The Violin Makers Journal

OCTOBER-NOVEMBER, 1963

THE OFFICIAL PUBLICATION OF
THE VIOLIN MAKERS ASSOCIATION OF BRITISH COLUMBIA

Ragnar Helin
(see story on p. 3)

Issued as an Educational Feature to encourage and develop the art of violin making.

The Violin Makers Journal

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EDITORIAL PAGE OF *The Violin Makers Journal*

CLARENCE COOPER, EDITOR

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EDITORIAL

Ragnar Helin, our President, is featured in this issue as the modern violin-maker, a tribute which he both deserves and has earned. The theme of this issue could well be entitled "The Practice of Violin Making" because it contains both practical information and scientific. The drawings of the outline of the violin are well represented in this issue, as well as many descriptive articles on violin construction.

For some time I have been preparing material for articles on Standards of Measurement. I felt that this issue was the appropriate one in which to commence these articles, particularly as in this issue there are a large number of violin outlines. What I had in mind in these articles is to find out if we cannot adopt a system of measurement and a procedure for taking measurements of the violin so that other persons can use the measurements and repeat them to make a drawing or to compare these measurements with ones of their own design. At the same time, I wanted these rules to be adaptable for other instrument sizes and also to relate to the musical notes and intervals. I hope our members will ponder on these rules and express their thoughts about them.

The next few articles deal with the subject of the outline of the instrument and we find that Mr. J. G. Mitchell submitted an interesting drawing of the violin mold. Mr. C. C. Parker has made an intensive study of the violin's geometry and in his letter has very ably explained many relevant points which clarify the violin outline. Mr. Frush has contributed a very good article on violin acoustics and it is interesting to note that he points out, as does Mr. Parker, that a circle from the centre of the violin passes through the points of the upper and lower bouts. Mr. Hill, in his articles on the bass bar, likewise agrees with Mr. Parker on the position of the bass bar. These two articles make a very interesting comparison. We also have very interesting comment on the bass bar by Mr. Meerburg.

Two of our local members, Peder Svindsay and Rev. G. R. Wright, give us some more valuable suggestions on how to get both the proper angle of the neck and at the same time, have it straight. Dr. March completes his article on Violins - Old and New, and reaches some very logical conclusions. Mr. Shrubsole has contributed some interesting data on thickness graduations. We should also thank Dr. Jenkins, Chief of the Forest Products Laboratory, Ottawa, for the formula of the speed of sound in wood. We also have a letter from Mr. Ratcliffe, drawing to our attention an error which we made in his previous article.

Our good friend, Harry Wake, in his column "Fiddle Fix" describes an interesting viola result. Incidentally, Harry did quite well with his instruments at the recent Exhibition in Arizona.

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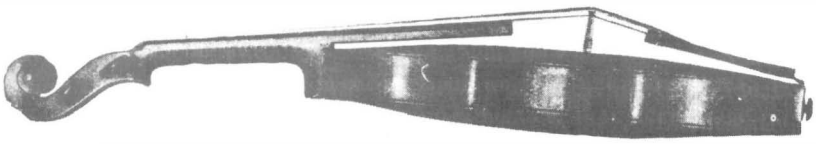
Congratulations to Harry Wake. At the Phoenix Annual Competition in Arizona, held in October, 1963, Harry won 3 Grand Awards, a second prize and the Michelman trophy for varnish. The viola referred to in Harry's "Fiddle Fix" won the Grand Award at this annual competition.



Living makers AND their instruments

RAGNAR HELIN by Al Gough

In previous issues we made you acquainted with the Presidents of our organization from the beginning in 1957. We are now going to present the story of the man who is presently holding this office. Most of you are familiar with the name, Ragnar Helin. He is a man bursting with energy. Not a moment goes by but something is accomplished. His business is cabinet making and antique dealing. He is a partner in one of the oldest established businesses in Vancouver. To see his work, either one of his beautiful violins, or anything else he puts his hand to, is to realize that here is a real artisan. I have many times visited Ragnar and his wife and great discussions have taken place in that basement workshop. Many of the local violinists seem to gravitate to his shop and some real hot discussions can be heard as the chips fly like mad as Ragnar is busy carving out the plates for some new piece of work. At present he is working on a quartet, using all B. C. wood from the same pieces of maple and spruce.

While Ragnar is busy on this, let's go on with his story as he tells it.

"I was born in Finland on January 4, 1907. I grew up in a small village near Jakobstad. This was a very small community and although music was a large part of our life and the violin was most important, there were very few violins available. I was between 5 and 6 years old when the urge to learn to play the violin drove me to try to make one, since I couldn't get one any other way. We had lots of tools on the farm and I liked to whittle wood even at that age. So I decided to make one out of solid wood. I carved the thing out as best I could, found some thin wire for strings, and put wood screws on a slant and tied the end of the wire to them and tuned the violin with a screw driver. Then I went out to the horse barn and stole some hair from the horses' tails and tied it to a willow branch. I rubbed some pitch on this "bow" and proceeded to tune up. It seemed to make a noise and I was happy as a lark. It did not take long before I could play some hymns and the family and the village people thought I was doing very well.

It wasn't long before I was longing for a better instrument and I guess I was about 7 when I tried again. I wanted one that had a hole in it! But I tell you that seemed to be very hard. It just seemed impossible to bend the ribs and I had no one to show me how. When I was a little older, somebody lent me one, but I was only allowed to play Church hymns on it and that did not agree with me. I wanted to play something a little faster and when my parents found me playing the faster music they took the violin away from me. This resulted in my making another one. I was about 8 years old then, and although I still found it hard to bend the ribs, I did it. When I finished the violin, it did not look good enough and I started another one. When I finished that one, it looked much better to me so I decided to burn the #2. Then I got myself in real trouble. But this was soon forgotten and I started another. I made myself some money with the #3 by playing dance music when I was about 10 years old. I kept this up for several years before I became interested in classical music. I obtained a home study music book, but it was very slow as I had no one to teach me.

I went to public school and was confirmed in the state church of Finland, the Lutheran church. At night I worked hard at studying my music and making violins. I had made several by the time I was 20 years old and then was called up to serve a year in the Finnish Army. After I came out of the Army I decided to emigrate to Canada and came to Vancouver in September, 1929. I went to work for Swift's, Cabinet-making and Furniture Repairs, and remained there until the time Swift died. Then Sid Elderton, a French polisher there for many years, and I decided to buy the business, which we did. So, I am still there. I have repaired some of the finest of furniture from all over the world which people bring to Vancouver. There are many pieces of furniture that I have worked on which have workmanship and finish that compare favorably with the finest of Cremona masterpieces that I have come across. We also reproduce furniture to order and I do not worry about how fussy the people are, it seems quite easy to

(cont'd. on p. 18)

One of Mr. Helin's violins

LOCAL NEWS

By Al Gough

Well here it is time for our newsletter again and by gosh it seems like I just finished the last one. Do these months never stop whizzing at me to let me catch my breath? I hope not, because I enjoy it. This will probably be the last issue we are able to get out this year so on behalf of every one of us here we wish you a very Merry Christmas and the best of everything in the New Year. And to quote a line from Ced Welstead on a card from him "don't get your gamboge varnish and your Christmas grog mixed!"

Horace Nelson, whose picture you saw in with the pictures of the P. N. E. competition, has been out of action this last while with a serious operation. Horace is one of those who is always there when there is any work to be done and we really miss him. Hurry up, Horace, and get back on your pins because we need you.

Peder Svindsay is working on a new fiddle and we hope to get him to put a few of his good ideas on paper shortly. He is an extremely fine workman and he has "big tone" in all his instruments. Also, George Friess has committed himself to take time again to make another fiddle. The wood is picked out. All I have to do is to keep on his back now and we'll have another prize winner, I'm sure.

In this issue we have the story of our President, Ragnar Helin. He isn't content to limit it to one violin. He's busy on a whole quartet and it's coming along very well. I feel a little ashamed of myself as my own effort is proceeding at speed zero at the moment. Ragnar keeps bugging me about it so I'll get at it. I'm going to use Robert McGowan's method of tuning the plates after stringing the violin up in the white. This man makes a lot of sense in what he says and I hope we hear a lot more from him. What do you say, Bob?

Peter Yuen has been made my assistant to help me get the great backlog of paper work done. I hope we are able to get things cleaned up in the near future. Those of you who are enquiring about Journals, and other miscellaneous items, again please have patience with us poor working stiffs who donate time to this Journal. We only LOOK professional. Honest, there is no great large office staff, etc. Just a few people who love fiddles and violin making and feel that their efforts are worthwhile.

The December meeting was our Christmas concert. No business was done. Just pure enjoyment. Dr. Leonard Marsh gave us a recital on the cello and also played on Peder Svindsay's cello that took a bronze medal here and his viola that took the silver medal in Italy. Mr. George Tate played on his own violin. George's music is always appreciated for his sweetness of tone and difficult technical passages seem easy when he plays them. A local baritone, Mr. Bill Dey, gave us four pieces with a clear, ringing voice full of colour. There were also selections by Miss Barbara Lye on the violin. However, the one who stole the show by her performance and excellent stage manners was young 7 year old Miss Yuen on the piano. In a very charming and lively way she faultlessly performed two rather difficult numbers. We'll be hearing more about this young lady at the rate she is going.

We'll let this be all for now and we'll look forward to another visit in the New Year. May it be the best ever for all of us.

* * * * * * * *

S T A N D A R D S

by C. Cooper

The time has come when I believe it is propitious for our members to adopt a standard method of expressing the measurements of the violin which can also be adapted to the other instruments such as the viola, the cello, and the double bass.

In order to start some system of standards I would suggest that we begin with a few rules, such as:

1. In referring to the outline of the violin the dimensions refer to the inside of the instrument measured to the inside of the ribs. These dimensions would then be the actual measurements for the inside mould. The method of making these measurements is set out in the rules following.

2. The reference line in the instrument would be the centre line measured inside the ribs from the neck to the lower bout. This centre line should be taken as the line to which all dimensions may be referred. Initially the length of this line should be given in both inches and centimetres. This dimension, expressed in inches or centimetres, is the only one which will be expressed in such a unit of measurement, the idea being that each instrument will have its own rule which will be graduated over the length of the centre line.

3. That we adopt a ruler or measuring device which is made for the particular instrument and varies with the length of the centre line of each instrument. This ruler will be of the same length as the centre line and will be divided into 72 parts. It will be used to make all other measurements of the instrument. These other measurements will now all be expressed in number of parts (i.e., of the 72 parts). See Fig. 1.

In making this ruler, it can be made of light plastic, flexible, about 3/4" wide. All points from "O" to "72" should be marked on this ruler. Also divisions of the length, such as 1/2, 1/3, 1/4, etc. could also be marked along the centre. These dimensions are useful for expressing the octave relationships, amongst other things. The reason for selecting 72 as the number of parts into which the line is to be divided is because it would correspond to 1/5 of the number of degrees in a circle. Also it corresponds to the difference between two node lines of a vibrating circular plate where the circle is divided into 5 segments according to the pattern of the Chladini figures. This dimension has also been used by others in drawing the outline of the violin.

4. That angles be expressed in degrees of a circle. By using dimensions which correspond to the degrees of a circle or related to a circle, such as the ruler suggested in (3), makes it easier because you can use one dimension to indicate several relationships, such as octaves, proportions and wave lengths of various notes. In substance, all the dimensions can be related to circles or spheres and at the same time indicate a wave length of notes or musical intervals.

5. That in measuring along the centre line of the top of the back the "O" point of the ruler should be at the neck end and the "72" point at the button end, at all times referring to a point on the inside of the ribs at those places.

6. That for the purpose of the outline of the mould dimensions at right angles to the centre line should be shown from points along the centre line to the inside of the ribs opposite such points at the following posts by the numbers along the ruler. These numbers should be selected as follows:

12 14 2/5 20 24 33 36 40 42 48 54 56 57

7. That where the curvatures of the top or back are presented on a diagram they show the following:

(a) Curvature of the centre line;
(b) Curvature across the upper bouts at points 12 and 20;
(c) Curvature across the centre bouts at points 33 and 36;
(d) Curvature across the lower bouts at points 48 and 57;
Note: The curvature ends at the ribs on a line which passes through the aforementioned points.
(e) If possible the curvature should be shown in all cases, both for the inside and outside of the plate;
(f) If possible, that for positions of the curve crossing the centre line that the radius be shown expressed according to the dimensions on the ruler mentioned in (3). (If this is not practical then possibly millimeters should be used.)
(g) That a straight line be drawn across the bouts to show where the ends of the curves are at the ribs and that a perpendicular line be drawn from this line to show the centre point of the curve.

