large quantities and it results in a scroll member which, while possessing the ornamental attributes of a solid cast scroll, is at the same time much lighter than a solid casting, and the cast portions of the same may be molded without the use of cores. It will readily be understood that the construction just described is applicable to the fabrication of scrolls for the other instruments to which my invention is directed, namely the viola, 'cello and bass viol.

Fig. 24 illustrates the method of bushing the pegs. The bushings 87 are preferably formed of fibre and are provided with an annular shoulder 88 bearing against the inside of the side walls of the head 79. After the bushings 87 have been inserted in the apertures formed in the head 79, their outer edges are spun or pressed outwardly to form the locking shoulder 89 which securely holds the bushings in place in the head. These bushings may, if desired, be made of aluminum or other material, but I prefer to use a fibre bushing, having found that when a wood peg is used in a fibre bushing it has a "feel" quite similar to that of wood pegs in a wood instrument. In the violin and viola the end pin or foot which is peculiar to the bass viol and 'cello is replaced by the end plug 90. An aperture is formed in the sound box to receive plug 90 which may conveniently be welded in place.

It will be noted that in the violin the sound-post plate described in connection with the bass viol has been eliminated and the sound-post 34' bears directly against the back panel 2' which may be roughened at the point where it contacts the end of the sound-post. I contemplate the use of the sound-post plate shown at 36 in Fig. 2 of the drawings in the bass viol and 'cello where the advantages of this construction are most fully realized. It is to be understood, however, that I consider the application of this feature of construction to the viola and violin as being within the purview of my invention.

It will now be observed that the essential features of my improved construction are applicable to any and all musical instruments of the viol and violin families and I do not limit myself except as defined in the appended claims to the instruments shown and described. The novel and improved bass bar construction, the neck assembly, sound-post assembly and head and scroll assembly are applicable to the violin, the viola, the 'cello and the bass viol, and for the purposes of the present invention these instruments may be considered as substantial equivalents.

Instruments made in accordance with my invention, in addition to being much more durable than wooden instruments, are characterized by superior tonal qualities and volume, equal to that of high grade wooden instruments. They are easy to fabricate, and when manufactured in large quantities there is little difficulty in controlling the tonal qualities and other desired qualities of the instrument.

While in describing my invention I have employed specific language in the interest of clarity, I have no intention in the use of such language of excluding any equivalents or minor variations of the invention set forth.

I claim:

1. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, the belly panel consisting of two members the meeting edges of which are flanged inwardly to form a bass bar.

2. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, the belly panel consisting of two members of unequal widths, the meeting edges of said members being flanged inwardly to form a bass bar.

3. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, said belly panel comprising two separate members of metal flanged inwardly along their meeting edges, said flanges being welded together to form a bass bar.

4. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, a bridge resting on said belly panel and means for mounting strings thereover, a bass bar extending inwardly from the belly panel and extending the entire length thereof, said bass bar being of maximum depth at a point approximately opposite the bridge and decreasing in depth toward the ends of the belly panel.

5. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, a bridge resting on said belly panel and means for mounting strings thereover, a bass bar extending inwardly from the belly panel and extending the entire length thereof, said bass bar being of maximum depth at a point approximately opposite the bridge and decreasing in depth toward the ends of the belly panel, the depth decreasing from the point of maximum depth as said ends are approached, at first relatively slowly, then relatively faster and finally relatively slowly.

6. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, a bridge resting on said belly panel and means for mounting strings thereover, a bass bar extending inwardly from the belly panel and extending the entire length thereof,

said bass bar being of maximum depth at a point approximately opposite the bridge and decreasing in depth toward the ends of the belly panel, the rate of decrease in depth from the point of maximum depth to said ends being variable.

7. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, a bridge resting on said belly panel and means for mounting strings thereover, a bass bar extending inwardly from the belly panel and extending the entire length thereof, said bass bar being of maximum depth at a point approximately opposite the bridge and decreasing in depth toward the ends of the belly panel, the rate of decrease in depth from the point of maximum depth to said ends being variable and comprising a portion of relatively rapidly decreasing depth and a portion of relatively slowly decreasing depth, the first named portion being located between the last named portion and the point of maximum depth.

8. In a musical instrument of the violin and viol type, a sound box, neck and head, said neck comprising a semicircular metallic member having inwardly-projecting studs welded thereto, a filler member lying within said semicircular member and means for securing said filler member to the studs.

9. A neck construction for musical instruments of the violin and viol type comprising a semicircular metal member provided with inwardly-extending studs rigidly secured thereto and flush with the outer surface thereof, and a filler member fitting within said semicircular member provided with depressions for loosely receiving said studs.

10. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, said sound box being formed of aluminum, a sound-post plate secured to the back panel and a sound-post extending between said plate and said belly panel.

11. In a musical instrument of the violin and viol type, a sound box comprising a belly panel, back panel and ribs, said sound box being formed of aluminum, a metal sound-post plate welded to the back panel and a sound-post extending between said plate and said belly panel.

12. In a musical instrument of the violin and viol type, an aluminum sound box comprising a belly panel, back panel and ribs, said belly panel being provided with "*f*" holes the marginal edges of which are flanged inwardly.

13. In a musical instrument of the violin and viol type, a metal sound box comprising a belly panel, back panel and ribs, said belly panel being provided with sound holes and being formed from two separate members, the marginal edges of said sound holes and the meeting edges of the separate members being flanged inwardly to strengthen the belly panel and produce the proper vibratory characteristics.

14. An end pin mounting for metal bass viols and 'cellos comprising an apertured reinforcing plate welded to the inside of the sound box, a sleeve rigidly attached to said reinforcing plate, said sleeve being flanged over the outside of the sound box, and means for mounting an end pin in said sleeve.

15. An end pin mounting for metal bass viols and 'cellos comprising an apertured reinforcing plate welded to the inside of the sound box, a sleeve welded to said reinforcing plate, said sleeve being flanged over the outside of the sound box, and means for mounting an end pin in said sleeve.

16. In a musical instrument of the violin and viol type, a belly panel, back panel and ribs, said belly panel being formed of metal and provided with a peripheral combined bead and flange extending upwardly from the surface thereof and outwardly and downwardly below the surface thereof, said ribs being formed of metal and provided with a peripheral flange extending upwardly from the surface thereof and outwardly, the combined bead and flange of said belly panel being welded to the peripheral flange of said ribs whereby a continuous projecting bead is formed between the belly panel and ribs.

17. A metal head for musical instruments of the violin and viol type comprising a key section member and two scroll members, a portion of said key section member extending around said scroll members to form the outer peripheral wall of the scroll.

18. A metal head for musical instruments of the violin and viol type comprising a key section member and two scroll members, a portion of said key section member extending around said scroll members to form the outer peripheral wall of the scroll, said key member and scroll members welded together to form a unitary structure.

19. A head for musical instruments of the violin and viol type comprising a metal key section member provided with an integral extension forming a part of the scroll, cast metal scroll members welded to said key section member, said integral extension of the key section member being wrapped around the edges of said cast metal scroll members and welded to the edges thereof.

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