FELLOWSHIP OF MAKERS AND RESTORERS OF HISTORICAL INSTRUMENTS

BULLETIN AND COMMUNICATIONS. APRIL 1978

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Bulletin no.11 April 1978

I must begin with an apology. This Bulletin is late because of a pile-up of work here; a book was due at the publishers on 1st April, there was an IFMC UK Conference in Edinburgh, from which we got back last night (Ian Morrison read a very interesting paper on Middle-Eastern lute construction which will appear in our next issue I hope), and I've got a run of lectures this week and next, which will delay its completion now that I've started.

EDITORIAL COMMENTS: A number of people have commented on the editorial comments made on the article by Bryan Tolley and his pupils in the last issue (Comm.100), and we have had a general sort-out on this. We want to keep the opportunity of commenting for two reasons: a) it saves three months if we comment in the same issue, and one of FoMRHI's aims is speed of communication; b) sometimes there are aspects of fact or opinion of which the reader should be aware, which, in a slower periodical, could be sorted out by an editor writing to the contributor, who might then revise, etc, etc, but which all takes time. What we have decided is that in future, whenever possible, such comments should be here in the Bulletin, and not attached to the Comm. in question, and that they should be clearly attributed to whomever made them. Further comments on Comm.100 will be found below.

LIST OF MEMBERS: The 1978 List herewith. Please throw away the 1977 list since there are a number of changes of address, and if you look people up in the wrong one, your letter won't reach them. There have been very few comments on the organological and geographical cross-indices. I hope that this means that you find themuseful, since they take the most time to do. Renewals are still coming in (in April, delayed from January!), so there are a number of old members who don't appear but who may turn up in the supplements. Despite the suggestion at the Seminar and the note in the last Bulletin, nobody has sent me details of period (med, ren, bar, etc), so it doesn't seem worth specifying the three or four that I know.

NEW FELLOWS: Cary Karp, Rodger Mirrey and John Thomson have been elected.

EUROPEAN SUBSCRIPTIONS: Cary Karp tells me that our issues take a month to reach him in Sweden, and asks whether he could pay the extra for them to come by airmail. When we first started we did send the European ones out by air until someone suggested sending them very much more cheaply as printed matter; we tried this, asking the people to whom we sent them whether they arrived in reasonable time. They said that they did, but these were people in France and the Netherlands, which are nearer than Sweden. The snag is that there is no printed matter by airmail rate; it's either full-rate letter post by air, or reduced-rate printed matter by snail (if it takes a month to reach Sweden). Anyway, we've discussed it and we think (and hope) that we can run two rates without confusion, so you can have the option. Those who are happy with things as they are can go on paying at the same rate as the UK. Those who want to can pay an extra £1 a year and get them by airmail. There are only two issues left for this year, so it's up to you how you get an extra 50p to me without paying more than that to do so. Eurocheques are no use - it costs me 75p to collect them here, and presumably costs you something to buy them. Giro works alright this end, but I don't know what it costs at your end. If you don't mind wasting a couple of pennies, and can get hold of one, put an American dollar bill in the post to me!

AREA SECRETARIES: It has been suggested that more news would get into the Bulletin with greater speed if there were area secretaries in those countries where we have more than one or two members. Someone could collect information about courses, publications, news of all sorts and so on and send it in as the American Bulletin, Netherlands Bulletin, etc. What do you think of this as an idea and, and more important, who will volunteer to do it? I'm all in favour of local FoMRHI branches to speed communication and speed contact, provided that you send stuff in here as well as locally, so that we can all benefit. As I've said before, I'm also in favour of translation of our Bulletin and the Communications, but that's a much bigger job. To start with, let's have some volunteers to act as local clearing-houses for information.

SEMINAR: Sahlan Diver writes suggesting that we charged too little (£3) for the 16th century Seminar and that it should have been £8 or £10 and that the surplus funds could have been used to advantage on other FoMRHI events. I replied that we charged £3 because that covered our costs and FoMRHI is a non-profit-making organisation (we did make £30 profit in fact, and we're using it for subscriptions for people who cannot send money abroad); I'm not paid anything, nor is anyone else (that is what Honorary means). However, I thought that we should have your views on this. Should we have charged more? What should we use a profit for? And, while you're answering, should we have another Seminar this year? And what on? My own view on the last is that it should be restricted to one or two instruments and should include, if we can work out how to do it, workshop practice. All comments gratefully received.

FURTHER TO: Comm.72: Philip McCrone tells me that Picton Press have reprinted their edition of the Encyclopédie plates.

Bull.9, p.4: Florence Abondance says that the plans Mel Sartain referred to are an old series. There is a new series (a list will be found elsewhere in this issue) of plans and post-cards. There are also black and white photographs, showing front,back and side views, available of all the instruments which plans are published for. There are also another 1800 negatives in the Museum, and a list of these is in preparation; I have asked her to send me a copy when it's ready.

Bull.9, p.4 (this is 4 at the bottom of the page; the previous was 4 at the top - it was only with Bull.10 that Djilda and I finally got into step by my numbering my first page as 2!): David Sutherland has sent us further information on the Giusti harpsichord in the Stearns, and will send further copies, with photographs, on request. I queried his use of the term "gravicembalo col fort'e piano", which he says does not imply a hammer action but the presence of knee or foot levers to change the registration. A drawing was made of the instrument while he was restoring it, and this will be available from the Stearns in due course. He is interested in exchanging information about the instrument with anyone interested in 18th century Italian keyboards.

Comm.84: Paul Hailperin says: "The idea that irregular woodwind bores were produced by a series of several tools has often been repeated, but I have not yet seen any proof of this. I have made 'complex' reamers and made instruments with these, and find that the resultant bore can be indistinguishable from the model being 'copied'."

Comm.86: Paul says: "Trever Robinson writes that 'uniform swelling by 3% would ... decrease the bore ...'. As far as I know, uniform swelling will increase the bore. But in practice woodwinds are seldom moistened uniformly by playing on them, and do not swell uniformly. If only the inside is moistened, the result will indeed be a smaller bore."

Comm.98: Paul says: "If someone is researching Cerrobend, I would be very interested to know something about the contents of this alloy, and

especially whether it is poisonous." John Rawson tells me (JM) that it is not toxic, so far as he knows.

Donald Garrod says that he consulted a doctor friend who was a consultant to various factories in Birmingham, not that he was alarmed for he has melted lead for clock-weights as well as key-weights for years without harm. He was assured that provided he washed his hands after handling lead, and worked in a well-ventilated room, he would come to no harm. He says that he would be more terrified of using John Rawson's chain-saw than lead. He is worried about some of the modern equivalents of shellac, whose labels warn that they emit powerful and toxic fumes, and we would welcome further information on these and any other potentially dangerous compounds in use today. He adds that wearing an industrial mask is always a good idea if you expose yourself often to fumes or dust. I would add that it is not necessarily only coal-miners who get silicosis - fine dust in the lungs, whatever material the dust comes from, is not really good for you!

Comm.99: Paul Hailperin again: "I am a great believer in allowing wood to warp at every stage of work, and feel that I have been successful in making oboes that stay straight by using this technique."

Comm.105: Rémy Gug apologises for his bad English and says that he is preparing a further Comm. answering some of the queries. We've had one comment on his English, suggesting that a new translation should have been made and checked with him. My reaction was that FoMRHI is for quick interchange, that it was all comprehensible and that we should be grateful to Rémy for sending it in English rather than French. My own feeling, very strongly, is that FoMRHI prints what it gets as it gets it and that providing it is comprehensible it does not have to be elegant. Your opinions on this would be welcomed.

Comm.106: Cary Karp says:"Whaddya mean 'no indication of which' Meantone?!? Anyone erudite enough to know that there might be several should certainly be able to see from the description of a tuning with all pure major thirds that it is,indeed, Aron's quarter-comma which is being described!"

More seriously, John Rawson says that he finds Klop's book more useful than Cary's leaflet, though Klop costs £2.75 whereas Cary is free. The least useful section of Cary's is that on Equal Temperament, which "is only one step removed from 'Fit twelve equal semitones into one octave' which is the problem, not the solution. What one needs is all the beat rates written out, including the rates for lots of check points." Of course, as he says, not many of us need equal temperament.

Comm.109: Paul Hailperin told me that early fifes are rarer than I suggested, and more important, and that he has just restored the two earliest listed. He is helping Stradner compose an answer to my review; I've not received it yet, but unless it has gone straight up to Manchester, it will be in the next issue if it misses this one.

Comm.111: Cary Karp tells me that the first volume of the Studia Instrumentorum is now out of print.

Please keep such comments as these coming in.

FURTHER TO COMM.100: There have been so many comments on Eph & Djilda's comments on the back page of the last issue that I felt it should be a separate section, instead of lumped in with the above.

Bryan Tolley says: "In defence of the instruments designed to be made at school (Comm.100) I would like to state the following points:
1) The instruments were designed purely as a project for some young children (12-14) keen enough to want to make their own instruments.
2) Materials used were those available at the time and the construction

was simplified as much as possible.
3) I agree with the critic that the hurdy-gurdy does not look like a copy of a particular instrument, but it works and sounds fine which was the main aim of the project.
4) The fiddle and psaltery have an appearance resembling medieval prototypes despite a totally different construction; surely the aim is to produce something that is playable; a 12 year old is not concerned with authenticity but more with getting the thing made to hear how it sounds.
5) Finally, I would like to emphasize that these instruments have been designed for schoolchildren and made by schoolchildren. They are not examples of the instruments I make for sale. For these I use traditional methods and materials and compile a folder of data before starting any new project in order to ensure a reasonable standard of authenticity. Early music has great potential for use in schools....With the financial restrictions placed upon school spending it is unrealistic to expect the purchase of say a consort of viols to promote interest in early music. I feel that the instruments made by some of my pupils form a satisfactory, economic and worthwhile approach to the problem. They are not intended as the ultimate in simplicity nor are they intended as a cheap D.I.Y. alternative for the serious musician (although I see no harm in anyone producing their own versions of our instruments), they are just designed to be made by children; nothing more, nothing less."

My own comment: With one exception, I agree with everything that Bryan says, and I was as surprised and upset to read p.76 of the last issue as he was, or anyone else. In fact, he agrees with my exception in his point 2 above; the hurdy-gurdy might just as easily have looked like an original instrument (though, obviously, the elaborate French instruments would have been beyond the abilities and the scope of his project). As you will know from previous comments of mine, I am a strong believer in simple instruments, made as authentically in appearance and construction as is practicable, for school children, and I am full of admiration for what Bryan and others have achieved in this way, especially where the children have themselves been inspired (and believe me, it takes some inspiration) to make the instruments for themselves. And when I look at my mixing-bowl nakers and my fire-tong cymbals and my very clumsily made tambourin de Béarn, as well as my total unability to make a hurdy-gurdy of the pattern I suggested in the last issue (Comm.96), I take my hat off to the kids. In this connexion, you may like to know that when I was asked about someone to write a do-it-yourself book for children on early instruments, I suggested Bryan's name, and the book will appear from Weyland in August, covering in detail twenty instruments that children can make at home or at school, some early and some more modern. It will cost about £2 and will, I hope, be reviewed here.

Stephen Taggart says: "I previously taught secondary-school woodwork, and had many instruments made under my instruction.... I have nowish to join the 'authenticity battle-front', but I regret that FoMRHI is so hidebound by authenticity that it seems totally incapable of expressing any approval whatsoever of the efforts of Mr.Tolley and his pupils. Nowhere in the Bulletin could I find even the most grudging admission that they might have done something of value....Like Bryan Tolley, I have taught instrument making to 13 year old girls, with little or no prior woodworking experience, and I presume that the Bulletin writer has not (nothing personal!). He fails to appreciate the teacher's problems, amongst which are: 1) Getting the children interested in anything. 2) getting them interested in making musical instruments. 3) Getting as much from the children as possible, in spite of their very limited knowledge. 4) Finishing up with a successful job, in a reasonably short time (There is no recipe more guaranteed to lose pupils' interest than a succession of long-drawn-out failures). I also think that the writer has not appreciated the full value of instrument-making

in the school workshop. He attaches more importance to the product than its production, which is understandable for someone not involved in craft education.... My main quarrel is....that the writer has used certain criteria by which to judge these instruments, which are different from the criteria under which they were designed and made. One final thought...is that their crude (Mr.Tolley's word) cpnstruction and the children's approach to these particular instruments is probably far more 'authentic' than present-day, high quality craftsman-made reproductions." [I hope that Stephen will forgive my cuts. jm]

Philip McCrone says: "I feel that ES's? comments on Bryan Tolley's Comm. 100 are a little sour. There must be several different concepts of authenticity. The slavish copying of a particular instrument (an excellent way to start) is only, to a degree, authentic to that particular instrument and may not be any more typical of that type of instrument than another built on general principles of that type but built with no particular model in mind, and .... they were made by and for 13 year old girls...."