The Planes in the Violin

8. That we adopt 4 planes of reference for the instrument:

(a) The plane at right angles to the back and top, along the centre line.
(b) The plane parallel more or less located in between the top and back at approximately right angles to the ribs. The position of this plane would be variable

for each instrument. This variation would depend upon whether the plane was 5 divisions from the top or 4 from the back; i. e., a major third relationship, or again, equally distant from the top and the back, which could be 1 to 1 or unison. Again, it could be 2 to 1, which would be the octave relationship. There may be other relationships which one could select.

The purpose of the plane is as a reference plane for the production and the position of the ends of the curves of the back and top produced to meet in this plane along the rib boundaries. This is the plane which governs the heighths of the curvatures of the top and the back noticeably along the centre line. It also accounts for what appears to be the difference in heights between the top and the back.

(c) A plane through the point 40 at right angles to the plane of the centre line. This ordinarily is the line for the bridge and the plane would be parallel to the bridge and through it. While we fix this point at 40 this plane is actually intended to be the bridge plane so you may wish to vary it a small amount. However the position should always be given with relation to the dimensions mentioned when using the ruler. Generally this plane would have reference to the top of the instrument.

(d) A plane through the post parallel to the plane in (c) above but through the point 42. This plane should be referred generally to the back of the instrument. This plane also makes a tangent with the inside of the ribs with the edge of the curves of the middle bouts near the lower points.

9. That the heights of the ribs be shown at the "O" and "72" marks and expressed in dimensions of the ruler, having in mind that one dimension of the ruler is approximately 5 m. m. so that if necessary the millimetre could be used to denote fractions of a dimension.

For the purpose of checking that the heights be shown at the upper bouts at point 12 and for the centre bouts at point 33 and for the lower bouts at point 57.

10. That the height between the top and back measured on the centre line at point 36 on the inside of the instrument be fixed at 12 dimensions of the ruler or alternatively, at twice the height of the ribs at the neck end, or "O" point.

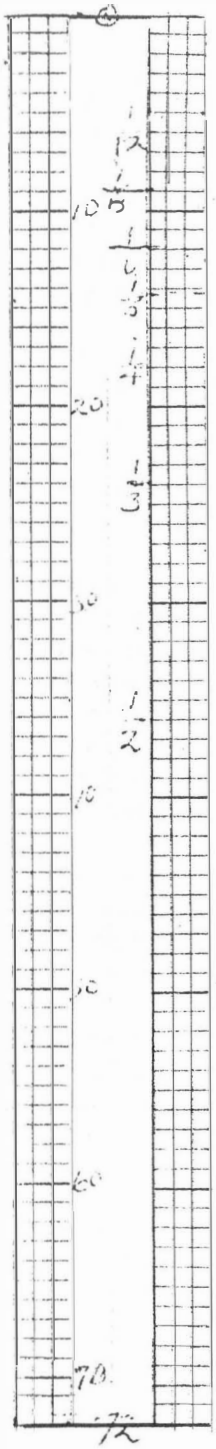


Figure 1.

VIOLINS - OLD OR NEW?

By Leonard Marsh

(This summer Dr. Marsh completed a book of musical reminiscences, from which he has kindly allowed us to reproduce a chapter of special interest to this Journal. This is the second instalment.)

In the light of what I set out in the first instalment, it is important now to remember that the best "new" violins are made from the finest, most carefully seasoned, choice-grained pieces of wood obtainable. Must they get even older, then? Is an old much-played box better than an old, perfect piece of wood? I've never heard the conondrum put this way, so I don't see why I should answer it. Anyway, there's still another step. What about the varnish? This is so important that I include it as one of what I call the Seven Eternal Questions debated among string players. Is it the varnish that does it?

Well, if a book could be written about seasoning, six books could be written about varnish. It is, in fact, a poor and mundane word for what ought to be considered the clothing of a violin. What rich and glorious robes some of them have! And what poor rags many others. Some of the varnish, at least, is protection: it seals and shields the wood from wear and climate and moisture and so forth - elements which would ultimately destroy it. Some of it is for show - for beauty's sake, would be a better way of putting it. The Cremonese masters went to extraordinary lengths to produce colourful, lustrous glazes: and never forget that six, seven, ten coats of varnish might go on a single instrument. Whatever the musical function of the varnish this much is clear - that by the time the wood has been prepared for the violin, wood and varnish are virtually one. So once again, fiddle-wood isn't just wood. And you can see that poorly prepared woods, or hastily assembled pieces in a factory, simply don't measure up to the product of the masters. But what does the varnish do? If you come across an article that really explains it, please let me know - airmail. There are a few theories. I like one of the most recent - that the secret is not the varnish, but the filler which the old masters used to seal the wood before they proceeded with the varnishing. The "proof" of this is that many old violins have parts of the original varnish rubbed off, but they still sound fine. If you don't like this, you might try your wits on another theory. This suggests that the molecules of the wood are the basic resonance chambers and that the varnish, after the initial seasoning, "sets" them forever. If this is really so, please note, it puts finis to the view that you can improve a fiddle by playing on it! And it would also seem to require that a fiddle should be played on before it's varnished. I've tried this out on a few makers - for of course it is possible to play a new fiddle "in the wood" as they say, if you go to the trouble of stringing it up. But all they can tell me is that the instrument sounds "brighter" after it's varnished. And most instruments, as far as I know, are not played very much before they're varnished.

Now you see how many factors enter into the making of a good violin - whether old or new. It's just possible one of the reasons there are more good old ones around is that makers a hundred and fifty or two hundred years ago were more careful, more painstaking, more critical - especially when they had wealthy clientele. This was particularly true of Stradivari; and it was notoriously untrue of some of the Italian makers, in Milan and Rome and elsewhere. They made cheap violins as well as the best; and as a result, there are some, for example, Gaglianos, which you have to look over very carefully (and play them!) before you know what you have. So how do we come out? That among old instruments, there are some absolutely first-class, some excellent or good, and some decidedly poor! But the best ones are the most likely to be surviving.

As for the new ones, of course there are good new instruments. They are constantly to be found by those who look carefully enough. The famous Quartetto Italiano uses modern instruments - a beautifully matched set produced by a contemporary Italian craftsmen. It is sadly true that one of the reasons they do so is that they can't afford old Italian instruments at the terribly inflated prices these now fetch - and there aren't any left in Italy, anyway! They have been siphoned off steadily over the centuries, to wherever the wealthy will pay the highest prices. Pierre Fournier, incomparable French cellist, uses a modern instrument - partly because he finds it stands up to the sonorous demands of the modern concert hall so well, but I feel sure this is partly also a tribute to top-rank French craftsmanship which reached such a peak with Vuillaume and has continued through the generations at the famous Mirecourt ateliers. Then there is the special case of the viola, in which altogether special events have operated to give modern craftsmen a chance. There are many musicians on the concert stage, and still more in orchestras, who use contemporary instruments. Many of them are reproductions of the masters, and none the worse for that. Of course if the publicity suggests that their instrument is really a Strad (or a borgozossi, which sound pretty good, though nobody's ever heard of it) they may not go to great lengths to deny it.

You must also remember that there is a First Level and a Second Level for good violins. There aren't so many old ones at that first (absolutely first-class) level, let alone new ones. And the ones that are good are treasured and preserved. The poor ones have been allowed to deteriorate or fall apart or disappear. Time itself (not age) does a terrible amount of winnowing-out. On the other hand, there are thousands and thousands of new instruments constantly being turned out: indeed, they flood the market. Unfortunately, the cheap and poor ones seem to compete with the excellent hand-made products a few devoted artists turn out here and there. They don't, for discriminating purchasers. But the best new ones can't attain the prices of the top Old Masters for another reason: they are not antiques. Unfortunately - I think it is unfortunate, though some deny it - every first-class old instrument has some of its value because it is rare, and because it has the prestige-value (some would say snob appeal) of a "name violin". An old violin, in short, is not judged entirely by its playing value. Some have lots of it - enough to make them a constant joy. Some are very disappointing. You might be much better off with a well-chosen but lesser-known name from the Second Level: or with a first-class product from a contemporary maker.

I can't resist adding that if repair and adjustment craftsmen were better respected, better paid, and looked after with the foresight which we occasionally give to our diminishing supplies of good timber or rich oil or uranium, there would be more chance for some of them to produce good new violins. The history of bows is revealing in this respect. There are a few outstanding old bows: but there are far more good bows which are just moderately old (fifty years and so forth), and plenty of excellent contemporary ones. This is not just because the modern design has improved - it hasn't changed all that much since the Tourtes and Dodds did their definitive work. It's because it's easier for a craftsman to make a living making bows. New bows are acceptable: new violins are not. But we need these craftsmen to keep our fiddles in order, too. They're getting as rare as the old fiddles themselves. Some more attention to the "contemporary" all round would do a lot of good in this area. It is being demanded for the painter and the composer. When will the living violin maker get his share of recognition, too?

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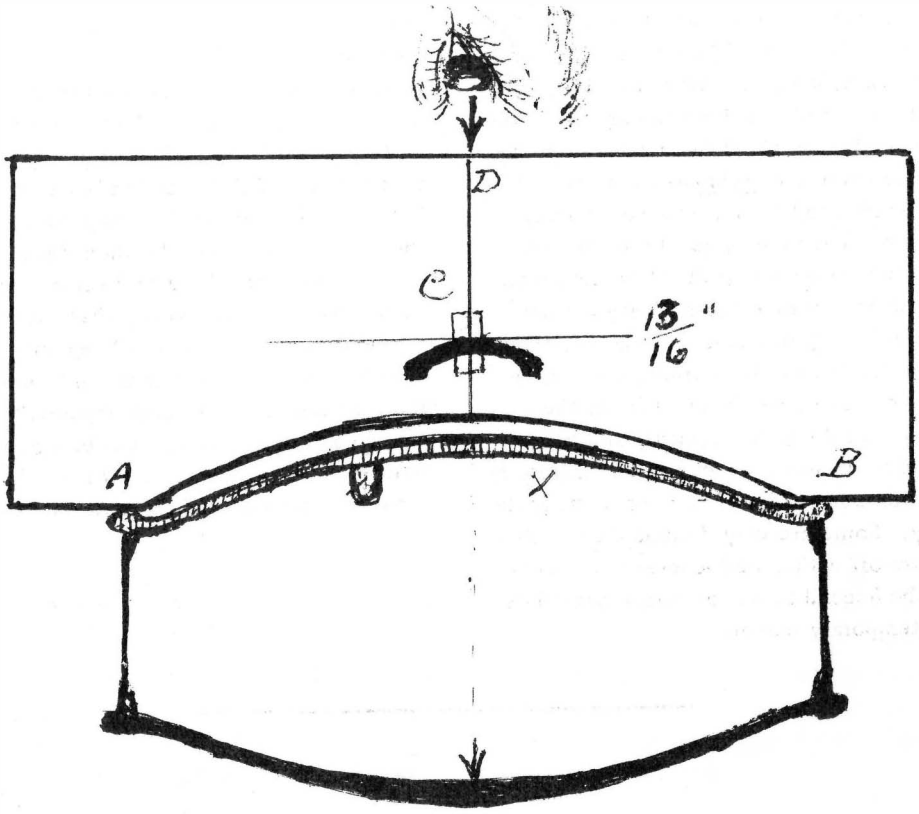
Note from the Editor: Dover Publication Inc., 180 Varrick Street, New York 14, N. Y., have published an unabridged edition of the original edition of "Antonius Stradivarius" - His Life and Work - by Hill Bros. of London, England. We understand that the price is $2.25, plus an additional 25¢ for postage. It would be advisable to write to Dover Publications first, before ordering this book. Incidentally, Dover Publications also publish many other useful books, such as "Sensations of Tone" by Helmholtz, and others.

ABOUT GETTING THE NECK STRAIGHT

by Peder Svindsay



There likely are no other groups of people with so many inventors as the violin-makers. They are very independent and seem to prefer their own way of doing things - make their own inventions when they think it is necessary. In fact, some of them seem to be more concerned about the tools they are using than the end product - the violin. I have seen several types of moulds, especially the inside mould, made of several pieces of wood that can be unscrewed and taken out when ribs are finished. As for myself, I am still using the same plain type I started out with.

But where the beginner in violin making usually gets into trouble is when he (or she) starts to glue the neck to the body. Most of them start out with the Heron Allan method, which is cumbersome, to say the least, and none too accurate. Yours truly did the same with the first fiddle, and the glue had almost set before I got it on. And that is where I started to think, like the rest of them: This calls for an invention of some kind, and I thought: we have a centerline on the violin, also on the neck on both sides. Why not extend the centerline along the finger-board and then down to the center of the violin. That is where my invention seemed to differ from the rest of them. In the end they seem to forget that they have a centerline and start to invent all kinds of complicated rigs to be clamped on the body, in the middle or the bottom end, sometimes both. Some of them so well made that a gunsmith could have been proud of it.

Why all these complicated rigs, when an ordinary postcard will do as well, or better? When a beginner looks at those things he may get discouraged before he starts, thinking it is too difficult for him. Of course, that would be alright if they were all of the type that make only cheap fiddles, since there is a tremendous surplus of that type. But on the other hand, there could be a budding Stradivarius amongst them, and there is no surplus of really first class violins. So let us make it as easy as possible for them to get started. Making a fiddle is only a craft that anybody can learn. But when it comes to making a superior violin, with flawless carving in good taste, a beautiful varnish of good quality, and the acoustic qualities to go with it - that is an art. And I think one of the most demanding of the arts, because it involves so many things. And it has to be functional. You could compare it to an architect designing a concert hall, only the violin-maker has to do all the work

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himself.

And now, back to my invention. It was in one of the early issues of our Journal but since it now has a much larger circulation it may benefit many if it is repeated. (See sketch, which should be self-explanatory, but I will add a few words.)

Take a card, or a piece of plastic or celluloid. The bottom edge must be straight. Mark a vertical line in the center of the card with a square. You can have one on the back side of the card too, in the same place, or you can cut a small hole at C so the center and top of the fingerboard can be seen from the front. But first, cut out enough from the bottom edge of the card until it rests on the edges of the violin only, at A and B. Then set the card up and mark the height of the top of the fingerboard with a horizontal line. Then you can see where the hole should be. And now you are ready for the gluing. To get a good center mark on the ends of the fingerboard, cut small pieces of paper from the gummed edges of an envelope and paste on. A pencil mark can now easily be seen. The same can be done on the top too, if it is hard to see where the center is.

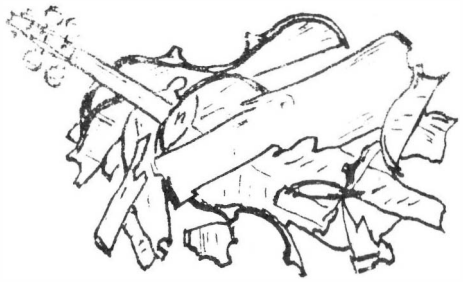
The beauty of this method is that you get the center and the height of the fingerboard in one single measure. And the same method goes for the viola, cello, and bass, only you may want a wide board for a bass and it does not interfere with clamping.

When repairing sometimes both top and back have to come off and usually you glue the back on first to get the button right. Then you use the card again and sight along the line D down to the center of the back. If it is a one-piece back paste on a small piece of paper and mark the spot. So many of the old violins have the fingerboard pointing to one side. Some of them have been made that way but others may have been done by repairmen that didn't know how, or didn't care.

It would be interesting to know if anyone has used this method before. If no one has used it before the year 1937 I can claim to be the inventor - and you will have to donate $1.00 for each violin you make using this method to the Journal's security fund. Thank you!

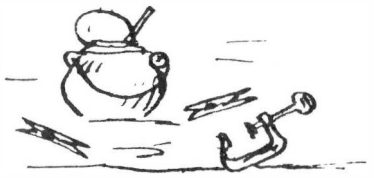
Remember - the best violin is yet to be made.

Mr. Helin in his workshop



Fiddle Fix.

By H.S. Wake.



A Novel Experiment

When I was ten or twelve years old my father gave me a second hand set of bound volumes of "Amateur Work Illustrated"! these were about the most exciting books that I had ever seen and I eagerly devoured every page, every illustration, every word; in fact I leafed through those pages so much that I believe I almost had them memorized.

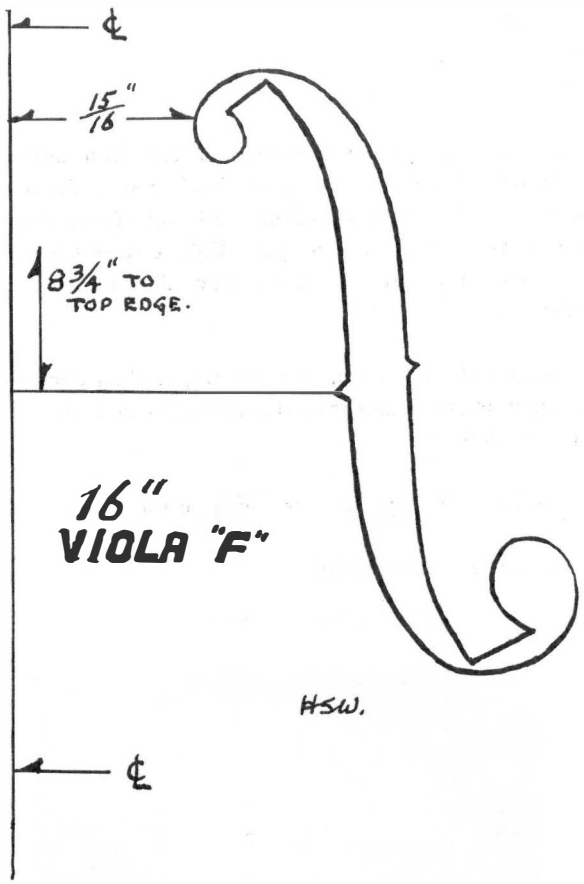
This "Amateur Work Illustrated" had been published as a monthly magazine and was of course very old fashioned by modern standards but just about covered everything that an amateur craftsman would be interested in; it was a sort of original "Do it yourself" book and each subject was dealt with by an expert; there was cabinet-making, scroll work, lapidary, bookbinding, (in fact the volumes that were now in my possession had been amateur bound from instructions supplied within); there was silversmithing and working in the precious metals, electro plating, countless recipes and formulas and yes, you guessed it, fiddle making; the well known work known today as the violin makers bible, "Violin Making as it was and is" by Edward Heron-Allen, was first published in the pages of "Amateur Work Illustrated" volumes one, two, and three, between the years 1882 and 1884; of course these volumes were about thirty years old when I got them and the series on violin making has been considerably revised since then.

Those volumes stayed with me for many years, having come to America with me in 1920, but somewhere along the line they got lost in the shuffle; they had served their purpose however as they had been a tremendous source of inspiration to me, who in those years even as now, was hungry for knowledge of the arts.

There was one portion in this series on violin making that particularly fascinated me, this was the description of a method for developing a violin outline, with dividers and compass on a given centerline; I remember completing the layout and showing it to my father but that's about all. Knowing that most of our readers have a copy of Heron-Allen's book at their right elbow at all times I can refer you to pages 136 through 139 of the second edition; it may be on different pages in the earlier edition but it's there, and I wonder how many of those who read this have ever made the layout. In recent years this method of developing a violin outline has crossed my mind many times and each time I would say to myself, "one of these days I will try it again" just to see how good (or bad) an outline it will produce; well the day came but in an unexpected manner and with rather amazing results. This brings us to the reason for this article.

Having sold my last viola which was a G. B. Guadagnini model 16 3/4" (Ref. "A viola in the making" August 1962 V. M. J.) I wanted to get another one started in order to complete a quartet of instruments, all made in 1963, for the forthcoming national competition at Phoenix in October; there was not much time for procrastination as this was early August; I wanted to make a 16" instrument this time because the larger size is just a little too much for the average player; but what about model and patterns for a 16" viola. I didn't have any and it was then that I remembered the layout on page 137 of Heron-Allen's book; now I could prove once and for all if the layout was any good, or even if a satisfactory instrument could be made by using this method for the outline. It is well over fifty years since I first saw this method and in all that time I have never heard of anyone ever having used it to make an instrument. Of course it can be used to make any size violin, viola, or even a 'cello; it is really quite simple but you must be very careful as the slightest misplacing of the compass point will distort the outline curves. My viola is now finished and the result is so gratifying that I feel our readers would like to know how it was done.

As previously stated, you can make the layout any size at all, but as the instrument to be described was 16" I will assume that you are making the layout for that size. First draw a vertical line on a piece of clean white bristol board or cardboard and mark off the exact length of the instrument you wish to make. In this case 16" exactly. The book gives the outline layout on BOTH sides of the centerline but we only need ONE side for a half pattern. Those of our readers who are adept at sheet metal work can put the layout directly onto a thin sheet of aluminum. Having established the length,



whether it be on sheet metal or cardboard this length must be divided into 72 equal parts, and then 20 horizontal lines drawn across at the points specified in the book and these lines marked A-B etc; horizontal line A being drawn at point 8 from the top, line B at point 14 and so on. Follow the text carefully until you have all the horizontal lines drawn and then, with compass or dividers you can develop the curves of the outline on one side of the centerline only; if your layout is on sheet metal you can either cut it out carefully to the line or drill tiny holes right on the line all the way around the half outline and cut it straight on the centerline; bristol board can be treated similarly except that instead of drilling through on the lines you can punch through directly onto your work with a sharp pointed tool. The sheet metal pattern is laid directly on the work with centerline to centerline and tiny punch marks made onto the wood through the holes in the pattern, not forgetting to add the layout for the button at top of the back. The main purpose of course is to get an accurate transfer of the half outline to your work then turn the pattern over and get the opposite half of the outline transferred. This way you will be sure that both sides will be in proper relation to each other.

The outline thus prepared and transferred to Spruce Maple for top and back was next cut out carefully and the back worked to a medium arching. The back thickness being 5 mm in an elongated central area and thinning out to 3.5 mm at the edges. The extreme edge rising to 4.5 mm. The belly thickness was made 3.5 mm all over and left just slightly full at the soundpost area. The extreme edge also rising to 4.5 mm. The belly arching is medium and rises a little more abruptly at both ends than that of the back to give a longer table area. The 'Fs' being spaced well apart to give good width to the table area. These f's are neither Strad or Guarnerius but were developed by the author to suit this particular instrument and I must say that they suit it elegantly. The ribs were made to a depth of 1 1/2" reducing to just over 1 3/8" at the upper block from the upper corners. The rib thickness was just over one millimeter or about .050".

The mold was made from two thicknesses of 3/4" plywood, bolted together and laid out from a half pattern cut to 5/32" inside the line of the outline half pattern. Other basic measurements of the finished instrument follow:

String length 14 7/8"
Nut to top edge of belly 5 7/8"
Top edge to center nicks of F's 8 3/4"
Between the F's at top 1 7/8"
Fingerboard height from belly 7/8"
Ribs 1 1/2" to 1 3/8" at top
Bottom of peg box to bottom of neck 6 1/2"
Bottom of scroll to top of back button 5"
Fingerboard length 11 3/4"
Across upper bouts 7 3/4"
Across center bouts 5 1/16"
Across lower bouts 9 1/2"

The tone of this instrument, both volume and quality far exceeds all expectations; it is well balanced over all strings and has great power on the C string with excellent timber. There are no wolf notes. Although the instrument is as yet unvarnished it is causing somewhat of a sensation among the professional (and amateur) players in these parts. It will be varnished by the Michelman process so as to be sure of it not losing any of the excellent qualities it now possesses. In fact the Michelman varnish will enhance these qualities as I have proved with other instruments.

And so ends our novel experiment and I hope this description will be of some help to those of our readers who like myself like to take independent action while still staying within convention. So let us now see how it will acquit itself in competition next October. I think it should do quite well for itself.

Harry S. Wake

Editorial Note:

This viola won a grand award in the Annual Competition at Phoenix, Arizona, held October 1963.

* * * * * * *

WHY CROOKED NECKS

by Geo. R. Wright

I was just wondering if any of our subscribers were having trouble with getting the necks of their violins glued in straight. I have designed and made a simple gadget that works perfectly.

The comparative size: it is simply a piece of 1/8" arborite, 4" wide and 8" long, with a wire loop to fit over fail fin and two wires at the broad end to fasten to No. 1 and No. 4 pegs.

Fig. No. 1 shows saddle glued on with soft pad to fit on the breast of the belly.

After fitting neck perfectly I use a soft, short wedge under the finger-board to retain proper height from belly. Be sure to use a hard wood pin in the heel to keep the neck anchored, then use one good clamp with well-fitted block on the finger-board and leather pad, tighten strings evenly and the neck can be drawn into exact position in a few moments.

Notice the fact of the two wires spreading each side of the finger-board makes it so the angle is slight and the upward satrain is nil.

Fig. No. 2 shows the simplicity of the job.

Yours for better fiddles.