Cary Karp says: " ... All comments on material published in the Bulletin made by people with pre-publication knowledge of that material either should not be made until after publication [i.e. in the next issue.jm] or should only be made with the author's knowledge and consent (having the option of withdrawing his material rather than having it printed with substantial editorial comment)."

A final depressing, but relevant, comment from John Whone: "My headmaster has a theory that 'you can't repeat a success'. As we have had early music concerts...we have 'done' Early Music...I have been eased out and other musical activities have taken place. I have not made an early instrument for two years..." More on p. 12 D.A.

Your further comments are solicited on any of the above, particularly on Cary's comment and my statement on the first page of this Bulletin. I hope that those not interested in educational work will forgive the amount of space that this has taken up, but I think it was worth it for two reasons. One, and one that nobody has mntioned, is that these children and the others like them are our successors if they are encouraged to continue, and surely it is our duty to encourage our successors. The other is the general principle of editorial comment, of which I am in favour, as I said on p.2, provided that it is fair and reasonable and provided that it is signed and well-separated from the item under comment. It can save time and be helpful, as witness the following paragraph.

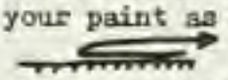
BOB MARVIN'S COMM. HEREWITH: Eph and Djilda say: "Bob...determined the size of instruments depicted by 'taking the distance between the eyes as 75mm'. We presume that he means the interpupillary distance (ie between the centres of the pupils).....The figure of 75mm seems over-large. We have taken this distance as 63mm (Comm.39). Our optician tells us that the most common distance for modern adults is 64 or 65mm....[and] that 75mm is very unusual, and the person having that would be suspected of cranial malformation. Bob's over-large inter-pupillary distance makes the recorders come out over-large, and at least 2½ semitones low in pitch - more if people were smaller then than now. [A copy of this has been sent to Bob and if a reply arrives in time, it will be found elsewhere in this issue. jm] More on p.13. D.A.

ANSWERS TO QUERIES: Arthur Young has sent a reply to Roger Spalding's request on regals that is so detailed that we have included it as a separate Comm.

Stephen Taggart responds to Doug Eaton's query on bow-hairing: "Best publication: 'Re-hairing of Bows' by Möller & Lohberg, published by

Wm.Lewis & Son, still available I think from Reeves. Also 'Bows and Bowmakers' by W.C.Retford, The Strad, £8.45. In re-hairing, the old hair is best cut off about 1" from head and nut. Meths is allowed to soak in, thus melting the old resin, burnt into the knot end in the previous hairing. Then a few hairs are pulled out at a time with pliers. The wedges, which should be sycamore, have to be shaped correctly, as also the mortices into which they fit. A bit of resin on the wedge helps it to stay in. Gauging the correct length of hair is a matter of experience. One very important point is to tighten the bow right up just after hairing, and even to play 'Robin Hood' with it, to check that the wedges are firm. Best suppliers of horse hair (in bulk): Arnold & Gould, Glemsford, Sudbury, Suffolk. Costs around £85 per pound, as opposed to £120 from some sources. Ask for "Best Live white, unbleached" 30" long will serve most purposes. Student quality grey hair is only £8 per pound and probably perfectly 'authentic'." /Djilda may be able to add something to this. Stephen sent a drawing of a re-hairing jig, but it's in pencil and I don't think it will reproduce; I'll send it up to Djilda, and if she thinks it will, she'll find a space for it. jm/ *

John Downing responds to Tom Savage's request for Armstrong's 'Irish and Highland Harps' with the news that this has been reprinted by the Irish Academic Press, 3 Serpentine Avenue, Dublin 4, Ireland at £12 plus 58p postage and packing; this is the 1904 Edinburgh edition with a new introduction by Dr.Seoirse Bodley.

John Barnes replies to Sender Fontwit: "If you use sellotape (Scotch tape, the ordinary transparent kind, in America) instead of masking tape you will get better edges on your gold bands. It needs to be pressed down along the edge very firmly with the thumb-nail. Then apply the size and remove the sellotape immediately while the size is still wet. This gives it a good edge. The sellotape will not remove your paint as well if you pull it backwards as you remove it, like this: 

There is also a short Comm. from G.I.Douglas on this subject herewith.

OFFERS: John Rawson says that he could make monochords easily, particularly in batches, if someone would like to sort out a good design. For them to be cheap they should not only be simple but also have as few parts as possible.

He also makes the same offer re a lathe as Bill Laing on p.9 of the last issue, for Londoners. He has a 5½" centres Barker lathe with rotating headstock, sliding tailstock etc, making it excellent for turning long tapers; it has change wheels, power feed all over the place and so on. It works but would need setting up properly for accurate results. Anyone with engineering experience who could make it go properly would be welcome to try it out.

PLANS: See above (and elsewhere in this issue) for the Paris Conservatoire.

The Royal College of Music has two further plans available: Harpsichord by Alessandro Trasuntino, Venice 1531, drawn by William Debenham, and Division Viol by Barak Norman, London 1692, drawn by Stephen Barber.

G.F.C.Veness has measured the Virginals at Ingatestone Hall (see GSJ 17) and the Friends of Historic Essex at the Essex Records Office, Chelmsford. are distributing the result.

Messrs.Frits Knuf (Buren (Gld) Holland) are publishing a new series of Musical Instrument Blueprints, technical drawings from the Museums of the World. So far available are three from the Haags Gemeentemuseum, the Albert Delin Clavicytherium of c.1760, Giovanni Celestini Spinetta of 1589, and an Andreas Ruckers Harpsichord of 1639. All three are described in the book reviewed by John Barnes in the last issue (Comm.108) and I'd suggest reading the review before ordering the plans.

* Sorry, but I'm sure it's too pale. I hope we shall have it in next issue. D.A.

COURSES: William Cumpiano is teaching three courses on guitar making and repairing at the Hoosuck Institute at his address. No dates given.

There is supposed to be a maker's course at Beverley, Yorkshire, in conjunction with the York Early Music Festival in the first week of July. I'm booked to give three lectures and there are so many other FoMRHI members involved that it might be a northern version of the Seminar last December. However, although I was promised them for this Bulletin, I've no further details yet; if they come before this is finished, we'll fit them in. If not, and if you're interested, the organiser is Mrs.Sibyl Burgess, Regional Craft Centre, Jews Court, Steep Hill, Lincoln LN12 1LS, tel.Lincoln (0522) 33247.

TOOLS & MATERIALS: See p.7, end of 1st paragraph, for a source of bow hair.

Cloth: John Rawson recommends P.O.B.Ltd of 6 Sycamore Court, Oatlands Chase, Weybridge, Surrey, as a source of high quality cloth, useful for keyboard instrument restoration (they are actually suppliers of cloth for uniforms. They are fast, efficient, knowledgeable, prepared to supply small quantities, and not expensive.

He also recommends Titebond (see p.9 of last issue) which he says is extensively used, but in secret as it's very unauthentic. It seems to have been reliable and has been tested by a well-known lab on behalf of a major keyboard maker and found excellent. It is very pressure sensitive and sets at once in a tight joint, allowing no time for complicated adjustment. It is undone with heat - moisture has little effect. It has a restricted shelf life and thus it might be worth getting together and ordering in bulk to encourage Djilda's dealer to keep his stock fresh; perhaps Djilda would combine orders? See p. 13 DA.

Leather: Otmar Seemann knows a local shop which sells leather for covering piano hammers to museums and restorers all over the world. They don't sell retail, but he would buy and send to anyone who needs it.

Metal Cleaner: Stephen Taggart recommends something called DIPBRIGHT, used in the antique restoration trade for cleaning clock brasswork, etc. Diluted 7:1 with water, items are immersed for a few hours. He doesn't say whether it's any more effective, or less poisonous, than oxalic acid.

Vice: Maish Weisman recommends a vice with jaws that swivel to hold a non-parallel object such as an instrument neck, obtainable from Georg Ott, Ulm-Donau, Postfach 5240, D-7900 Ulm, West Germany. Their Parallel vice no.35 costs about DM 240 by the time it's in London.

Varnish Dryer: Eph & Djilda offer a kit for making up an ultra-violet lamp, with full instructions for making it and a cabinet, for £11.39. Because 5 foot fluorescent tubes don't travel well, it's really only useful to those in reach of Manchester or who can arrange a rendezvous with them elsewhere. They'll send a description and the instruction sheets to anyone interested.

Wood Seasoner: Lyndon Reynolds recommends the Ebac Timber Seasoner from Ebac Ltd, Greenfields Industrial Estate, Bishop Auckland, Co.Durham, which is a refrigeration dehumidifier to fit into a cabinet of whatever size you choose, designed for the small-scale woodwork business. Lyndon says: "Everyone knows that naturally dried timber is best, but since many people use kiln dried material anyway, they might as well do it at home".

REQUESTS: We have a lot of these. It would help if you sent the answers to the requester, rather than to me. Their addresses are in the List of Members, and if I have to send them on, it takes my time as well as yours, and the postage comes off FoMRHI funds. The ideal is to send them the information with a copy for me if it's of general interest, as with those on pp.6 & 7 above.

EMIMA: John Dawson asks whether EMIMA still exists; he has written to O'Driscoll without getting a reply, and I have given him the only other address I had, which apparently produced no response either. Can anyone help him? And if there is a new secretary or address, can they please tell me too, please, because I do get enquiries.

TOOLS: Peter Baldry asks whether the Bulletin could include a "consumers' guide" to instrument-making tools. Certainly we include all the information that comes to me on manufacturers and suppliers, and Comms. on techniques etc, but I don't think that we can do a proper Which? survey. Partly we can't afford to buy them for that purpose, and partly we're not big enough to risk libel actions! However, if anyone likes to send in comparative notes on different makes, provided that they are objective and not libellous, we'll certainly print them.

VIRGINALS: Terence McGee asks for sources for plans of virginals; he does not specify type, maker or date, but presumably he wants others than have appeared in the various lists that have appeared in FoMRHI.

TABOR PIPES: He also asks for plans for three-holed pipes.

FIFES: Paul Hailperin asks whether anyone knows of any fingering charts for early renaissance military flutes, as distinct from the"art" instruments. While restoring the instruments mentioned in p.4 above (further to Comm.109), he found that the normal fingering charts don't work, especially on the higher notes, which suggests that there was a difference between the military and art instruments.

FLUTES & RECORDERS: Paul Whinray asks for more "nuts & bolts" articles on renaissance and one-key flute making and recorder making of all periods. May I remind our more experienced makers that many of our members are beginning and that some of them, such as Paul who is in New Zealand, live a very long way from anyone else with experience. We could do with some Comms. on basic techniques. Incidentally, he has been experimenting with local woods, and finds some of them very successful.

He would also be very grateful for measurements and theoretical and actual fingerings for renaissance flutes, as well as any general information (he is familiar with "the usual books, journals, etc"). He asks whether anyone has measurements of the cantus traversi (the high one) and whether anyone can interpret Mersenne's second chart for the flute or the fife one, and whether anyone has made flutes with these fingerings or whether they are misprints or what. Whoever answers Paul's request above will please send him a copy (sorry, they're both Paul; I mean Hailperin and Whinray).

DORDRECHT RECORDER: Neil Buckland asks for the name of anyone who can provide him with dimensions/drawings/x-rays or whatever of the mediæval recorder found in Dordrecht.

Philip McCrone also asks for dimensions of it as he wants to make a copy for use in the Play of Daniel. There is enough interest in this instrument (especially in view of the considerable differences between Rainer Weber's and Horace Fitzpatrick's reproductions) that we could do with one or more Communications on it. Cf Early Music October 1975 (Fitzpatrick) and GSJ 29, 1976 (Weber).