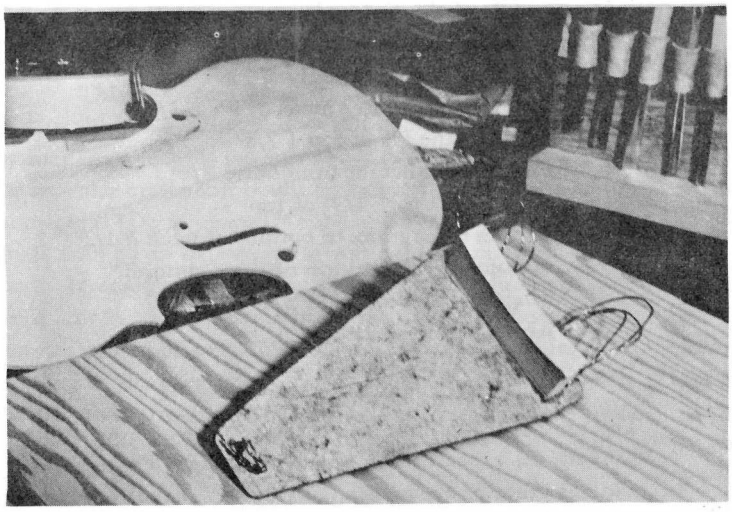


Fig. No. 1

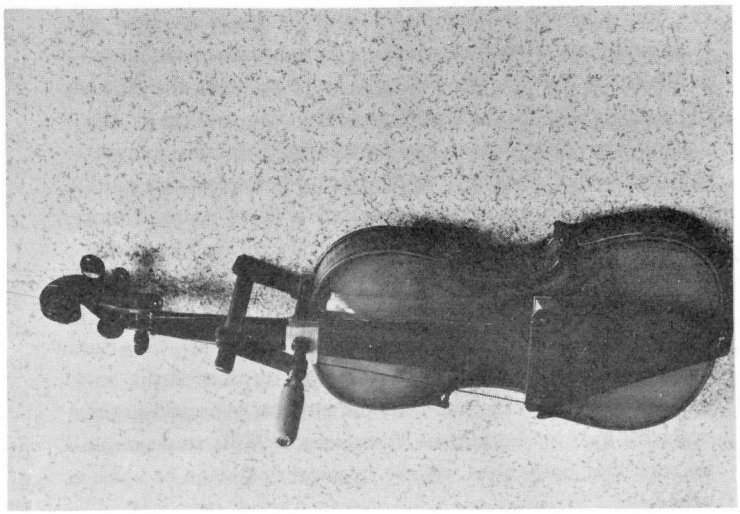


Fig. No. 2

WHY WASTE MONEY ON PAINT BRUSHES?

by Geo. R. Wright

I have spent too much money on trying to get a varnish brush that will not shed its hair. To date I have not found one, although I pay from $3.00 to $5.00 each. I admit I have not tried the sables, which run from $7.50 to $10.00. So I was struck with a thought - why not use sponge rubber, as a disposal job. So here it is.

Take a wooden clothes pin, whittle the end down a bit. Then get a hunk of foam rubber, or a piece 1/4" thick. Cut a piece about 1" by 2", trim the corners off, as in picture, fold and insert into clothes pin, leaving only about 1/4" outside for varnish.

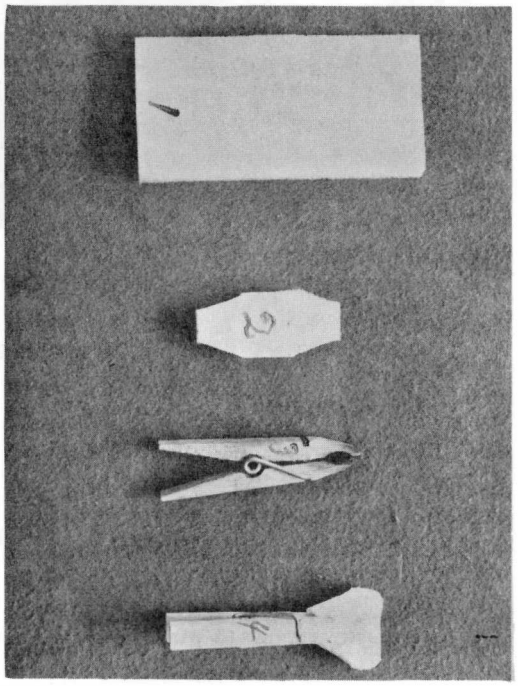
You may have to make a few adjustments on this point as it is important not to have too much hang-over.

It sounds foolish but try it out and see for yourself.

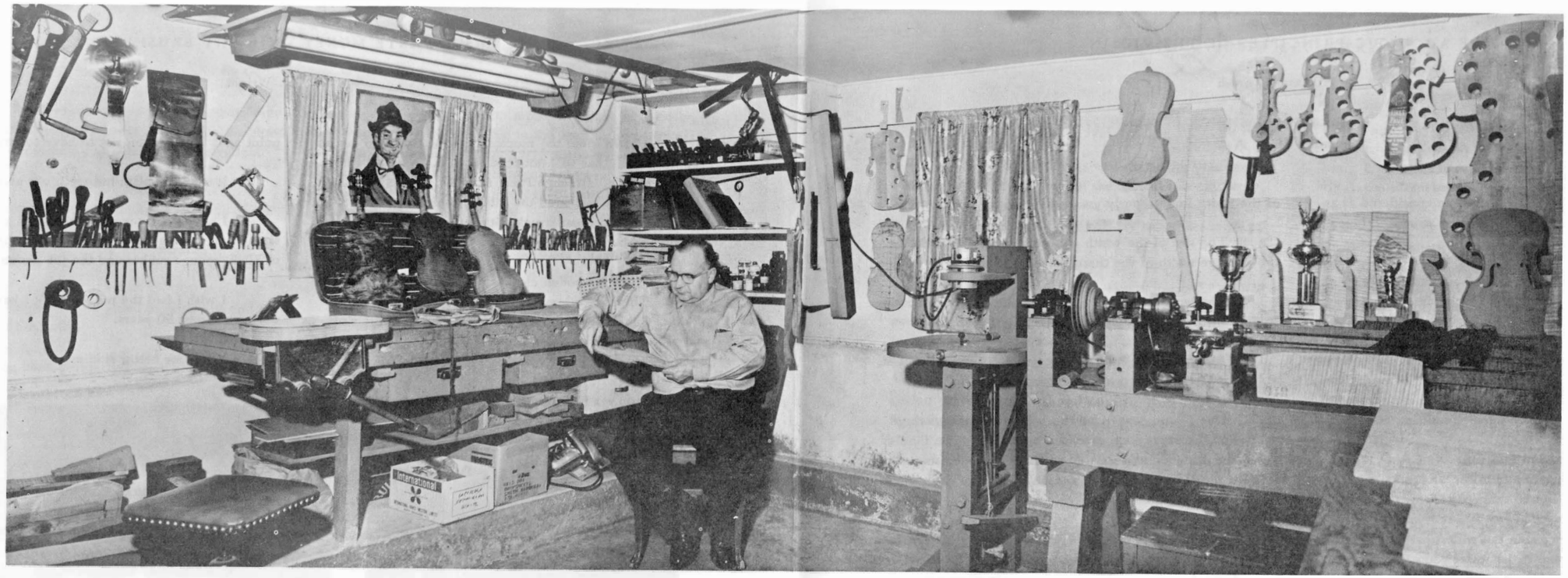
I have done several violins and a cello without a single hair falling out of it. Then just throw away the bit of FINE sponge rubber and the job is done.

I wish I had the money back I have spent on brushes during the past 50 years.

Yours for better fiddles.



1. Large piece of fine sponge rubber.
2. Small piece cut to thickness and size.
3. Clothespin trimmed at tip.
4. Complete job, ready to work.



WIDE ANGLE SHOT OF RAGNAR HELIN'S WORKSHOP
(photo by E. R. Cruise)

me to keep them satisfied. I also do french polishing.

I got married in Vancouver June 9, 1934, to the then Miss Elsa Adelena Sederberg, who had come from Soadom, Finland. We now have two boys, Ralph and Kenny. Both are musical. Ralph played the violin and piano quite well when he was younger, but he quit. Kenny played piano for a while, then took up drums. He worked very hard at it and claims himself to be one of the fastest drummers in Canada. But it seems to be no different to any other art. You can hardly live on it. There seems to be no place for art in the world anyway. It is more or less like professional cabinet making! It has to be a labour of love because there is no money in it. Even the Vancouver Symphony Orchestra is having a very hard time of it this year.

I play violin in a trio that I organized and we play music of our own choice and really enjoy ourselves.

I have been lucky enough to win the Cardo Smalley trophy twice and the Don White trophy twice for the Best Toned Violins in the Competition. I have also won many other prizes and ribbons. Heaven help me, I cannot figure my art and hobbies in dollars and cents, and if I did it would probably break my heart. I have done repair work for many years but discourage this, as I would rather spend my time making new ones. Right now I am working on a full quartet. I have been lucky enough to get all the maple from one piece of wood and the spruce from another. I hope some day I will be able to get some of my hard earned money back, but, old as I am, I can still go to work at it with a smile. I am one of those who never say die.

Now I'll tell you a little of my own experiences in the making of violins. I started with an outside mould at first, but burned it! I found that it was not reliable enough. The mould went out of shape easily and altered the curves. I have used the inside mould ever since with none of these problems. At first I made violins with the arching done by eye and did my best to get the "Cremona" look to them, but the voice I was searching for failed me. I then decided to follow the master and use the arching blocks and model from the 1720 Strad. This has paid off for me and I seem to be getting closer to the right voice. We have heard a lot of talk about new and old violins. My feelings are that although my instruments are rated highly and have won many competitions, I still have a long way to go to get what the grand old masters have.

For thickness of the plates, every piece of wood, even from the same tree, is different in hardness and there can hardly be a set thickness.

Of all the reading I have done on violin-making, and I have done plenty, I feel that Robert McGowan, in the February issue (1963) of the VMJ has come up with the greatest idea I have heard of. I tried his suggestions on my last violin and although I had to rush and not give it the amount of testing I wanted to, I came up with a voice that has more freedom and more beauty than I ever had before. I intend to use this idea on the quartet I am making now, and I will let you know how it turns out. That violin took the first prize and the Don White trophy for the best tone. I hope we hear more from McGowan as I feel he has much to contribute to violin making in general.

THE ACOUSTIC PRINCIPLES OF THE VIOLIN

by William H. Frush

Box 35; Atwood
Indiana, U. S. A.

The body of the violin should be considered as an amplifying box to which is attached the strings, bridge, bass-bar and sound-post.

The shape or outline of the body is the determining factor in locating the bridge and f-holes in their proper positions.

A circle drawn from the center of the plates should touch all four corners at the same distance. The division of the upper and lower halves is located in the center between the upper and lower corners, measuring vertically.

Each half is divided into five equal parts. The extreme width of the upper and lower bouts should be located between the second and third parts from the ends.

The distance between the widest part of the upper bouts and the widest part of the lower bouts is composed of fifteen divisions or vibration nodes.

There are nine of these nodes from the bridge location to the widest part of the upper bouts and six from the bridge location to the widest part of the lower bouts. The nodes can be expanded, contracted, raised or lowered to conform to the bridge location and the outline. The bridge location is the center of vibration. This is made possible by the difference in the size of the bouts.

The center of vibration of the back is found in the same manner as that of the top and the nodes should conform in every respect to those of the top. There are twenty-five nodes in the length and ten nodes each side of the center of the width in a properly graduated violin.

The size of the width nodes is obtained by taking the average width of the three bouts and dividing by twenty.

The bass-bar should be located on the second node to the left of center.

The f-holes are placed a certain distance from the axis to maintain the correct thickness of the top.

One f-hole centers on the left half of the average width and the other centers on the right half. The f-holes should be designed and located so that the same amount of wood is removed from above and below and on each side of the center of vibration.

The bridge is placed on the center of vibration by checking the vertical and horizontal nodes. The sound-post is centered on the second node to the right of center so that the nodes of the top and back are not changed in any direction. The bass-bar should conform to the left side of the top as the sound-post conforms to the right side of the top.

The top and bottom blocks should be the same size and weight. Both sections of ribs should conform to the center of vibrations, to the nodes of the top and back and to each other. The weight of each individual block and rib should be centered.

The strings, bridge, bass-bar and sound-post should be adjusted to blend with the body in both weight and vibration.

VIOLIN GEOMETRY

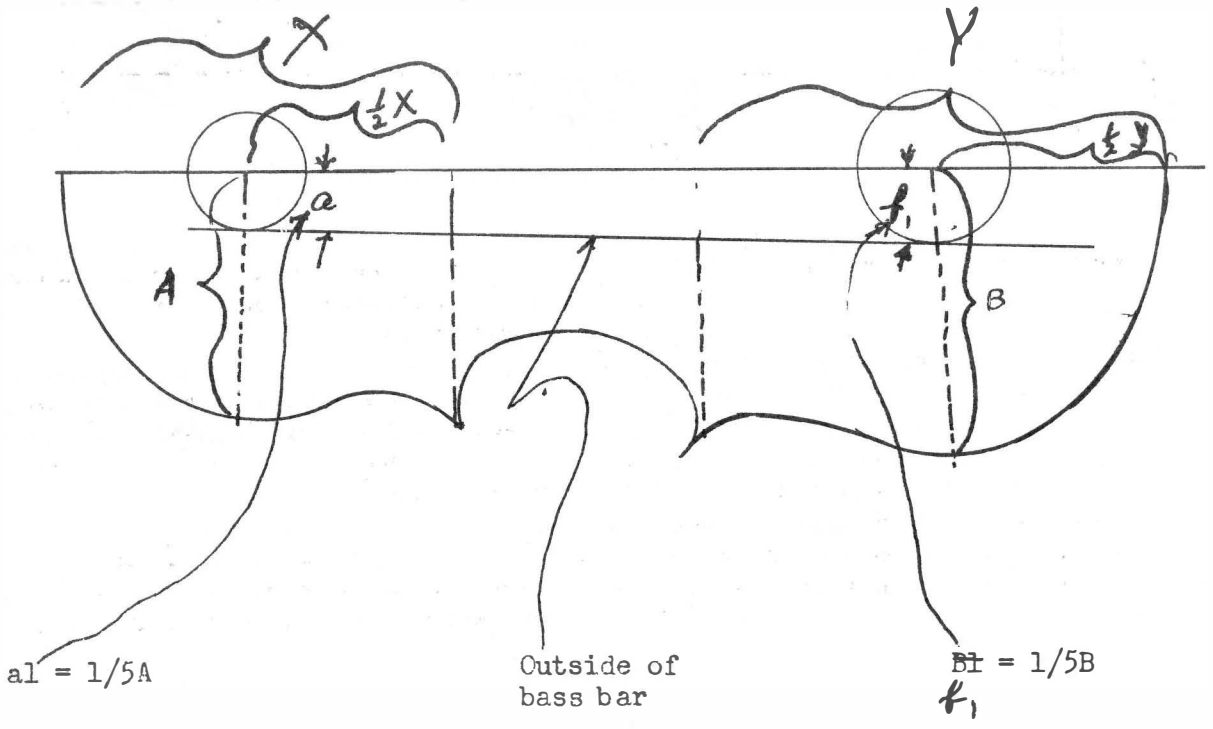
by C. C. Parker

"Dear Mr. Cooper: Nov. 28, 1963

Happy Thanksgiving, and thanks for your latest letter. I hope you'll forgive the shortness of my reply, as I'm all disorganized from having to pack up for the move to South Georgia, but will try to answer some of your questions.

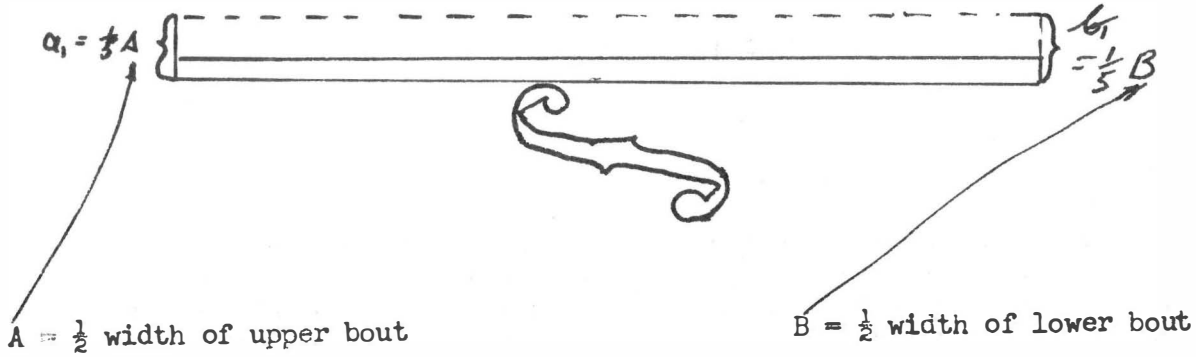
Up until about 2 weeks ago, I was just as much in love with that 5:4 relation in the violin geometry as you are, and it really hurt me to have to give it up in respect to the bass bar. I was very pleased with that violin outline, locating the bass bar, and ff holes, which I sent to you, until I tried to fit a bridge to it, and found that a standard bridge just won't fit. In the diagram I used two circles in the center of the upper and lower bouts to locate the bass bar. They were in relation to the bout widths of 5:4; i. e., the diameter of the smallest circles was 1/5 the diameter of the bout, and the larger 1/4 the diameter of the bouts. These circles established two lines which located the length and width and position of the bass bar. This is wrong because at the bridge line, the feet of the bridge should straddle these lines, but a standard bridge will not do so. This is the case of being so infatuated by a ratio that I neglected to see the obvious.

The correct ratio is as below.

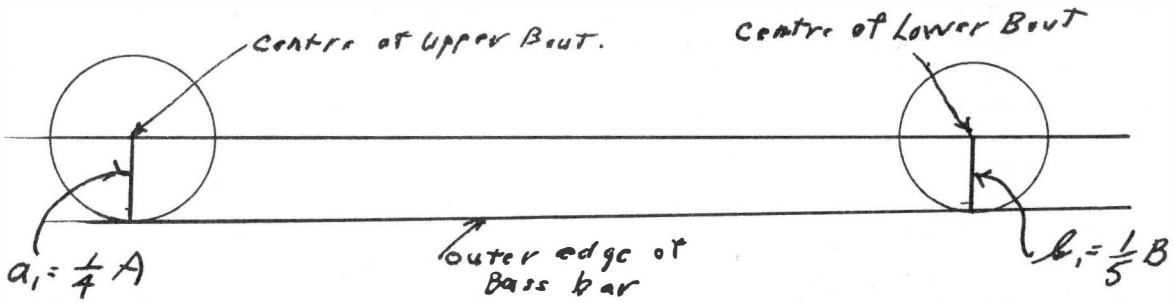


The 1/5 ratio then determines the outer edge of the bass bar and not the inner edge as I've shown it on my drawing.

The only remaining possibility under this circumstance would be for the ratio to be 5:6, rather than 5:4. The inner hole of the ff's should be on this line also.



There is another geometric position for the bass bar that I have noticed in a number of violins that seems to me to be geometrically illogical, as follows:



This latter puts the bar more parallel with the center line.

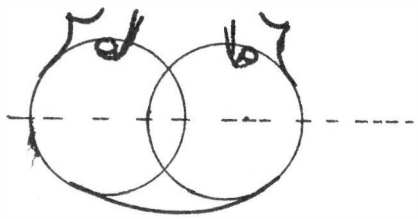
I have tried both of these later, and the 1/5 in both bouts seems to give better results on the G string.

I have not tried the bar and ff hole positions shown in my drawings. The results would be interesting to find out, but would require a wider bridge with a resulting wider string placement, (which would be intolerable to the violin performer) so like it or not, we must stick to the standard bridge width.

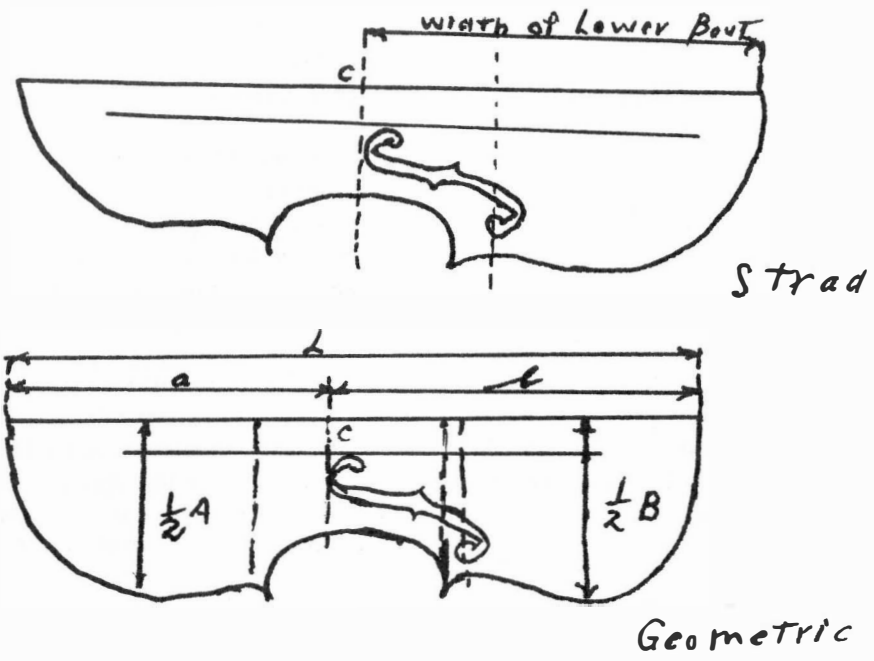
The angle the ff holes make with the center line is correct, I think, but should be moved closer together, as above described.

The lower part of the ff holes are correct, being located on a line tangent to the two circles that just fit the cheeks of the lower bout and have a definite ratio to the bout width.

The upper end of the ff's are tangent to the line drawn across the center line, and dividing the latter into parts which are in the same ratio as the widths of the bouts.



Although I believe the above to be geometrically correct, Strad. usually put this cross line up from the tail pin equal to the width of the lower bout.



$\frac{a}{b} = \frac{4}{5}$

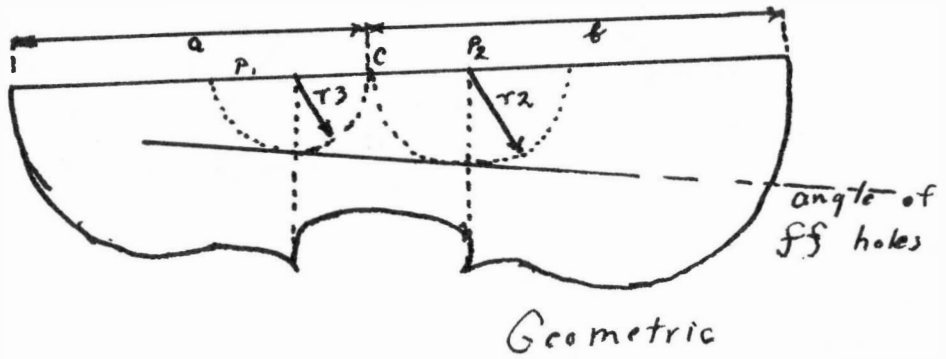
$a + b = L$

$L = .97\ (A + B)$

$a = .97A$

$b = .97B$

Also the angle of the ff holes



Perhaps the above will explain my drawing better.

My outline is based on the ratio of the bout widths to the length at the inside of the ribs. I used 5:4 because this is the average Strad. ratio, and the length is (.97) times the sum of the bout widths. I used this because it is also the average Strad. length in relation to the sum of the bout widths. Dividing the length into 72 equal parts may be very well for locating circles and their radii but it is not geometric. My outline can be drawn complete without ever knowing anything except the length, and the bout widths. In other words, it is strictly geometric, drawn only with a compass and a straight edge. The method is very flexible and any number of different shapes for the outline can be derived. (Which is the reason I found myself in error occasionally.) I will send you a complete description of the method as soon as possible, with photos. I'm familiar with the 72 part method described in several books, but I find no advantage in it. A good line outline is less trouble. For a geometric analysis of an outline, it is necessary to discover just what each curve is, how it is related to other curves, and why. The why is most important.

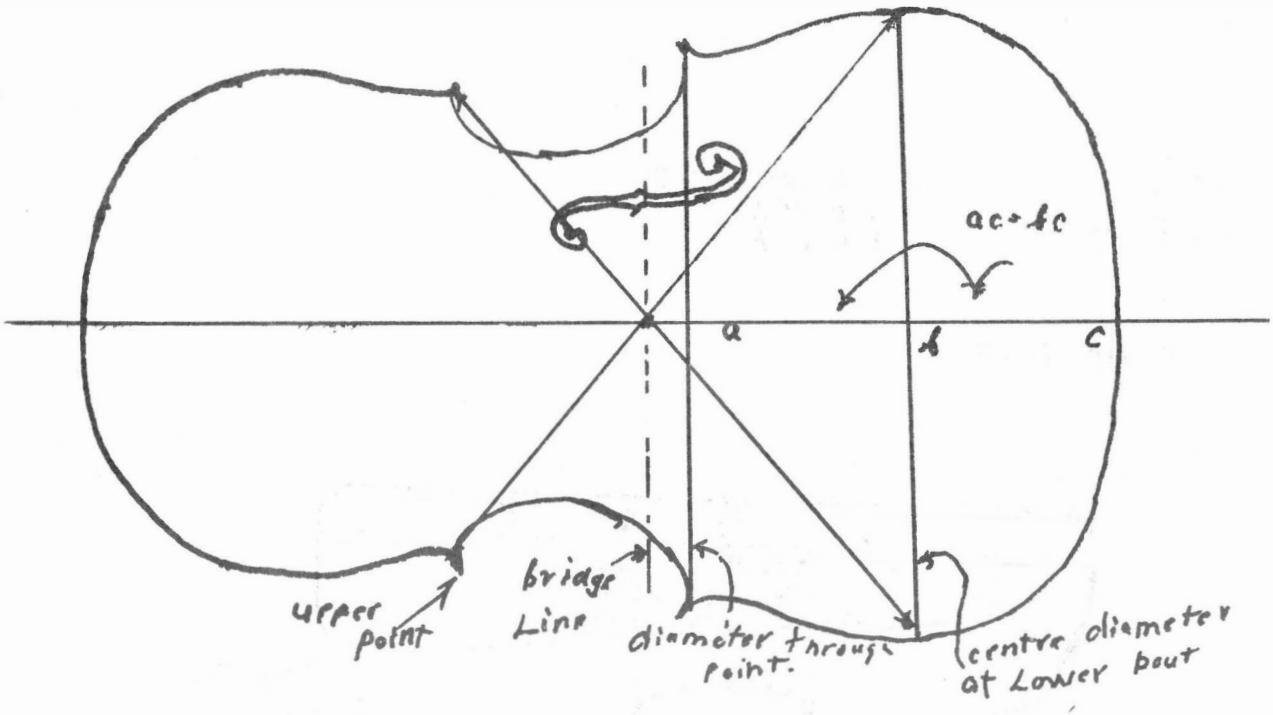
For example, a free-handed outline with the ff holes cut just anywhere cannot be analyzed geometrically, because there is no logic in it at all, although it can be redrawn by dividing into 72 parts and locating circles - but it can be redrawn easier by tracing an outline of it.