CRUMHORN: Christopher Hawker, who is a craft teacher, is trying to make a crumhorn. He is working from a drawing and article of John Whone's in Music in Education, July 77, which "is very general and leaves a lot of questions unanswered, such as how does one go about tuning it, what diameter are the tuning holes, how does one steam-bend it and why are the holes drilled at an angle to the centre-line". Another request for a basic nuts & bolts Comm. in other words. Who will write it for us? And if you think it too simple and basic for FoMRHI, you might be pleasantly surprised by response from your colleagues who may say 'but I find it

easier to do it this way'. I agree that there is no substitute for a proper apprentic training and so on,and that you are all so busy making that you haven't time to write it all down, but spare a thought for those who are simply too far away to go to anybody for training.

Norman Sohl asks whether any members would share experience with him on making crumhorn reeds, preferably of cane but at a pinch of anything else.

CLARINETS: Peter Forrester asks whether anyone can advise on restoring eroded areas of the bore, epsecially the barrel, of clarinets of c.1800, or whether he should simply leave them alone.

INTERNATIONAL DOUBLE REED SOCIETY: Judith Meier asks whether anyone can provide her with the address of this body.

BRASS MAKING TEACHERS: The Mid-Glamorgan Education Authority are setting up a Workshop for the repair of brass instruments at the School of Musical Instrument Making and Repair, Ystrad Mynach College of Further Education, Ystrad Mynach, Hengoed, Mid Glamorgan, Wales, and they are looking for someone who has the expertise to help them set up the workshop and who would be interested in lecturing to the students (and presumably in teaching them). If any of you are interested in the job, or know of anyone who would be, would you please get in touch with the Principal, Mr.A.C.Parry. The phone no. is Hengoed 812929.

HURDY-GURDY: Enzo Puzzovio asks whether anyone knows how it got that name?

I would be interested in hearing from anyone who might be interested in making an instrument of the type I postulated in the last issue (Comm.96). Cary Karp says he is thinking of it, but he is also thinking of ways and reasons why it might not work (which is fair enough) and I'd be interested in anyone else's ideas also, especially if the cost were reasonable enough that I could afford to buy the result!

LUTES: Stephen Minett asks for basic information on lute-making, eg peg-turning, finding and converting suitable timber for back, belly, neck, etc, finishing and varnishing, glues, adhesives, etc, etc. I.e. another nuts & bolts Comm. Probably best as several Comms, for it would take too long for one person to write all of it, whereas it would not be too much to take a bit of it each among several of you.

VIHUELA: Dan Vaillancourt asks where he can get information on the technique of playing the vihuela de mano; any suggestions of books, methods or teachers (the last presumably within reach of Ontario) would be welcomed.

LUTE: Trevor Dibben asks whether anyone can give him any information on the pegbox, treble & bass riders, inlay on the back of the neck, of the lute by Magno Dieffopruchar in the Vienna Kunsthistorisches Museum, no.AR 969.

CODETTA: I shall hold this open until I've done the List of Members, for late-coming requests and information.

SAW-BLADES: Richard Shann says he got an "extra thin kerf TCT sawblade from Parry & Son Ltd, 329 Old Street, London ElV 9LQ which works beautifully, taking out only 1/16" of sawdust (a saving of 25% on key-facings for keyboards). My size is an 8" blade and I would like to hear of anyone's experiences with larger sizes, as might be needed for ribs etc. Parry's didn't know they supplied this item, so it may be news to others as well."

FURTHER TO Comm.109 (see p.4): A letter from Gerhard Stradner arrived this morning. He says that he used the height/diameter ratio and the volume only as indicators of age, an idea which had not occured to me, but that, with great caution since large=early is by no means invariable, could well be an useful indicator. He says also that because of the superficial similarity of drumsticks, he would prefer to leave the choice of probable pairs to the reader. He, like Paul Hailperin, considers that the two fifes are the only surviving instruments of this type from the 16th century, and that the four multuple cases for fifes seem to be unique. I apologise for my ignorance of these; it had not occured to me before receiving Paul's letter that fifes differed so extensively from flutes. Further, he says that the Catalogue is available from Landeszeughaus am Landesmuseum Joanneum, Raubergasse 10, A-1080 Graz, Austria, for a cost of AS 40 (c.£1.50). The title is: Trommeln und Pfeifen, Graz 1976.

BEVERLEY COURSE (see p.8): Six sheets of information and booking forms for this arrived yesterday. It is a residential course, staying at Cleminson Hall, about three miles from Beverley, at a cost of £45, including all concerts, transport, lectures, food and lodging. One can also book by the day, by the event, and non-residentially (£16 for the 4 days). There are concerts by the Camerata of London, Fistulatores et Tubicinatores Varsoviensis, Early Music Group of York, Musica Reservata (2), and the Play of Daniel given by Pro Cantione Antiqua and the Landini Consort. All the lecturers save two (and perhaps those still named) to be/are Members or Fellows of FoMRHI. They are, with the dates:

5th July: Myself, a general instrument lecture.
6th July: Eph Segerman & Djilda Abbott on bowed & plucked strings;
not yet named on woodwind
Myself on manufacture of early percussion
Ian Harwood on 16th century viols
Chris Page on Instruments of the Troubadours
Myself on musical iconography at Beverley (there's a massive article on this in the July Early Music).
7th July: Mark Stevenson on harpsichords
John Lincoln on Northumbrian small-pipes
John Lincoln on the acoustics of string instruments
Edgar Hunt on the design of recorders
Michael Morrow on a subject of his choice
July 8th: not yet named on assembling instruments from kits
Graham Wells on musical instrument sales and auctions
Bryan Tolley on musical instrument making in schools.

All in all it should be quite an interesting course; rather more tightly structured (and much more expensive) than our own 16th c.Seminar, but there should be plenty of gossip and exchange-of-information time. At least it's not in London and gives those who live in the north a chance.

FINALLY: The List of Members herewith represents three days hard work, more or less non-stop. Please use it. If you are travelling, look up who lives wherever you are going and get in touch with them if their interests parallel yours at all. If there are a number of people living near you, get in touch with them; arrange your own seminars or gossip sessions. You can't meet and talk with colleagues without learning something.

EVEN MORE FINALLY: Apologies again that this is so late. Deadline for the next issue is 26th June so that I've time to get it done before I have to pack up kit for Beverley (which looks like needing about 200 instruments to do all three of those lectures).

I'm an idiot; bookings or information on Beverley from: Martin Horrox, Lincolnshire & Humberside Arts, Area Centre, 6 Posterngate, Hull HU1 2JN; tel:0482 24813.

Jeremy Montagu
7 Pickwick Road
Dulwich Village
London SE21 7JN

BULLETIN SUPPLEMENT Djilda Abbott.

EDITORIAL COMMENTS. I would add to Jeremy's notes on p.2:- (i) Whenever possible we do try to send editorial comments to the author in time for his reply to be printed in the same issue (eg. see notes on Bob Marvin's Comm, below and on p.6). (ii) If any author does not personally wish to work Jeremy's p.2 system, let him simply say so when sending in his Comm., and we will respect his wishes. I hope that this will make writing for FoMRHI acceptable to those who feel like Cary Karp (p.6) as well as providing the quickest possible means of communication for those of you who feel this is more important. Let's have some views on this, please. (iii) This seems the place to mention also that I am in the habit of blacking in bits of drawings etc. that look to faint to print, and other minor tinkering. If any author would prefer I didn't, or would like to check the final copy before it goes to the printer, please say so and I'll organize it. (iv) Please keep writing, and please try to remember the Notes for Contributors - on the back page.

FURTHER TO COMM. 100, my contribution to the discussion which starts on p.4:-
My apologies for forgetting to put my name and Eph's to that Bulletin Supplement.
I was very surprised and shocked to read the reactions to our comments on Brian's paper. Eph hasn't seen them yet as he's away in USA for a few weeks.
On reading Brian's paper, our first thought was admiration that someone should do such a project with schoolchildren, and then go on to write it up so that others might be encouraged to try for themselves. The only reason we didn't say this was that it seemed to us to be too obvious to be worth going on about. It is now apparent to me that this was a serious miscalculation and I apologise for it. It is true that both Eph and I have our differences with Brian. But to put them into perspective they are relatively small details. We have great respect for what he is doing, and our only purpose in arguing with him is that we should increase our understanding, both us and him and anyone else that cares to read it. (I wish we'd had a project like Brian's when I was at school.)
There are two topics arising in the discussion that I would like to take up. Firstly concerning general attitudes to that much-vexed question of authenticity. Some people try to be authentic, others don't, which is okay by me. We all of us make our compromises (yes, me too) and I have no quarrell with any of this. However where I do feel strongly is that we all should try to be honest about our compromises. (No arguments with Brian's paper on that score.)
My second point, again on authenticity, is that the authentic way of doing something is often a very practical way, even for nowadays. As an example of this , we mentioned last issue that a more authentic design of medieval fiddle would be easier to make than Brian's. Unfortunately we didn't find time to make our fiddle as we had hoped, but instead a couple of lire da braccio * are well on the way. The construction is similar:-
The ribs, neck and pegbox are cut in one piece out of a plank of wood say 2 to 2½ inches thick. The inside of the body is cut right out, the hole going through to the other side of the plank (easier to make than a blind hole). The top and bottom of the ribs are best cambered, so that both the back and the soundboard are arched across the instrument but not in the longways direction. The back and soundboard are each cut

* These are needed for a performance of the Intermedi to 'La Pelegrina' (1589) being organized by Joan Wess in Liverpool on June 18th. It promises to be an exciting experience, both musically and as a showcase of instruments. I will be glad to send details to anyone interested.

in the flat (or could be plywood), say 1/8" thick, and bent over to fit the ribs. A small number of bars, crossways on the back, and crossways or longways on the soundboard, is both practical and most probably authentic. The arched construction though not essential is easy to do and gives extra strength. Also I get the impression that fiddles or rebecs with arched soundboards nearly always have a more even acoustic response than flat ones, and consequently can be got to give more tone without developing wolf notes. A leather tailpiece fixed onto an end-button is less work than a wood one.
Aside from those ill-placed remarks concerning Brian's Comm. 100, our note "On Simple Instruments" is, I think, an issue worth airing, and I would welcome further discussion on it.

TITEBOND, continuation from p.8. All I know about this dealer is in Bull. 10 p.9. If he's doing his job properly the glue ought to be fresh. Ask him. Damn you, Jeremy. You know I've got more jobs to do than there are hours in the day and yet you think I want to get stuck into glue distribution!

BOB MARVIN (continuation from p.6) sends a last-minute postcard: "You're right. I meant 65 mm. But it's a pretty loose measuring way nevertheless."

DRAWINGS OF MUSICAL INSTRUMENTS IN THE BRUSSELS MUSEUM

The following drawings of musical instruments from the Brussels Conservatoire are available. All these drawings are full-scale plans with many details, useful to organological research or to build copies.

1. II-course BAROQUE LUTE, JOHANN CHRISTIAN HOFFMANN LEIPZIG 1716
Drawing by Geert Vermeiren. Mahillon no 1559. BF. 350
2. 13-course BAROQUE LUTE, JOHANN CHRISTIAN HOFFMANN LEIPZIG 1730.
Drawing by Geert Vermeiren. Mahillon no 3188. BF 350
3. Belly of CHITARRONE, PIETRO RAILICH VENICE early 17th century.
Drawing by Stephen Gottlieb. Mahillon no 1569. BF. 150
4. Belly of CHITARRONE, MATHEUS BUECHENBERG ROME 1610.
Drawing by Stephen Gottlieb. Mahillon no 1570. BF. 150
5. BAROQUE GUITAR, GERARD J. DELEPLANQUE LILLE 1761.
Drawing by Geert Vermeiren. Mahillon no 2915. BF.350
6. A TREBLE CRUMHORN, Italian + 1575. Drawing by A.M. Moonen.
Mahillon no 610. BF. 150
7. A TENOR CRUMHORN, Italian + 1575. Drawing by A.M. Moonen.
Mahillon no 611. BF. 150
8. A BASS CRUMHORN, Italian + 1575. Drawing by A.M. Moonen.
Mahillon no 614. BF. 150
9. A RENAISSANCE FLUTE, CLAUDE RAFI LYON 1515-1553.
Drawing by A.M. Moonen. Mahillon no 1066. BF. 150
10. A BAROQUE TRAVERSO, TUERLINCKX. Drawing by A.M. Moonen.
Mahillon no 1089. BF. 120.

MUSICAL RESEARCH ASSOCIATION
Petit-Sablon, 16-17.
B-1000 BRUXELLES
Belgium

Please don't send money with your order, but wait until you receive notification.

MM/bb

Paris, le 23 Mai 1977

SOCIETE DES AMIS DU MUSEE INSTRUMENTAL
du Conservatoire National Supérieur de Musique
Association déclarée conformément à la loi de 1901
14, Rue de Madrid - 75008 Paris

Téléphone :
292.15.20

Compte chèque postal :
La Source 33.693.69.

DIFFUSION DE CARTES POSTALES COULEUR D'INSTRUMENTS DU MUSEE INSTRUMENTAL

Ces cartes postales sont disponibles dans les salles du Musée, le Mercredi et le Samedi de 14 h. à 16 h. 30.
Le prix unitaire est de 2,00 F.
Elles peuvent également être envoyées sur demande.
Les frais d'envoi sont alors de 0,50 F. par unité pour l'Europe, et de 1,00 F. par unité (voie aérienne) pour tous les autres pays.
La série proposée ci-dessous sera peu à peu complétée.

N° 1 HARPE, passant pour avoir appartenu à la reine Marie-Antoinette, faite par Naderman père, fin du XVIIIe s, E. 482. C. 293.

N° 2 CLAVECIN fait par Nicolas Dumont, Paris, 1697, "refait" par Pascal Taskin, Paris, 1789, E. 774. C. 329.

N° 3 CLAVECIN fait par Henri Hemsch, Paris, 1761, E. 974.3.1.

N° 4 BASSON RUSSE fait par Tabard, Lyon, début du XIXe siècle, E. 2207.

N° 5 ORGUE POSITIF, allemand (?), XVIe siècle, E. 682. C. 690.

N° 6 VIOLON, ayant appartenu à Pablo Sarasate, fait par Antonio Stradivari dit Stradivarius, Crémone, 1724, E. 1729.

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TECHNICAL DRAWINGS OF MUSICAL INSTRUMENTS FROM THE COLLECTIONS OF THE MUSEE INSTRUMENTAL

These full-size drawings are printed on paper together with explanatory notes.
They are available in the museum on Wednesday and Saturday from 2 p.m. to half past 4.
They may be sent as well on application, at an extra cost of 3,50 F for each drawing for European countries and 15,00 F for other countries (by air-mail).
It is intended of progressevely develop the following series :

N° 1 LUTE, eleven courses, anonymous, France (?), XVIIth c, E. 540. C. 156. String length : 680 mm ..... 40,-- F.

N° 2 GUITAR, five double courses, anonymous, France (?), XVIIth c, E. 30, C. 263. String length : 725 mm ..... 60,-- F.

N° 3 MANDORE, ten strings, anonymous, Italy, XVIIIth c, String lenth : 335 mm ..... 50,-- F.

N° 4 BASS VIOL, six strings, Henry Jaye, London, 1624, E. 73. C. 171. String length : 670 mm ..... 40,-- F.

WORKSHOP. One of our members tells us that a small workshop is available in Winton, Bournmouth. Enquiries to: R. A. Knight, Aldeburgh Golf Club, Aldeburgh, Suffolk. Tel: Aldeburgh 3309.

FoMRHI Book News

Jeremy Montagu

Entirely due to my problems (those mentioned at the beginning of the Bulletin, plus subsequent break-downs with the car which have wasted an unconscionable amount of time) there are no book reviews from me in this issue. Brief reports and summaries follow here and there will be proper reviews in several cases in the next issue. My apologies to the authors and publishers concerned.

DIVISIONS: A new journal run by two of our members, Walton Mendelson and Paul Kenner, to act as a forum for any and all performance problems, where questions, however simple they might seem to an "expert", can be put and answered. Very roughly, it looks as though it is going to be a performer's FoMRHI, but, judging from the dummy cover, which is all I've seen so far, more elegantly produced. There is no indication of what the subscription is going to be. Walton says: "I should like to solicit FoMRHI members for contributions, anything from comments to formal articles. To anticipate: the typical reader of Divisions will not care about the best way to restore one's geigenwerk (although he might be interested in what one is), but he will want to know how to care, preventative and curative, for his instruments. There are probably many subjects that FoMRHI members could write about, that would have no place in the bulletin. There is a 'Guidelines for Articles' which can be sent to anyone who is interested in contributing." In addition, he offers FoMRHI members small advertisements (one inch by three inches) for about £5; the actual size and price is subject to confirmation once they have sorted everything out with the printer. Their address is P.O.Box 18647, Cleveland Heights, Ohio 44118, and Walton's and Paul's addresses are in the List of Members.

DAS MUSIKINSTRUMENT: A well-established periodical catering to the established musical instrument building trade, especially but by no means exclusively in Germany (there are summaries in English, French and Italian of those articles thought to interest the readers of those languages). There is not any great interest in early instruments, chiefly because they are geared to the factory makers, rather than the small makers, but there are frequently technical articles of general interest. The same firm publishes many important books on musical instruments, especially on acoustics and construction, and issues a list which includes not only their own publications but those from most other publishers also. The relations between the Deutschmark and the pound being what they are, for members in the UK it will be their own books which are of the most interest, but for members elsewhere I'd say that this one of the best lists I've seen and well worth writing for. Their address is Verlag Das Musikinstrument, 6000 Frankfurt am Main, Klüberstrasse 9, West Germany. Their books, incidentally, are in all languages, though with rather more in German than in others, as one would expect. There are books on the acoustics and on the construction of practically every instrument, old a nd new.

CATGUT ACOUSTICAL SOCIETY: Another well-established organization. Considerable interest was expressed during the 16th century Seminar on their techniques of plate-tuning. They have, as most of you will know, developed new and logical sizes of violin family, but this isoutside our sphere of interest. Their acoustical methods could well be important, however, to some of our members, and they also study and report on the properties and behaviour of materials used in instrument construction, such as woods and varnishes, and the effects of environmental conditions on tone quality. Their subscription is £8 a year (£10 overseas) and anyone interested should write to Mrs Carleen M.Hutchins, 112 Essex Avenue, Montclair, N.J.07042, U.S.A. Eph has provided the following

note on their approach: "FoMRHI is primarily concerned with musical instruments in the historical perspective, looking backwards in time. CAS is primarily concerned with how stringed instruments work and applying this understanding towards the future. The history of musical instruments is largely concerned with 'improvements' in the past, and instrument historians are more interested in the reasons that the improvers had for what they did than a modern technical understanding of what they did, but such a modern technical understanding can give guidance to the historian's quest. The technical advances made by CAS members and reported in their Newsletter are extremely valuable for the maker of historical instruments, since their methods offer the promise of making copies of original instruments which are more acoustically equivalent to each other and to the original than the natural variations in wood will allow when just dimensions are reproduced. [It was precisely in this area of getting it right by acoustical and mechanical means that there was the most resistance and objection from the more experienced craftsmen at the Seminar, to some of whom it seemed a complete negation of everything that they stood for and worked by. Which way you go is up to you, of course, but you do have to consider both aspects and decide accordingly. j.m.]. Their semi-annual newsletter has some similarities with FoMRHI's quarterly issues. They use reduced-size typescript...[and] the approach is very informal and a wide variation in quality, length and depth is encountered in their articles. Theoretical and experimental articles of mainly scientific interest are mixed with very practical articles on instrument making and repairing, and with some chatty reports and reviews. With growing membership and reputation, the scientific contributions are becoming predominant of late.

LYNDESAY LANGWILL'S INDEX OF WIND INSTRUMENT MAKERS, 5th EDITION: This is now available, and is as invaluable as ever; an essential tool for anyone working with wind instruments. The 5th edition consists only of 37 pages of Addenda and Corrigenda at the back of the book; the rest is as it was in the 4th edition. Thus, if you have a 4th edition, you will have to decide whether it is worth £10 being that much more up-to-date. However, since the 4th edition has been out-of-print for some time, any wind person now has another chance to acquire the Index, and I repeat that it is an essential tool. Copies are obtainable from Lyndesay Langwill, 7 Dick Place, Edinburgh, EH9 2JS, for £10 plus postage, or from the better musical bookshops.

WILL JANSEN'S THE BASSOON: This book, the arrival of which has been long awaited is at last about to appear, but in a quite extraordinary manner. Frits Knuf (P.O.Box 720, 4116 ZJ Buren (Gld.), Netherlands) are producing it in 12 bi-monthly instalments. Common enough for news-stand 'encyclopædias' or for massive dictionaries like MGG, but I've never heard of it before for a single book. The price is pretty extraordinary, too: 660 Dutch guilders, plus 75 guilders for binding cases. However, it should be the ultimate book on the bassoon.

MUSICAL INSTRUMENT COLLECTIONS OF THE WORLD: Another project from Knuf, a series of instrument catalogues from the following museums: Karl-Marx-Universität, Leipzig; Gemeentemuseum, Den Haag; Horniman Museum, London; Ringve Museum, Trondheim; Russell Collection, Edinburgh. Also some special exhibition catalogues and so on. Leaflets available from Knuf at the address in the preceding paragraph.

SCHRIFTENREIHE des MUSIKINSTRUMENTEN-MUSEUM der KARL-MARX-UNIVERSITÄT: This combines an annual report of the museum with news of accessions, restorations, plans available, etc, and occasional articles. Plans or full-size drawings available include: ribbing of a lute belly by Edlinger (Cat.497), Flötenwerk c.1800 (4133), travelling harpsichord by Marius (83), 2 manual octave spinet by Gellinger (52), fretted clavichord by Dominicus Pisaurensis (1), another by Donat (12), a fret-free clavichord by Silber-

mann from the Markneukirchen Museum, a 2 manual harpsichord by Harrass from the Sondershausen Castle Museum. Vol.2 consists of a history of the Museum by Helmut Zeraschi. Vol.3 includes the 1976 annual report and several articles, one of the most interesting being on the authenticity of the left-handed clavicytherium, no.66, by Hubert Henkel, in which Dr.Henkel concludes that this, the only left-handed keyboard instrument that I know of, is a fake, probably dating from around 1900, not long before Kraus bought it.

Die RÖMISCHE ORGEL von AQUINCUM by MELINDA KABA: This book, no.6 in the Musicologia Hungarica series and available from Akadémiai Kiadó, Budapest V, Alkotmány U.21, Hungary at £10.00, will be reviewed properly in the next issue. It is, at a quick glance (it arrived this morning) a full report on the instrument, including spectographic analysis of its materials, with photographs and drawings of every single surviving part of the instrument and photographs of the reconstructions made in 1935, 1958 and 1969. Dimensions of every fragment are given. Since this is the only organ surviving from Roman times, and since this is the first really detailed description of what is actually there, this is a book of considerable importance to all organ scholars.

INTERVALLIC HEARING, ITS NATURE & PEDAGOGY by O.SZENDE: Same publishers, costing £11.00. Again to be reviewed next time. It covers varying scales and temperaments and how they are perceived, with the results of tests on the hearing of intervals correlated by sex, age and other factors. It may be interesting and even helpful on tuning and perception.

MUSICAL INSTRUMENTS OF THE WEST by MARY REMNANT: I owe Mary an apology; I have reviewed this for Early Music (the July issue) and haven't had time to do it again for FoMRHI, even though she had a copy sent to me in very good time. I'll do it properly in the next issue and will say here only that it is an excellent book, extremely well written, with a great deal of information, some of it new, on European instruments of all kinds (no ethnographic and only a very few folk) from antiquity to the present day. It is best on string instruments, good on woodwind, slightly less good on brass, and weakest on percussion. There is an excellent selection of illustrations which are appallingly reproduced so that while some are quite clear, many look like poor reprint work and others are just dark smudges. But the text is good enough for this to be only a minor blemish (of which Batsford should be thoroughly ashamed), and the book is well worth the £10 is costs.

BOUWERSKONTAKT: We now have permission to xerox any articles or other notes from this. They are all in Dutch, of course. Djilda houses it and I will give the number of pages of each article, to give you an idea of what it would cost. Look back in previous Bulletins for a list of contents of their other issues, and ask her for copies of any that you want. This issue, no.9 (Jan.78) includes an article on woods by J.A. Lasschuit (12 pages), one on lute-pattern parameters from the late Rik van Pelt and Toon Moonen (3 pp.), and one on strings, plectra and hurdy-gurdy repairing by George Sandberg (3 pp.).

FoMRHI Comm. 112

THE COMPASS OF THE ROYAL COLLEGE OF MUSIC CLAVICYTHERIUM

William Debenham

A recent detailed examination of the RCM clavicytherium has thrown new light on the original compass of the instrument. This communication describes in brief the results of the examination.