There is very definite evidence that the old masters did not draw free-handed outlines.

If you will take a good Strad. outline and draw a circle that just touches each of the 4 points of the inner bout you will find that its radius will have a relation to the length of 4:15; i.e., divide the body length into 15 parts the circle radius will be 4 parts. (This is, however, only true for certain periods of Strad.'s life.)

Also, if you will take your dividers and scout around in the Strad. outline you will find other relations. For example, the positioning of the ff holes cited above. In some of his violins a line drawn straight from the upper corner to the intersection of the lower bout diameter crosses the bridge line exactly on the center line.

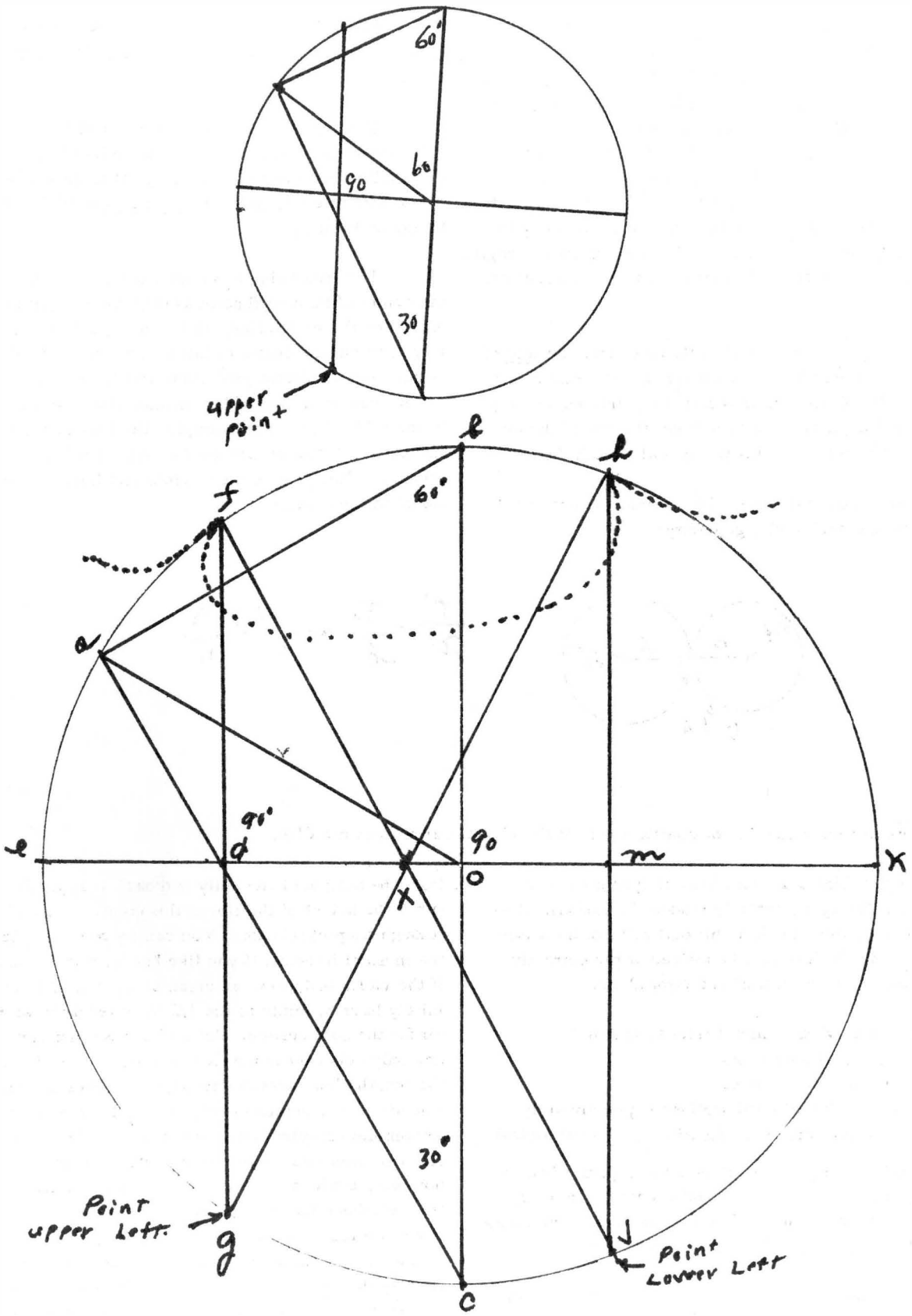
The location of the inner bout points in a Strad. pattern are like the key to a secret cypher, and even when



the above relations fail to hold - other definite relations can be found. This is all pure Euclid geometry, the only science of geometry available to the old Masters. And believe me, they used it to its fullest.

I use several other branches of maths. for my investigations, but I have always been able to reduce it to Euclid geometry so far.

You will find that in the geometry of a Strad. that the equilateral triangle is very important. Consider the circle that just touches the points of the inner bout:


60°
60
90
30
upper point
b
h
f
60°
a
90°
d
90
m
X
e
X
O
30°
Point upper Left
g
J
Point Lower Left
C

The above is a geometric analysis of the Strad. points of the inner bout on a 1720 Strad. and is the only kind of geometric analysis that is logical. You will note that I have made no reference to physical lengths, although the radius of this circle is related to the length in this violin by 4:15 (see the photo I sent previously). In fact, the entire 1720 outline can be analyzed in this same way and is related to the equilateral triangle throughout. In this way the length d m, the length of the inner bout can be calculated by the use of "trig." when the radii ob = r is given an actual length. In my opinion this is the only way a geometric analysis can progress.

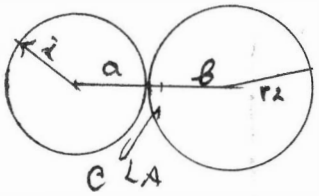
When geometry finds the relations, then the <u>why</u> of the question can sometimes be answered. The why of the above geometry of the points is that the points are the key to the outline cyphers - and from them the rest of the outline can be discovered. This is true with certain Strads.

I hope you will agree with me that the above is the only way to approach violin geometry.

In any event, it is the only way to approach the geometry of the bridge (which I will have to postpone until later.)

The outline I sent you (my own) with the misplaced ff holes and bass bar is derived in a similar way - but with some refinements to take advantage of some modern points of acoustic science, namely, <u>balance</u> (which I'll have to forego until later).

The idea being to so construct the outline, to place the center of its area (known as the Center of lateral area "CLA") on the bridge line, and then to graduate in such a way as to put the center of lateral gravity on the CLA. Strad. used a uniform graduating which took care of this and his center of area of his outlines always fell very close to the bridge line. For example, the CLA of a circle is its center. If two circles are tangent, it will be between them on a line joining their center and inversly proportional to their radii:



$$\frac{r'}{a} = \frac{r_2}{b} \text{ or } \frac{a}{c} = \frac{r_2}{r_1}$$

The CLA we are interested in, of course, refers to the vibrational or dynamic CLA.

Do you think that these kind of dynamics were above Strad. (being a relatively modern inovation)? If so, why did he take this trouble in his outline? For no reason at all? I cannot believe that he arrived at the correctly balanced outline through trial and error alone.

The bout widths which I refer to as A & B
A = width of upper bout
B = width of lower bout
averages in a number of good violins to approximately ($\frac{A}{B} = \frac{4}{5}$) or a ratio of 4:5, your favorite. The next logical ratio is 4:5:9, giving the length equal to 9 parts when the bouts are 4 and 5 parts. But this ratio does not hold up, because the average length of most good violins runs about 4:5 (8.73) varying somewhat from 8.55 to 8.82.

The inner bout width can also be brought into this relation but it is quite obscure as a musical ratio, and is only clear under a geometric analysis. Also, the thickness from belly to back. In a Strad. this thickness as measured from the outside of the belly and back is approximately 2 times the height of the ribs at this point. A very obscure (though simple) relation. You can try to relate these to the musical intervals if you like but for what reason?
If the violin body were an organ pipe, it would very definitely have to relate to the 1/2 wave length of sound in air for the note desired. But a violin isn't an organ pipe, and only acts very remotely like one. By this I mean that the length alone doesn't determine the enclosed air note. The air note is determined by the enclosed volume <u>plus</u> a "complex-couple" between the ff hole-size, and the resonant properties of the back, belly, and ribs. There is, however, evidence in my mind that the old makers made their violins related to certain notes for the purpose you have in mind - however this falls through because they had no way of measuring wave length in air at that time other than by the length of a standard organ pipe. Whether they did or not is immaterial anyway because the geometry gives adequate reasons for the measurements. Not to mention the fact that there are innumerable different musical

scales at different pitches, and that the pitch has changed a great deal since Strad!s time.

The ideal spot for the air resonance on the G string, so that it will sound with equal timber with the D string, is from B to C#, usually C#. This is at the upper end of the G string open position range (below the D). The resonance should also be broad or of a low Q with a height of about 40 DB.

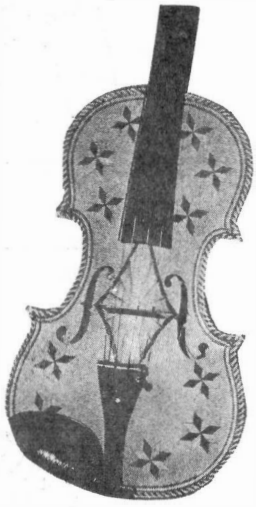
Because this corresponds to the 1/2 wave of sound equal to the length, I believe is a coincidence. (Because) consider if you will that in the days of the old masters the strings were tuned a full note lower, which would put the air resonance up on the lower part of our D string. A spot that produced a rather poor G string in our day. So that if there is any advantage to having the length of the violin equal the 1/2 wave of a certain note - we invented it - and not the old masters.