The clavicytherium now in the Musical Instrument Museum at the Royal College of Music is probably the earliest surviving stringed keyboard instrument. Its small compass of 40 notes and wide octave span of 176 millimetres both indicate that it could date from the late fifteenth century. The intarsia clavichord in Urbino which has a comparable octave span of 178 millimetres (see ref. 1) is dated 1479 to 1482. Furthermore, a similar instrument is illustrated in Virdung (1511) which suggests that clavicytheria of this type were commonly made during the fifteenth century. This view is reinforced by observation of the RCM clavicytherium, the design and execution of which is so sophisticated that it must surely be the result of a long period of development. From this one concludes that the compass of the instrument must have been in general use at the time and is therefore of great interest to those involved with the study and performance of music of this period.

The keyboard of the clavicytherium is at present numbered to give a chromatic compass of E to g^2. Two of the keys are missing while others are badly damaged, thus making it difficult to identify their original positions. There is no trace of an earlier sequence of numbers on the keys. These difficulties are increased by the fact that the keyboard facings have been replaced at some time in the instrument's history, possibly when the present compass was adopted.

Nicholas Méeus was the first to point out that the present E key has, under its replacement facing, a blocked in cut out for a sharp, thus proving that the present key order is not the original one. More recently, John Barnes made an attempt to establish the original compass of the instrument, (ref. 2). He did this by first grading the cranking of the naturals and then re-ordering them by seeking matching marks between adjacent keys to get a compatible set. Using this method, he arrived at an original compass of F to a^2 with the g^2 sharp missing. The cranking of the keys is such, however, that this compass could only have been the true one if the octave span varied through the compass and also if the present

balance rail were a replacement. The first condition, although unusual, is not without precedent, (ref. 3). In order to check the second condition Elizabeth Wells, the curator of the RCM Museum, commissioned the author to X-ray the instrument, in particular its balance rail and back guide pin rail.

The results of these X-ray photographs was to show that the back guide rail and pins were almost certainly original and that there was no evidence to show that the balance rail was a replacement. Extensive woodworm damage to the balance rail made it very difficult to identify possible old balance pin hole positions. The X-rays did show,however, that the second and third balance pins had been moved at some time. This discovery was confirmed by a close visual inspection of the instrument and tended to reinforce the view that the balance rail was original, as it showed that the rail pre-dated the compass modification which gave the present compass.

At this stage it was decided to make a cardboard replica of the keyboard so that different compasses could be tried out without excessive handling of the instrument. It immediately became clear from this replica that the balance rail in its present form could only accommodate the present E to g^2 compass. This is because the key cranking starts beyond the balance rail so that the balance pins, although they are in a straight line, reflect the keyboard layout in their different spacings. For example, the five pins from f sharp to b flat are closely spaced while the pairs e-f and b-c are widely spaced. If the repositioning of the second and third balance pins was taken into account the compass that the balance rail suggested was E, "E sharp", F,G,G sharp,A and thence chromatically to g^2.

Since this strange arrangement in the bass seemed most unlikely, a renewed attempt was made to identify the grain direction on the distal ends of the keys. This is the only really sure way of establishing the original key order but had failed previously because of the eveness of the grain of the lime wood key panel and the penentration of dirt into the grain of the key ends. However, it was found that by using the extremely intense light from a slide projector at grazing incidence the growth rings could be seen clearly on many keys and that the direction of the medullary rays (perpendicular to the growth rings) could be seen on all but one of the keys.

By laboriously comparing the grain markings between keys, all the while looking for tool marks, knots etc., for confirmation, it was found that the original order of the keys could be assembled. The order confirmed that the balance rail was original and that the original compass of the instrument had the key order in the bass mentioned above. The alteration to give the present compass was simply made by exchanging the positions of the F and G keys and moving the "E sharp" into the new F sharp position. The sharp cut out in the E key was filled in and a new sharp cut out in the G (previously F) key

made for the G sharp. The new F and F sharp keys required new balance pin positions to maintain the correct key spacing.

How this strange arrangement of keys in the bass should be interpreted remains to be solved. The simplest and most likely solution, suggested by Derek Adlam, is to take the compass as one of F to g^2 without the F sharp, with two pedal notes to be tuned to whatever the music demands.

1. E. Ripin. The Early Clavichord, Musical Quarterly, L III, 4 (October 1967).
2. J. Barnes. Unpublished communication to E. Wells, the Curator of the Museum at the RCM.
3. S. Marcuse. Musical Instruments, p.384, Country Life, 1966.

Reproductions. Donald Garrod

I was most interested to read William Debenham's comments in the October issue of the Bulletin. Although such drawings should lessen the wear and tear on antique instruments - and this is an indisputably desirable aim - there is no real substitute for playing such an instrument, or, if it is too far gone for that, for examining it at close quarters; and not in a glass case. This causes all sorts of distortions as well as hiding what is at the back!

To copy an instrument from someone else's plans is a severe test for a craftsman who also wants to feel creative. Surely there are few instrument makers who are not striving to make something better or different. For example, you might consider that the Jerome harpsichord in the Victoria and Albert Museum would be improved with more delicate supports for the jack rail or that the wrest plank could have been more securely fastened to the frame. With due deference to the purist, there can be many details which a craftman would like to alter or "improve upon" without affecting the ultimate sound.

There are questions a pure copyist must ignore if he is not to have doubts about the perfection of the original: did the maker do it this way because it was accoustically better, or easier in construction ? Or did he make a mistake?

I am sure that a commentary with speculations of this kind would add to the excellence of Mr Debenham's plans.

FoMRHI Comm. 114

ON THE CONSTRUCTION OF RUCKERS HARPSICHORDS.

Rémy GUG

"Broviere geht ewer's Studiere"(1)

I should like to make known the results of observations made over the past six years devoted exclusively to the building of RUCKERS type instruments (Hubbard Mod. II & IV). My aim in this communication, is to invite those interested to repeat and follow up the experiments.(2)

Like my colleagues, I was very soon convinced that the old masters left nothing to chance in their construction. But the attitude of certain modern makers, who maintain that it is sufficient to assemble well-chosen pieces of wood that have been carefully measured and prepared, did not strike me as being satisfactory. Since a given path can be taken in two opposite directions, I felt that the attitude of the old masters was not that of:"Let's assemble these pieces and see what sound they produce"; but rather: "To obtain or approach our ideal sound, let's master materials and methods, and be conscious of the effect of each of our actions on the final result."

Consequently, I sought an approach that would support or invalidate my conviction. And it was the RUCKERS method of fixing the bottom of the instrument that gave me the idea for an experiment which appeared most dangerous at the time.

Wishing to remain faithful to the proverb which heads this article, I took the risk of detaching the baseboard of a copy of Mod. IV (two 8'), without slackening off the string tension. Great was my surprise to find that the case suffered no distortion, nor did the strings go out of tune. RUCKERS had simply worked in such a fashion as to be able to play his instrument "open"(3). In this way he had direct access to those elements which directly influence the quality of the sound.

Each of us can discover for himself the methods which this technique offers, and their advantages. The following is an example:

We are all aware of the existence of those blocks which are glued, in the treble of certain instruments, to the soundboard and liner and which in effect restrict the soundboard in that aera (For example, instruments in Antwerpen and Amiens). The possibility of detaching the baseboard of our instruments facilitates a simple experiment designed to give a precise idea of the usefulness of those blocks. For example, sounding the treble, first WITHOUT,then WITH the double liner (or block). The physical quality of the result speaks for itself.

(1) An alsacian(and universal!) proverb which teaches us that simple experiments are better than long-winded theories.

(2) ... so that they may have the pleasure of arriving at their own conclusions and in due course, exchange the results.

(3) I have applied this technique to seven other instruments, without meeting the slightest difficulty.

But, since each instrument behaves differently, it was necessary to find a means which allowed the determination of either the optimum position for the block or else its uselessness. I worked out the following procedure:

From a small board, 15X50X120mm, make a sort of "comb" with teeth cut in such a way as to pass between the strings(see figs. 1 & 2). Place the "comb" on the outer edge of the soundboard in various places, applying the pressure necessary to inhibit the soundboard's movement, while a second person plays the treble. The successive changes in tone colour can be noted.

Your taste and ideal should guide you to choose the most satisfying position for the double liner, together with its dimensions, assuming of course that you find it to have a positive influence on sound quality.

Fig. 1

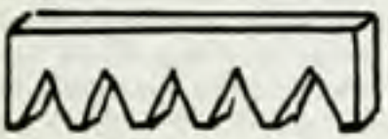
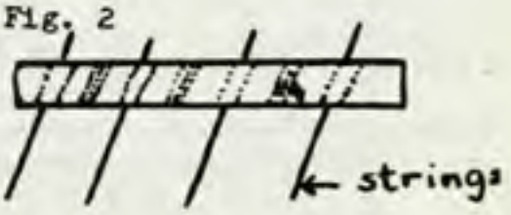


Fig. 2



The second part of this communication is given over to the description of a simple experiment for the observation of the distortion of a harpsichord case when the strings are pulled up to pitch. The experiment was made on the case of a Ruckers model IV reconstitution, having neither soundboard, baseboard nor transverse bracing. The principles are given so that anyone interested can repeat the experiment and/or supplement my observations.

> What is the distortion undergone by the frame (ribs-liners-wrestplank) when tension equal to that of two 8' registers is applied ?

In order to simplify, in practice, the work involved in stringing the case completely, it is easier to use modern piano wire and "group" the tension. For example, if the total stress is to be 400 Kg., one needs only to hitch 20 strings (of, say, 55/100 mm. in diameter) at 20 Kg. tension each, using slide rule or dynamometer. The strings will of course be spread to correspond to normal stringing.

Having mounted these strings and before tightening them one should place a plywood sheet over the case and mark out the position of the upper edge of the case.

The second stage consists of pulling the strings up to the required pitch, without moving the "false lid" (previously fixed by two panel pins at A and B), and marking out the new shape. Fig. 3 shows the distortion of the case of my Ruckers model.

Those interested will be able to make this and other similar experiments which can provide practical knowledge, of which one can be legitimately proud...!

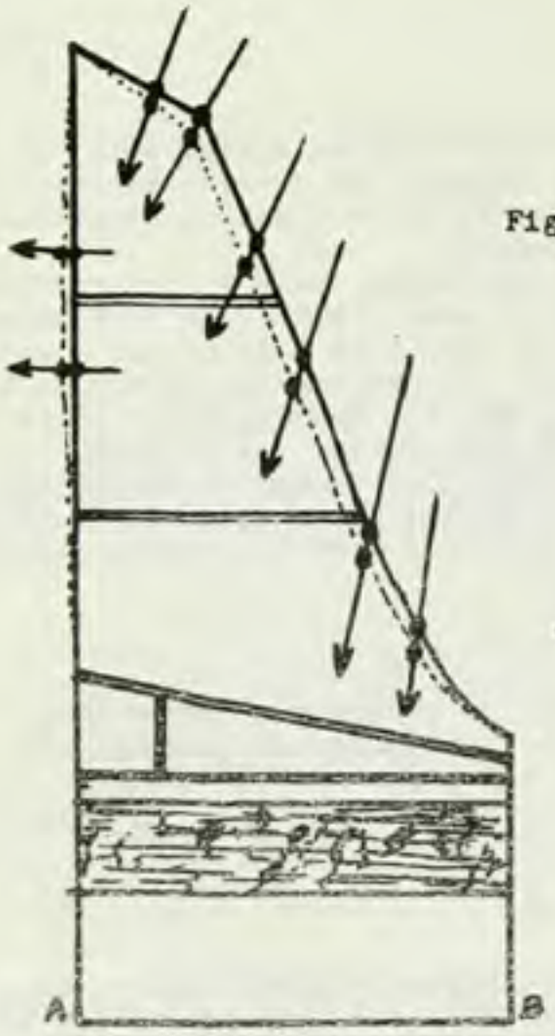


Fig. 3 ——before tightening

.....after tightening

→ the arrows indicate the direction of displacement of various points taken on the curved side.

I should like to conclude with this question:
Since the direction of the arrows coincides with that of the braces used in most 18th. c. harpsichords, which appears to be perfectly logical, why did Ruckers place their braces in an apparently illogical way?
They have left yet another enigma for their 20th. Century disciples !

FoMRHI Comm. 115

MORE ABOUT DRAWINGS OF KEYBOARD INSTRUMENTS.

JOHN BARNES.

I think I can add a little more to the discussion which so far comprises my Comm. 46, R. K. Lee's Comm. 68 and William Debenham's Comm. 85, but which I hope will draw contributions from others with experience of producing or using drawings.

William Debenham questions two sections of Comm. 46 — no. 3 concerning distortion and, if I deduce correctly, no. 5 about omitting details known to be modern.

The distortions which I advocate correcting are those with an obvious cause and an extent for which there is internal evidence. If, for example, the front edge of a wrestplank is a curved line whose mid point deviates from the straight line joining its ends by 3.5 mm (as with my Dulcken harpsichord) I would suggest that it was probably straight when made but has gradually bent because of the string tension. This wrestplank could, of course, be drawn curved as it is today, but a valid alternative is to draw it straight and add a dotted curve showing in full or in part the present shape. If this is done it is necessary also to alter the line of the nuts in a corresponding way.

The advantages of doing this are that it takes the aim of drawing the original state to its logical conclusion, it makes the drawing more directly useful to a builder of copies, and that measuring string lengths from the drawing gives results which are likely to be more nearly correct than those measured directly from the instrument. If a note explains what has been done and the meaning of the dotted curve, then no information has been suppressed. To do this introduces no subjective interpretation but merely amounts to following a simple convention.

I cannot see why the correction of the particular kind of distortion defined above should lead to inconsistencies requiring further correction, as described in William Debenham's second paragraph. I can well imagine, however, that a process of rationalisation could have this effect. An example of this would be the assumption that lines which are nearly parallel or perpendicular were meant to be parallel or perpendicular and should be drawn as such. If he is warning against the rationalising of angles and measurements he has my wholehearted support and, from his remarks in Comm. 68 at the foot of page 32, that of R. K. Lee.

The distortions I am concerned with are essentially component distortions, and my somewhat cryptic remarks in the paragraph following section 16 were meant to suggest that component distortions are often best understood by studying the components in isolation, determining separately their probable original shape, and reassembling them to form a relatively simple overall design. The most distorted instrument I have ever worked on was the Fritz clavichord of 1751 in the Victoria & Albert Museum. The string tension had bent the back of the instrument so that the string band made unintentioned angles with both soundboard and hitchrail. I would expect that X-ray techniques, while successfully relating dimensions on different levels, would tend to complicate somewhat the task of reconstructing the original relationship of the components in a solid object as distorted as this.

William Debenham's preference for as much factual information as possible on the drawing probably leads him to include features of known recent origin. As a restorer, I find that it is sometimes advantageous to add pieces to the hidden inside of an instrument, e.g. cloth across soundboard shims. If this is done reversibly and does not confuse the observer or modify the sound I see no harm in it. But I would personally rather not see these expedients exposed on a drawing and would, for reasons of consistency, prefer the suppression of all modern items. If a restoration happens to have substituted a new part of ideal design this may appear on the drawing because of its merits, but I prefer to see this part marked "conjectural" rather than "reconstructed". It would interest me to know the feelings of others concerning both this point and the correction of distortions.

FoMRHI Comm. 116

The Circulation of Restoration Reports.

John Barnes

Some of my restoration reports may be of interest to other restorers, and some contain accounts of the marking out methods and deductions concerning the assembly order which may be helpful to other builders. There are now some 20 of them, mostly in the Victoria and Albert Museum, London, The Royal College of Music, London, and the Russell Collection, Edinburgh. If it would be welcome to members and if it would encourage other restorers to do likewise I would catalogue these restorations for FoMRHI, listing the kind of information to be found in the report and the Museum from which (at least theoretically) copies might be obtained.

The following is the text of a restoration report on one of my own instruments which illustrates the kind of details which are worth recording even for ones own use, e.g. previous owners, previous string gauges and case distortion. The actual work described is routine, but it may be of interest that useful traces of original materials were found and used as a basis for the reconstruction of the bassoon stop, and that, though traces of probably original hammer coverings existed, they were only a chance survival on 6 hammers and were only discovered after all the hammers had been closely examined. This evidence was left in such a way that future restorers would be able to see and interpret it even if they do not have my restoration report, and all new parts were signed and dated, e.g. on the paper backing of the three touch pads and on the paper of the bassoon. All removed pieces of any importance were fixed inside the instrument with a copy of the report. The techniques used in 1976 were chosen to be as nearly reversible as possible but it should be mentioned that those used in 1965 could have been improved upon.

RESTORATION OF SQUARE PIANO c 1820 by CHRISTIAN GAISER.

HISTORY The label on the soundboard near the back reads:-
Instrumentenmacher / Christian Gaiser / zu Rastatt/
im Grossherzogthum Baden / verfertigt / alle
Gattungen von Forte - Piano.
The compass of 6 octaves FF - f^4 suggests a date between 1810 and 1825. The style is closely similar to that of pianos made in Vienna.

When I bought it in February 1956, two identical labels nailed on the underside were fairly complete, though partly torn. They have now disappeared but formerly read approximately:-
The Olde Colonial Shoppe, Clocks, Antiques, Curios,
Bric-a-brac . . . St. Louis Mo.
The piano has therefore been in America. It was sold about 1953 by John Sebastian Morley, Brompton Road, London, to C. F. Colt, Bethersden, Kent who sold it to me. Neither Morley not Colt adjusted the action successfully and both had trouble with hammers hitting the wrong strings. The dampers above d''' were missing.

When bought it had the following strings (probably Morley):-

Morley (?)			As replaced Oct. 1965		
1 - 12	covered strings		1 - 11	covered strings	
13	.82 mm	brass	12 - 14	.61mm	
14	.61 "		15 - 16	.56 "	brass
15 - 18	.61 "		17 - 21	.51 "	
19 - 22	.55 "		22 - 31	.46 "	
23 - 31	.43 "	steel	32 - 36	.49 "	
32 - 49	.37 "		37 - 48	.46 "	steel
50 - 62	.34 "		49 - 61	.40 "	
63 - 73	.27 "		62 - 73	.36 "	

Tuning was very difficult owing to bridge pin friction with these thin strings but became easier when they were replaced with thicker ones in October 1965. At this time I removed the back pinning between f' and c''' to improve the movement of the strings across the bridge and reinstated one of the $f^{\sharp}$' tuning pins. Previously all strings above this $f^{\sharp}$' were wound one pin higher up, overflowing to a fourth pin in the top row. Below note G the tuning pins had been replaced with modern thicker ones, probably for the convenience of using holes for starting the coils.

These were retained in use, but their tops were filed so that one tuning key could be used for all tuning pins. At this time part of the wood strips above the soundboard which held the tuning pins had already been replaced (notes FF - $f^{\sharp'}$) and had split along the line of pins adjacent to the case. The split piece was replaced and black paint applied over all the top surface of the tuning pin strips, the damper levers, the damper mounting block, the moderator strip and the top of the bassoon.

The twist of the case with the thinner strings slightly above modern pitch was 9 mm and reduced to 3 mm after 2 weeks without strings. Two years later, with thicker strings at a semitone below modern pitch the twist was 5 mm and it is now (1976) 9 mm again.

In order to withdraw the action, keys 55 - 73 must first be removed from the keyframe. The hammer shanks 56 - 73 have all been repaired with mahogany, probably because they were broken whilst removing the keyframe with these keys in place. Hammer head 69 is itself of mahogany. Since the number 69 appears to be in the same handwriting as the other numbers on the hammer heads, these numbers would appear to have been written on by the craftsman who repaired the broken shanks. Most of the repaired hammers have pencil numbers, e.g. 1 on hammer 56, 2 on 57 etc.

It is interesting to notice a join in the heads of hammers 14 and 50 due to several widths of wood being joined together before making the tapered strips from which all 73 hammers were cut. These joins are like those occurring in keys. Presumably the original hammer covering was glued to the hammer head strips before they were cut apart.

THE PRESENT RESTORATION. When the modern felt was removed from above and below the key tails and from behind the hoppers, a paper strip was found glued in each place with the remains of thread lacing in a zigzag pattern. These paper strips appear to be the remains of the original touch pads and were left in place. For each of the three new touch pads several cloth strips were sewn together with a strip of paper using thread in a similar lacing pattern. The total thickness required for each touch pad was established by trial. The original paper (one strip of which

had writing on) and the new touch pads ready to have the paper part glued in place are shown in photographs 1 and 2.

The keys were tightened at the balance and guide mortices by applying water soluble glue and levelled using paper washers.

The parchment hinges of hoppers 1, 3, 13, 27, 34, 39, 40, 60 and 73 had already been renewed but the workmanship was poor. The other hinges were original and .23 - .28 mm thick but many were weakened. The original parchment was from a written document. Nearly all the hinges were renewed.

The wear marks on the hoppers appear to be from pads 5 mm wide and new escapement pads of white leather 2.7 mm thick were made for the hammers and can be seen in photograph 3. The pads on the hoppers through which the tip of the wire spring passes were of modern blue felt before restoration and these were replaced with leather.

Before restoration the hammer coverings consisted of one thickness of brown leather neatly done probably by Morley, which can be seen in photograph 3.

When one thickness of leather 2.7 mm thick sold by Goddards, Tottenham Court Road, London as white doe was substituted on one hammer the sound was brighter and considerably louder. The increase in loudness was particularly noticeable in the treble. On trial the same leather was found suitable for the whole compass and was used throughout.

On removing the brown leather the hammers were found to be cut by a knife either side of the butt as though a previous covering had been cut away at the glued tip at each end of the leather strip. This suggests that the previous, probably original, covering was only glued near each end. Most of the hammers were completely free of remains of previous covering but traces were found on nos. 58, 60, 65, 66, 68 and 73. This leather is shown in photograph 3 on hammers 58 and 73, and is white. These traces are probably from the original coverings and were left exposed with the brown leather coverings separating them from the new white leather.

Before restoration key 61 had a mahogany head touch plate, coloured black. This was replaced in ebony.

Before restoration the bassoon had a roll of cartridge paper but earlier layers were found below this in the following order: green silk, red silk, paper .9 mm thick. A short length was cleaned to obtain samples (the paper sample had a curved ink line on it) but most of these layers were left undisturbed. A new covering of paper was made and red silk was glued on top of it.

The earliest covering of the frame above the front of the soundboard appears to have been green silk, so new green silk was used for the replacement.

The pattern for the moderator was taken from a 6 - octave square piano by Walter, no. 63 in the catalogue of the Vienna Kunsthistoriches Museum, which is very similar in appearance to the Gaiser though the Walter has a front wrestplank. The Walter has tongues of white box-cloth 1 mm thick glued above a strip of paper attached on top of the wooden strip.

The dampers are still missing above d'''.

John Barnes, October 1976.

Comm. 134 continued from p.72.

Comm 83: The following corrections should be made:
point 3- end of next to last line, "stress the exiting wire past . . ."
point 5- Although this may well be true it cannot be directly verified and I would prefer never to have said it.
point 6- It is now clear that possible differences in effective elastic moduli have very little to do with the observed differences in sound. Internal damping characteristics are, however, extremely important and provide a mechanism by which subtle differences in alloy, crystalline structure, position of working stress on the stress-strain curve, etc. all become audible. The generally accepted characterization of a string material by its density and elastic modulus should be supplemented by this factor which, being a function of several processes some of which are frequency dependent, cannot be represented by a single coefficient.

Comm 102 Comments: The traditional piano maker's rule-of-thumb upper limit for the Dw of a covered string is that Dw should not exceed Dc. In practice piano strings often run at this limit and the situation where Dw/Dc = 1 is not solely of imagination-exceeding theoretical concern. Computing Dw from a given D and Dc is, as I see it, the main practical use of the formulas. The Dw selected in practice will have to exceed the Dw calculated by either formula, but the discrepancy will be less when formula 2 is used.

I disagree with Cary on his last point, but in accordance with his wishes expressed on p.6, will not present my argument this issue. Djilda Abbott.