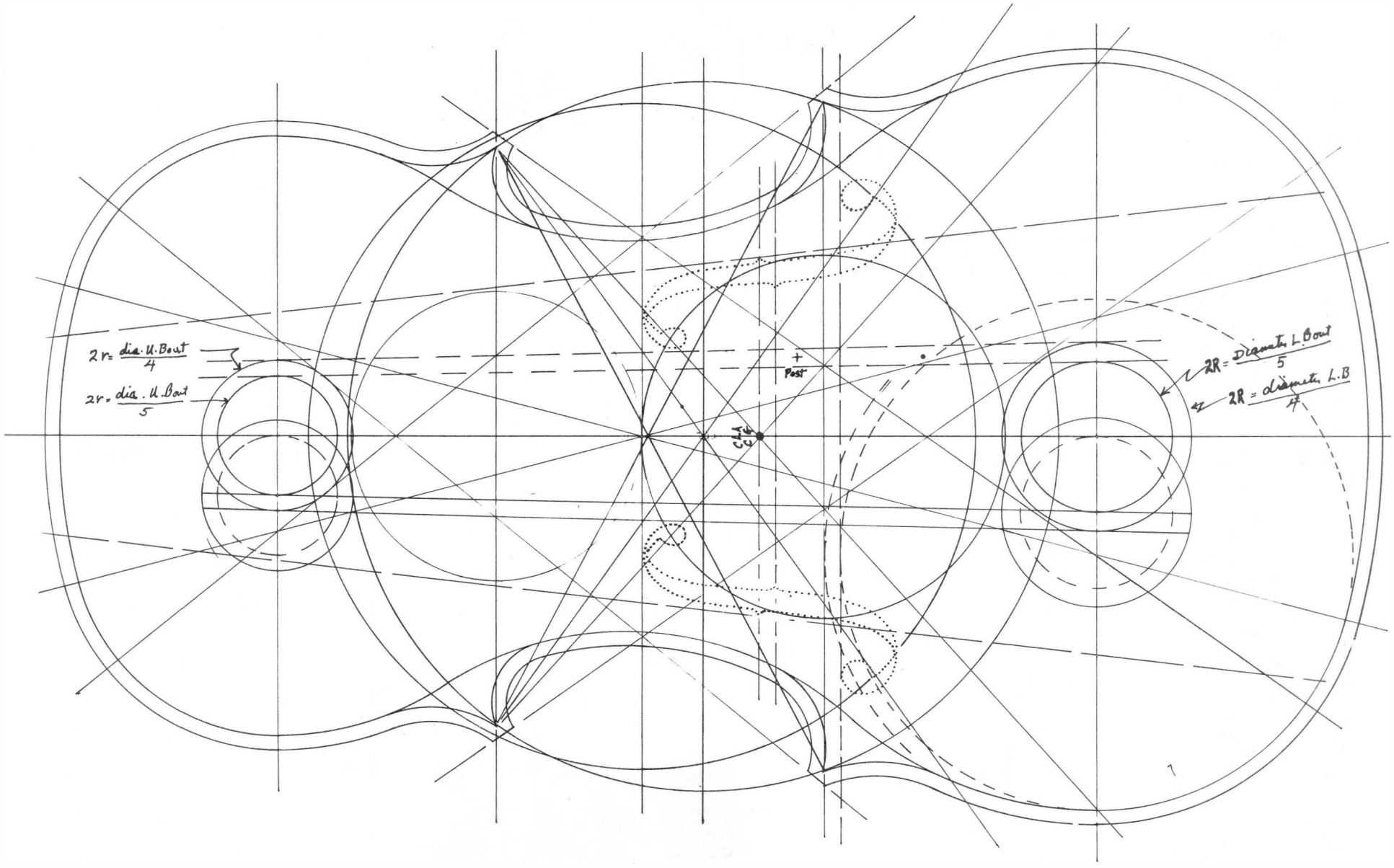
There is, however, a critical length for the violin, I believe, and it is somewhere betwee 13 1/2" to 14 1/2", probably close to what you say, 13 7/10", which is what I'm presently using. There is also a critical neck length (string length) and fortunately for us, it is just about what we are presently using.

The reason for all this, I believe, is the mass/compliance ratio of the various parts, and from there, we can adjust the rib height to gain the correct air resonance that we wish, for the best G. string.

I think I've covered all the points you mentioned, so until next time, I'm on my way to Georgia.

Sincerely,
"G. C. Parker"
1227 1/2 Beach View Drive,
St. Simons, Island,
Georgia, U. S. A.





Ratio: $L = .97(\text{dia UB} + \text{dia LB})$

L = length. = 14"

$\frac{\text{dia UB}}{\text{dia LB}} = \frac{4}{5}$

VIOLIN MATHEMATICS

by C. Cooper, Editor

A violin reflects the character of the maker and the quality of the instrument depends on the meticulous care which the maker has taken in producing the instrument. The final result is reflected by the skill and the accuracy of the maker. The usual method is to copy or follow plans of one of the well-known instruments whether they be a Stradivarius, Guarnerius, or Amati. Whether the plans are correct or not is something which is not always known. One believes that they are usually carefully copied, but then again if they are blueprints, or printed on a machine, invariably, the paper has been stretched and they then become of questionable accuracy. One of the problems therefore is to test the accuracy of such drawings. This would reveal whether the paper on which they were printed was stretched in any dimension. If there are errors in the drawing then the problem is how to correct them. It would seem that many violins made from such plans could produce disappointing results unless the maker became aware that there were errors and knew how to correct them.

The purpose of these articles is to enable you to understand the violin as certain dimensions and to provide a means of measuring them and in this way you may check the accuracy of any drawings which you propose to use. On the other hand, you may wish to make your own patterns using the mathematical methods described in these articles, and in this way you can even use your own skill in judging how to produce an instrument with a beautiful tone.

This beautiful tone in the violin is the object of our search. It is the tone for which we are striving, but may be cannot describe. Tonation is a description of musical sound and this musical sound combined with other musical sounds may produce a pleasant harmony. We must therefore consider all notes and their harmony. This, in substance, is the study of the intervals of music. In this study there are two phases, the description of the intervals, such as 3rds and 5ths, etc. Secondly, as a mathematical fraction expressing the relationship of two notes by comparing their vibration frequencies. The following chart in Figure 1 tabulates these:

Mathematics	1	$\frac{16}{15}$	$\frac{9}{8}$	$\frac{6}{5}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{7}{5}$	$\frac{3}{2}$	$\frac{8}{5}$	$\frac{5}{3}$	$\frac{16}{9}$	$\frac{15}{8}$	2
Notes	C	C#	D	E^{b}	E	F	F#	G	A^{b}	A	B^{b}	B	C
Vib. Freq.	261	293.6		326.2	348	391.5			435		489.4		522

C = 13" when sound rate is 1131 ft. per second.

The purpose of this article on mathematics is to point out that the measurements of the violin are based on the musical interval. I would suggest that you compare several measurements of the violin and you will note that various portions of the violin have a relationship to the others similar to the relationship of the musical interval.

Sound is represented as travelling in concentric circles. Actually, it travels in the form of spheres where the waves are emitted from a common center to all of the spheres and the diameters which expand from this sound source. No doubt you have noticed that the resinators made for Helmholtz were in the spherical form. The classic illustrations of the propagation of waves is the one in which they suggest that the pebble dropped in the still water of a pond produces ripples which is a visible manifestation of wave motion in the plane of the surface of the water. This illustration, of course, can be multiplied by dropping two pebbles into the water a short distance apart, giving a pattern of wave motion from each and a crossing and reflection of waves.

In substance, what we claim is that the violin should be made to accommodate the wave lengths of musical notes, and at the same time be able to accommodate the notes of the intervals. In doing this one must take into account the above-mentioned method of travel of sound waves.

The next problem is that of the resinator. It is interesting to note that a cross-section of the violin is similar in form to the cross-section of the ideal resinator form illustrated in books on Physics.

(to be continued)

A METHOD OF MEASURING THE CURVATURES OF THE VIOLIN

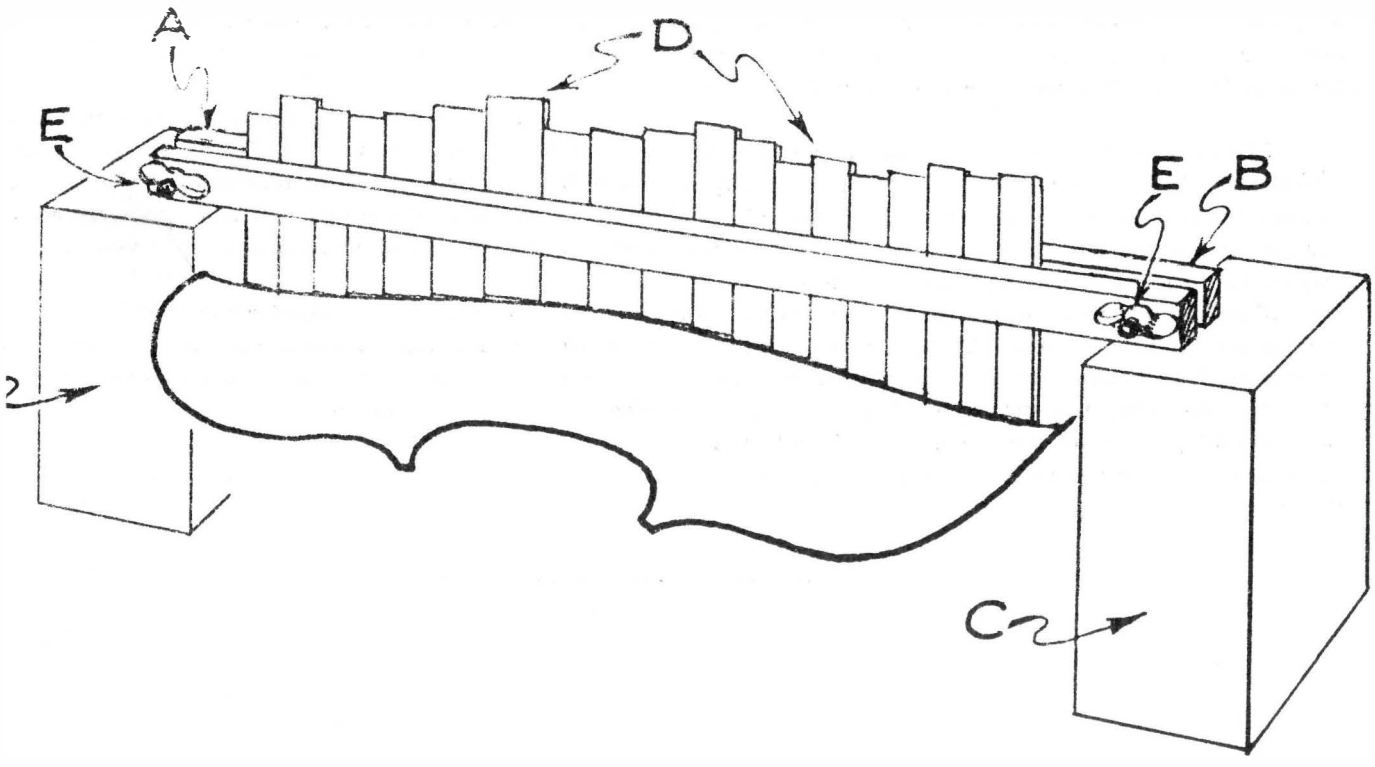
by Clarence Cooper
Victoria, B. C.

Quite frequently we have an opportunity to examine closely a good violin and wish that we could copy the curvatures in the fond hope of duplicating the good tone exhibited by such instrument.

The method of copying curves which is being suggested possibly is not very new but more than likely has been forgotten. The sketch shows the method intended. The tool consists of two strips of wood, lettered A and B, which are fastened together by bolts and wing nuts, lettered E - which are convenient for tightening the two strips together. In between the strips A and B are placed a series of cardboard strips - lettered D. The cardboard strips in the middle can be wider than the ones used at the ends. A convenient size is 1/4" for the centre ones and an 1/8th inch wide for the ones near the ends. To measure a top the two strips (A and B) are placed on Blocks C and then the cardboard strips are inserted into the slot between the two pieces of wood (A and B) and allowed to rest on the top and when on are placed in position. The two strips (A and B) are then tightened by the wing nuts E and the whole tool is then taken off the blocks and a curvature can then be traced along the edges of the strips. The process can, of course, be repeated to make the measurements of curvatures across the width of the instrument.

When making measurements as suggested above, the position of such measurements should always be noted so that the record is properly completed.

November 25, 1963



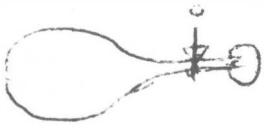
THICKNESS GRADUATIONS

by Egerton W. Shrubsole

Box 232, Sault Ste. Marie, Ontario.

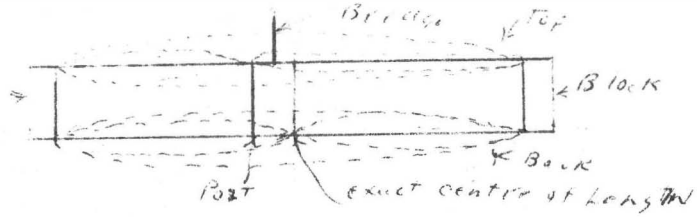
I would like to have you make a fiddle with my graduations. I think you would find the theory a little different from what you have been reading and I think you would be satisfied with the tone. First of all - quarter cut wood for back, belly and neck - in order as I mentioned before to put warpage to work in the right direction. Then the belly. 7/64" all over except in a circle 1 3/8" in radius centred on a point 8 1/16" from top edge (at sound post location) which is 8/64. By sound post location I mean on the centre join opposite sound post. The arching of the belly is 5/8" high at sound post (the highest point) on centre join and relatively flat from that point forward for about 3", falling gradually to purfling. Now the "f" holes measured between the 2 small upper holes are 42 mm apart. Now for the back. The arching if 9/16" high at the highest point (the exact centre of length) and is a true arc of a circle flattened off a wee bit at the top and bottom blocks. The graduation here is a bit more complicated, as follows. Measure from the top (or bottom) edge exactly 1/2 the length of body (7") and on the centre join set one leg of a pair of compasses and describe a circle with radius 9/16" and inside this circle make it 10/64" thick. Next circle has a radium of 1 1/16" and a thickness of $\frac{9.56"}{64}$. Next a circle of radium 1 11/16" and a thickness of $\frac{8.36"}{4}$. Next circle radium of 6/64". Outside that circle everything $\frac{4.78"}{4}$ thick. You probably think I am nuts to get 64ths of an inch divided into 100ths but actually it is quite simple to do, as follows:

Take a piece of brass or copper 1/2" wide and 20 centimeters long, 1/16" thick. Cut it so that it is only 4/64 wide at one end and tapering to the other end to 24/64". Thus you have a wedge-shaped piece (with both edges perfectly straight) that tapers 20/64 in 2 centimetres. Now divide this by scratching at the proper places with a darning needle in millimetres and it follows that it tapers 1/64" in every 10 mm; hence it tapers 1/10 of a 64th in every mm. By guessing at the division of mm into 10ths you can set your calipers very close to 1/100 of a 64th. But you may say - how do you calibrate to these small tolerances? Quite simple. I use a pair of calipers like these (diagram) that



can be bought in any hardware store and I round off one jaw and file the other jaw to a knife-edged point like this:

By moving the calipers over the surface the knife edge leaves a slight scratch or cut when you get close to what you want, which is removed with a scraper and the process repeated until you get exact thicknesses. I have found that the back is of much greater importance in the production of tone than the belly and this can be understood since the belly vibrations are controlled by the post and the bar while the back has no control except the arching and the thickness of wood. I find that by making the arching and graduations plus bar, sound holes, etc., the same I can duplicate the tone of any of my instruments and to hell with hap tones, etc., providing the wood is acceptable. I can get almost identical results with a wide variation of belly thickness providing the arching, etc., and the back graduations are identical. After much experimentation I have arrived at the back thicknesses that I have given as being the best, and the belly has enough wood but not too much. Any slight alteration in the back will cause a difference in tone. And now I'll try to describe the theory behind this. I'll draw the plates as though they were flat to make it a little more simple.



I have pencilled in the two types of most prominent vibrations above. On the belly you get a depression of the whole plate shown by the long curve. You also get an oscillation or teeter totter centred on the post depicted by the shorter curves. Similarly on the back you get the same effect except here the post induces the vibrations and the thicker wood plus the greater curves at the centre of the instrument provides the impediment which makes it also vibrate partially, as shown. A little thought will show that these partial vibrations or should we say harmonics, occur in the back and belly at the same instant, in opposite directions. I might add that until I started exploiting this theory I was getting nowhere as far as tone was concerned, but since, I have produced some good instruments, having sold a cello for $1000. and violins up to $500. I believe that the belly arching of Jack Batts has considerable virtue

and am going to investigate this further. It may be that I'll have to alter my scheme of thicknesses somewhat to get the most out of this arching. I may also have to alter the graduations of the back with this B. C. wood of yours. Incidentally, look up my articles that you published in the Journal on the placement of the bass bar. This theory may sound a bit strange, but I have become rather skeptical of a lot of ideas that are expounded without a reason, either given, or one that I can figure out. Hence my respect for Jack Batt's arching. Anyone can see that the arching he advocates will give freer vibration to the belly since it is founded on the well known fact that a flat surface vibrates with less resistance and freer than curved one. I hope you can follow the rather sketchy outline of this theory.

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COMMENTS ON THE BASS BAR

by W. H. Meerburg
P. O. Box 382,
Salisbury, S. Rhod.

I read Carleen Hutchins' article in the Scientific American and the thing which struck me that one of the drawings showed the bass bar at a right angle with the inside curvature of the top. Almost all books tell you that the bass bar should be perpendicular to the gluing face or truly vertical with the exception of a book written by F. Geiger and L.M. Cole, 14 E.Jackson St., Chicago (in my opinion the best book on violin making ever written). We all know that it is best to have the grain of the belly at right angles to the arching, so it is only logical to have the bar running in the same direction. I had a violin made to Norman Miller's idea but did not like the tone much. I took it to pieces and returned in accordance with Skou's microtone system (which I also hold in very great esteem) and put the new bass bar in at right angles to the inside curvature and the result is excellent.

THE THICKNESS OF THE PLATES AND THE BASS BAR

by A. R. Hill
12639 Trans Canada Highway, North Surrey, B. C.

What are we looking for in a violin? Most makers are looking for a Strad. tone. I look for smoothness in tone, but sometimes softness is mistaken for smoothness. A Strad. is both loud and soft but a recording does not show how smooth it is. The best violin I tested was graduated as follows:

Starting in the centre between the feet of the bridge in a circle of 2" in diameter the thickness is 1/8", plus .006". The same thickness continues gradually outward and gets thinner in circles increasing in diameter by 1/4", about .002", as you proceed towards the edge. Any other way of graduating produces tone but it is not as smooth. By imitating the old violins you are not going forward.

How to Place the Bass Bar

First, measure across the lower bouts on the inside of the violin and suppose this distance is 198 mm - divide this by 10, which gives you 19.8 mm. Now measure across the upper bouts inside the violin and say this distance is 160 mm we divide this also by 10 and get 16 mm. Now if we draw a horizontal line from the lower bouts to the upper bouts we notice that it is closer in the upper bouts to the centre line.

Suppose the bass bar is 10" long, 5" on each side of the bridge. The horizontal line is near to the feet of the bridge, one is close to the sound post and the other is close to the bass bar. The bridge I have is 38 mm wide on the outside of the legs so that from the centre line on the violin to the outside of the bass bar should be 19 mm. So taking the approximate difference in the horizontal line or centre of the bass bar should be 2 mm closer to the centre line. I stress this because you may not make a 4 mm bass bar onto the belly. This would give you 16 mm from the forward centre end of the bass bar to the centre line of the violin and the other end (in the lower bouts) 19 8/10 mm. This is about 2 mm. farther from the centre than some books give but this is the best way to figure out the problem. The 2 mm means of course horizontal at both ends, i.e., out further 2 mm.

But placing the bar is not all. The height of the bar is just as important. It should be 7/16" under the bridge which is about right and be sure the bass bar tapers evenly to nothing at the ends. Start the taper from the center not a little way away or your note "C" will suffer. The bass bar should be at an angle of 90° from a straight line of a ruler placed across the outer edges of the inside of the violin.

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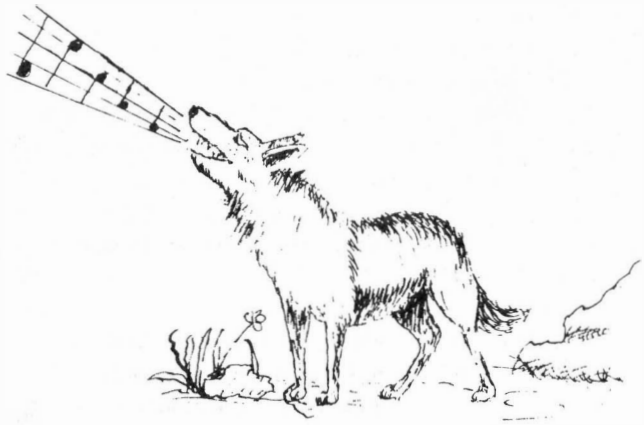
Wolf Notes

by The Editor



Comments from Carl Farseth

Ever since Otto's days we have been trying to shake the thin edge, and what does Saunders do? He thins the edge even more than Otto. Deterioration of the glue in purfling is just as bad as anywhere else.

I believe makers should be encouraged to discuss their tools and gimmicks. I have one bar steadying the bridge (giving it a third leg) when sanding its feet. Some Vancouver maker no doubt uses one similar.

I believe down-under Miller's problem with too little and too much pressure of bridge on top is due to varying angles at which the neck is set. It is strange how many makers don't pay any attention to the neck angle. Set at too great an angle the sound doesn't come out of fiddle (bridge is too heavy), set too straight the fiddle is very easy to play but the tone is weak.

Shelving can be a boon or curse.

Carl Farseth,
4024 Elliot Ave.,
Minneapolis, Minn.

Editorial Note:

Mr. Farseth's comments on the thickness of the top may be a little confusing and require some explanation. While there are many reasons for this I would only like to discuss two of them.

1. The thickness of the top is usually uniform and if anything, has a slight taper towards the edge. The top receives the vibrations directly from the bridge and in turn, transmits these from the post to the back and along the bass bar to the upper and lower bouts. The top is close to the sound source and hence the intensity of the sound does not diminish as quickly in travelling along the top. The nature of the wood, i.e., the fibres running lengthwise, readily carry the sound along the length of the instrument and hence very little change is needed in the thickness towards the top end. It must not be overlooked that the bass bar itself is thick in the centre and then tapers towards the top and bottom. This tapering effect amplifies the sound in the upper and lower bouts. With such a fixture as the bass bar the top should then be of uniform thickness.

2. The purposes of changing the thickness of the top is to tune the plate to make it compatible with the back plate. This is accomplished in two ways:

(a) If the note of the top is too high, then the plate should be thinned in the centre.

(b) If the note at the top is too low, then the plates should be thinned near the edge.

* * * * * * * *

Measurements

You asked me to pass along any measurements I made so you could compare them with Smiley's. I measured around the mold outline on Reid's plans and Chelsea Fraser's plans and got just 100.0 cm. I took a print of Reid's outline and got a balance point about 1/16" towards the candal end from a line through a point one-half way around the mold outline or at the 25 cm. mark. This placed the balance point 1/4" ahead of the bridge line for a stop of 7 5/8". With a planimeter measuring to .01 sq. in. I got the following results:

Cephalic to BP	- 242.5 cm^2
Candal to BP	- 297.7 cm^2
1 plate totals	540.2 cm^2
Rim + blocking	59.0 cm.
1 diaphragm area	481.2
2 port area = 10.6 cm^2	

As you can see I came out very close to 540. cm.

for one plate area but got about 1/2 again as much for rim+block. Of course Smiley said not to bother with unnamed and undated plans but I was interested in seeing how close Reid's was to his specs. Norman Miller wrote me once that Reid's plan had too much overhang beyond the ribs anyway but think he was referring to his plan with the first edition. Mine are the vellum plans and his blocks and overhang may still be too large.

When I have more time will planimeter the "Earl" as shown in the Journal and see how I compare. The only named Strad. plan I have is a blueprint of the Dolphin which, being a blueprint, is not too exact scale as the dimensions are shown in several places and do not agree. The fellow I just found out was interested in violins and lives about 60 miles from here said he would be glad to loan me his outlines. He has them for the "Alard" Strad. "Pagannino" Guarnerius, and "Old Bull" Amati. These came from a Mr. William Lamb who was in business in New York City about 1900. I'll get them and see what they measure up to if I get time.

"Wendell"
157 N. State St.,
Concord, N. H.

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The Speed of sound

The speed of sound along the grain of wood can be calculated from the following formula:

$$c = 812 \sqrt{\frac{E_L}{W}}$$

where C = speed of sound in inches per second,
E_L = modulus of elasticity in compression parallel to grain in pounds per square inch.
W = weight of wood in pounds per cubic foot.

For example in the case of sugar maple in the air dry condition, table 4 in the Tech. Note. 3, Forest Products Laboratories of Canada, gives the following values:

$E_L = 2,070 \times 10^3$ lb. per square inch.

W = 46 lb. per cubic foot

therefore, speed of sound $= 812 \sqrt{\frac{2070 \times 10^3}{46}}$

$= 1.72 \times 10^5$ inches/sec.

In the case of white spruce in air dry conditions speed of sound = 1.98×10^5 inches/sec.

FORMULA FOR CONVERSION FROM METRIC TO LINEAL

$$\frac{\text{Weight of Sample in grams}}{\text{Volume of Sample in c. c. 's}} \times \frac{6556}{105} = \text{lbs. per cu. ft. (W)}$$

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Correction for Mr. Ratcliffe

"The Editor: Dear Sir:

In your issue for June - July, on page 31, in Wolf Notes, I am afraid you have misread my letter as I said I did agree that the small micro tones in back and belly should match each other, the word "not" should not have been put in. I hope you will correct this. Since writing you Mr. Skou has furnished me with full information on his methods but I have not yet had time to carry out experiments owing to having had a long period in hospital.

I congratulate you on having provided a first class Journal on matters appertaining to the various members of the violin family. Please keep up the good work.

Some of the books on violin making contradict each other; one says the tap tone of the belly should be C and the back D. It then goes on to reverse these intervals. Tap tones are not much use anyway, but I can assure you one has to have a super ear to hear the small micro tones, as a musical note and not just noise. Also the selection of timber for both plates must be done by an expert with much experience. This is one of the chief factors which makes a properly made violin sound good.

It was a great shock to me to hear of the death of Don White. I corresponded with him quite a bit. I think the world has lost a fine maker.

Re fillers; the late Justin Gilbert used mostly ordinary rosin in turps as a filler, but he also stated it would not do for ordinary thick violins as made by some modern makers. I was the first maker in England to use his methods years ago, long before the book Cremona Technique was printed. I do not however use this system now. He also was a fine experimenter and gave years of his life to some good work.

It is a mistake to make the plates too thin as is evident in some work. There is always a risk of losing solidity of tone. Great experience of the wood in hand is a great asset. I have an open mind on the use of fillers.

Best wishes, Yours sincerely,

H. W. Ratcliffe"