THE UNIVERSITY OF MICHIGAN
SCHOOL OF MUSIC
THE STEARNS COLLECTION OF MUSICAL INSTRUMENTS
FREDERICK STEARNS BUILDING
BAITS DRIVE AT BROADWAY
ANN ARBOR MICHIGAN 48109

Documentation of a "fort' e piano" mechanism once existing in the "Giusti" harpsichord

The accompanying photographic plates show evidence that the "Giusti" harpsichord was originally fitted with a mechanism for changing registrations, activated either by knee levers or foot pedals, the only apparent purpose of which would have been to provide a "fort' e piano" stop. The instrument is a large, single-cased Italian harpsichord, probably eighteenth century, falsely ascribed (by Franciolini) to Joannes Baptista Giusti, 1693 (Boalch, 2d ed., no. 12). The following notes refer to the photographic plates, which show details of the instrument. Everything visible in the photographs is original and unaltered, except that:

a) the instrument has been restrung;

b) the register hold-down block at the treble end (Pls. I, III) is a temporary replacement for the existing original; and

c) the registers have been pierced (Pls. III, IV) to receive pins in the ends of the new hand levers which have been installed as a temporary expedient pending reconstruction of the original mechanism.

Evidence for a register-changing mechanism is as follows:

1) Holes at either end of the nut piercing wrestplank, wrestplank support blocks, and bottom (Pls. I and III through VII).

2) Impressions on the bottom made by iron rods, the L-shaped ends of which align with the vertical holes through the instrument (Pls. II,VI and VII).

3) Three pairs of screw holes in the bottom where straps supporting the iron rods were fastened (Pls. VI, VII, and VIII). Note: pressure marks around the vertical holes,visible in Pls. VI and VII, are new and were made in fitting the temporary hand-levers.

4) Holes for anchoring the mechanism on the top side of the instrument, as follows: (a) pairs of holes piercing cheek and spine close to the front of the wrestplank (Pls. III, V); (b) a single hole piercing the cheek in back of the jackrail support block, just visible at the extreme left edge of Pl. III; and (c) a single screw hole in the wrestplank just in front of the register hold-down block at the bass end (Pl. IV). Plate IV also shows abrasion marks on the jackrail support block aligned with the vertical hole through the instrument. and V

Information regarding either the details of the mechanism or the existence of a comparable mechanism on any other Italian harpsichord will be gratefully received, and may be sent to the restorer of the instrument, David A. Sutherland either at the above address, or as follows: 637½ S. Main St., Ann Arbor, Mich. 48104.

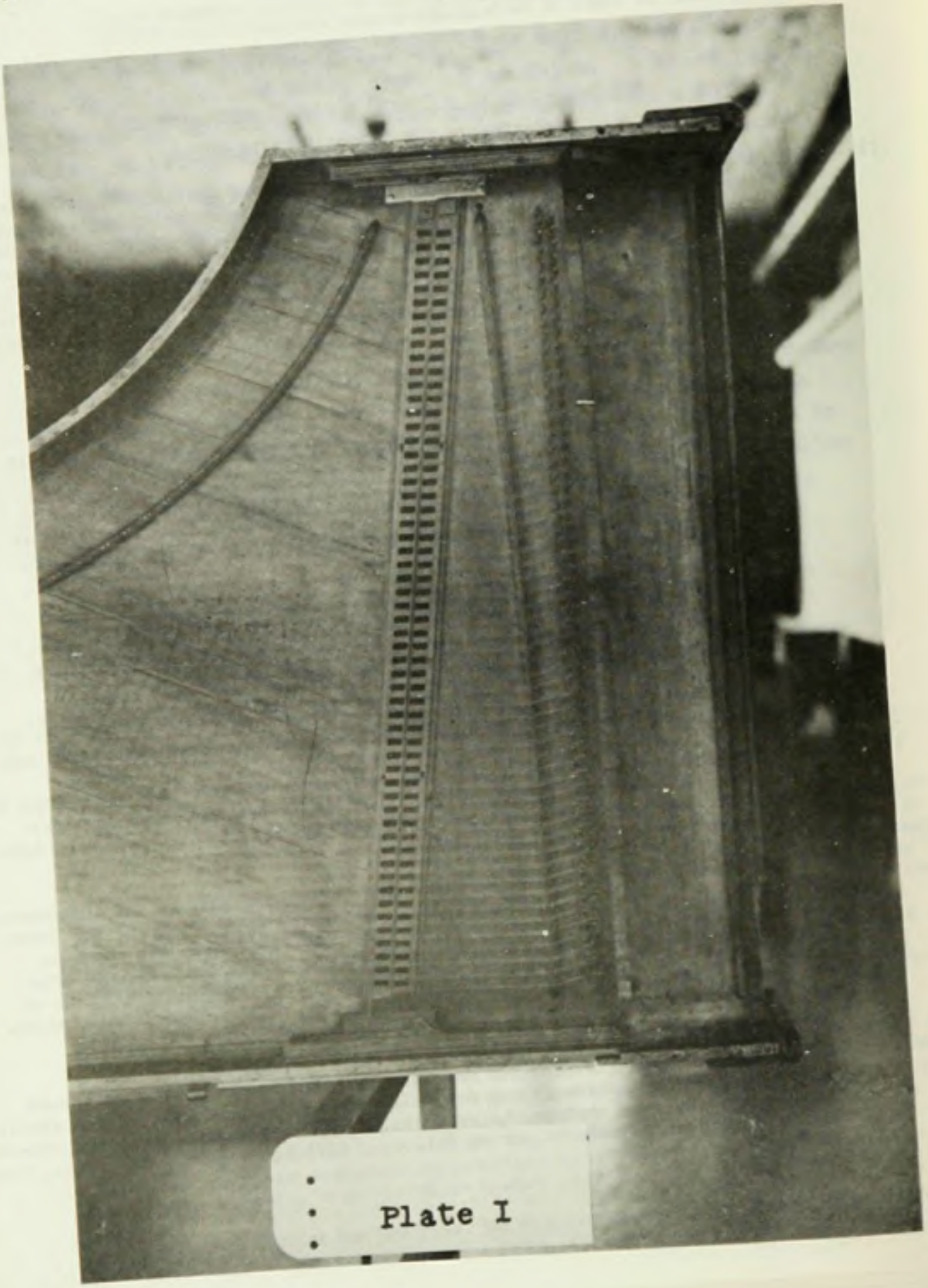


Plate I

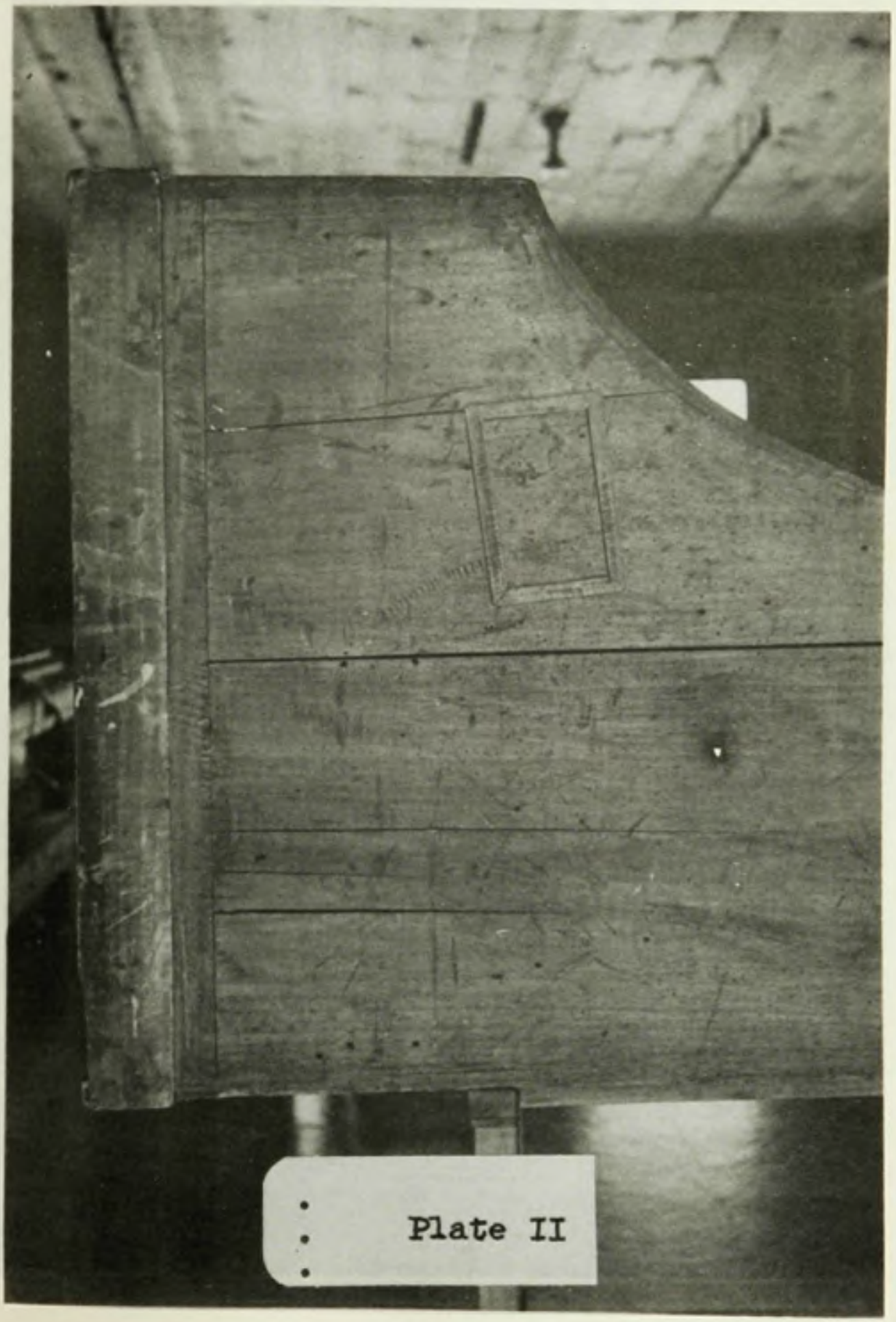


Plate II

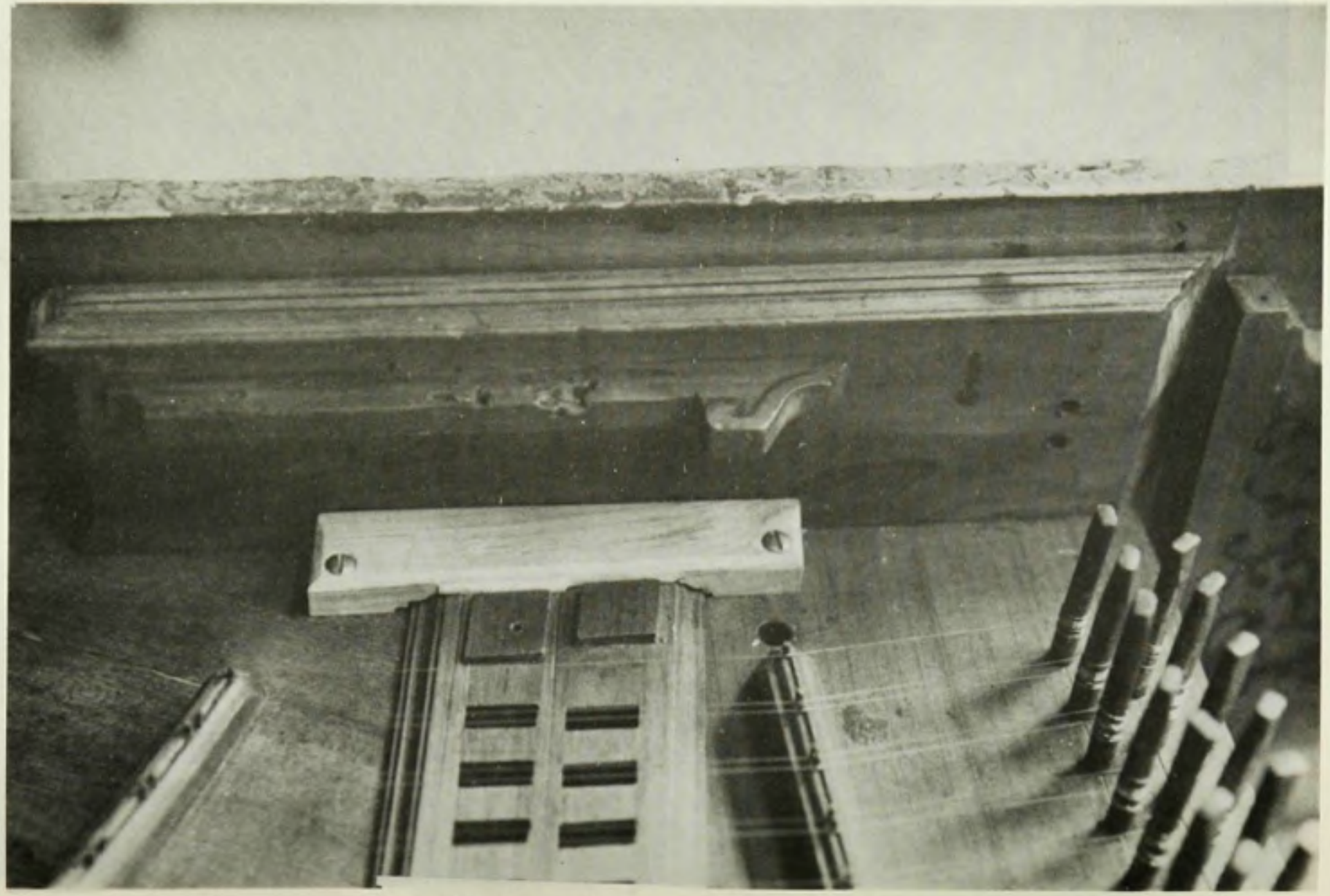


Plate III

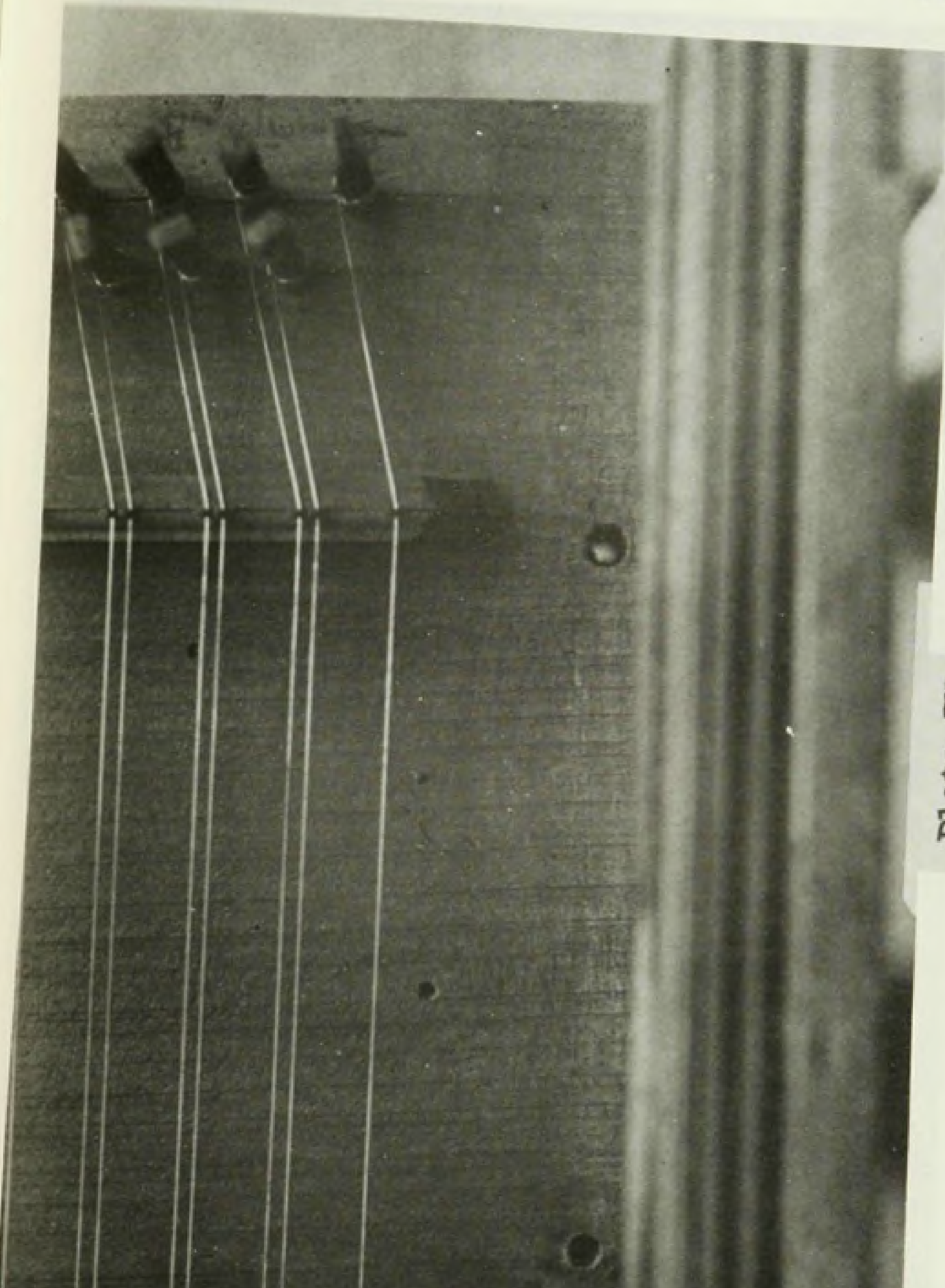


Plate IV

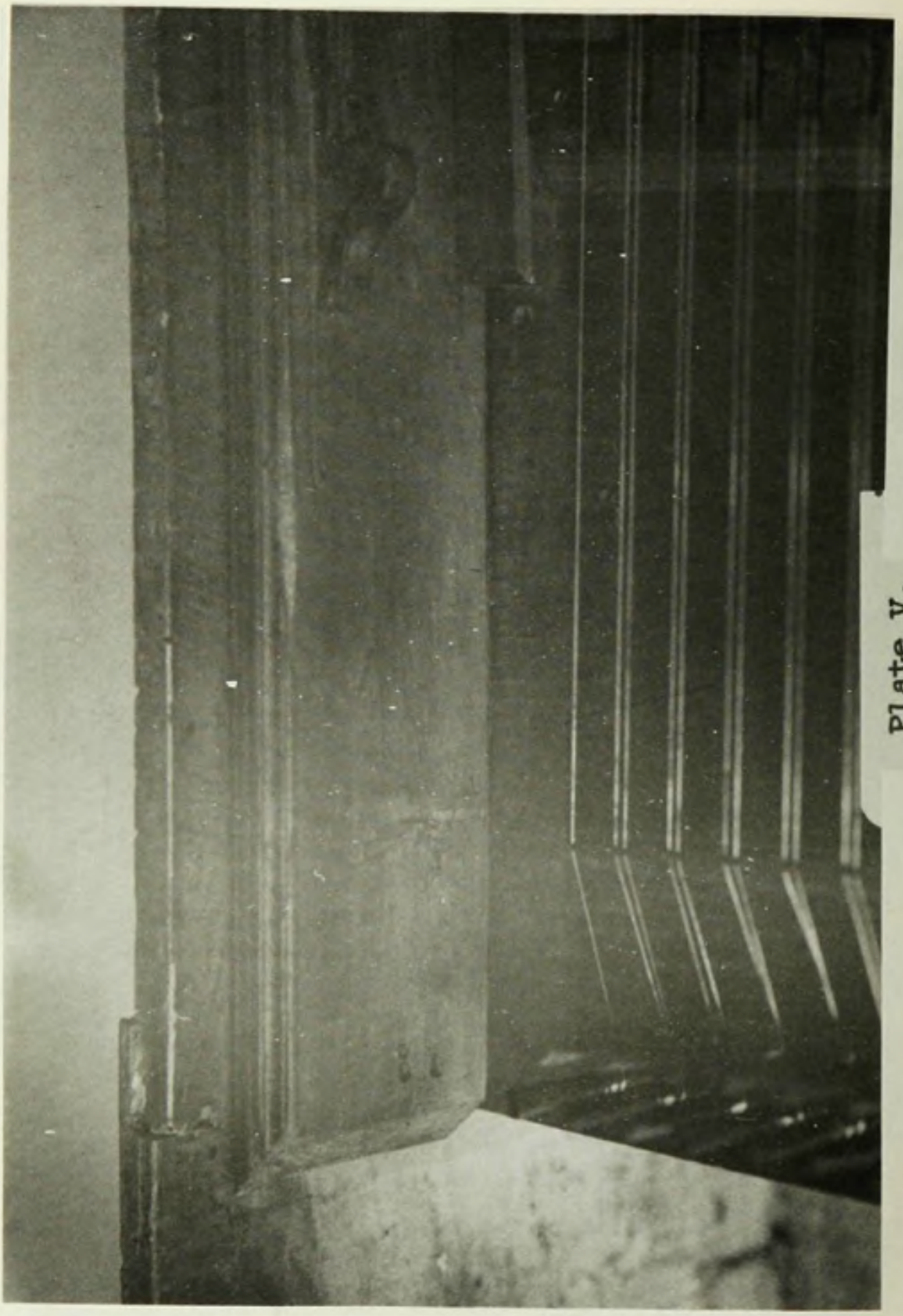
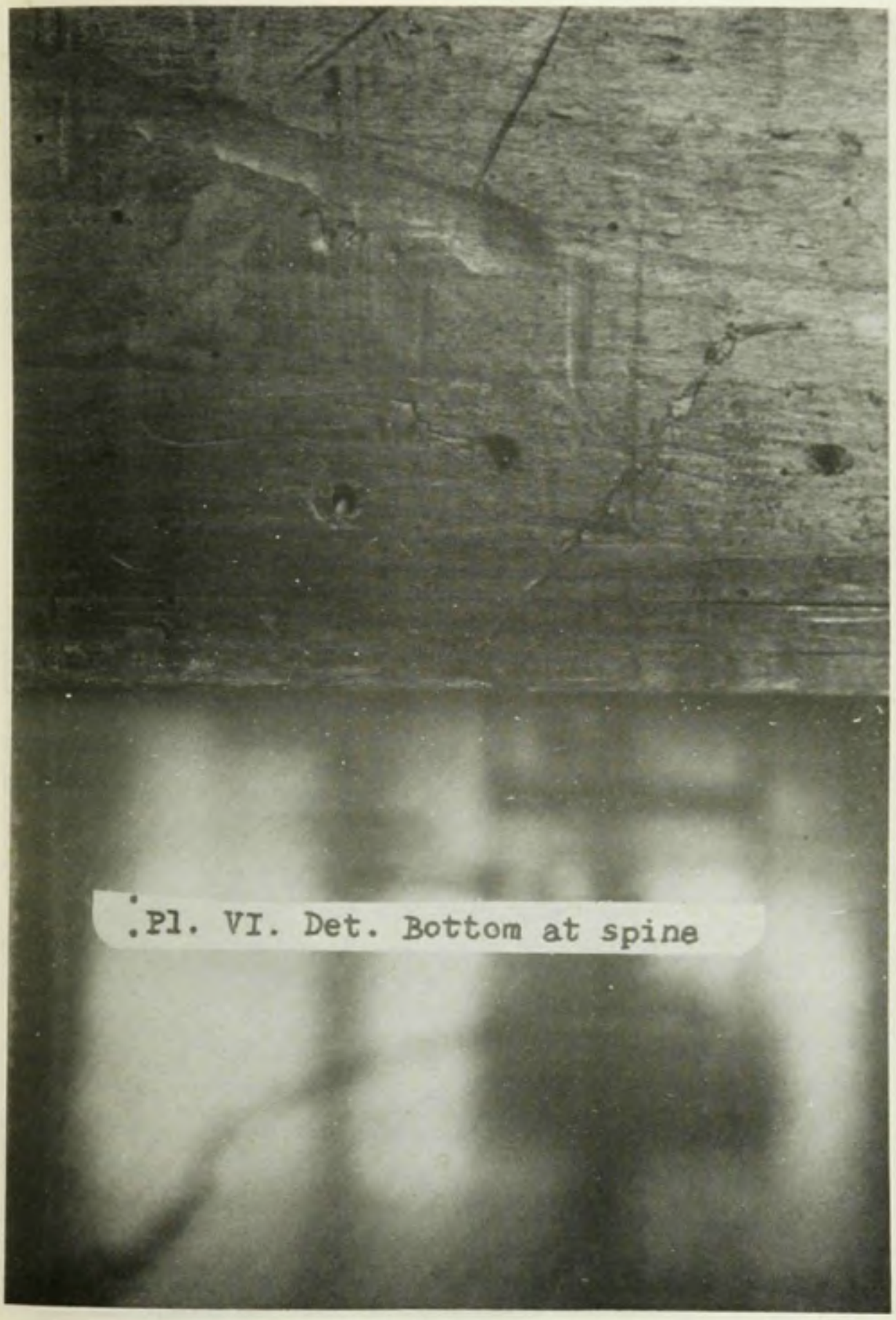
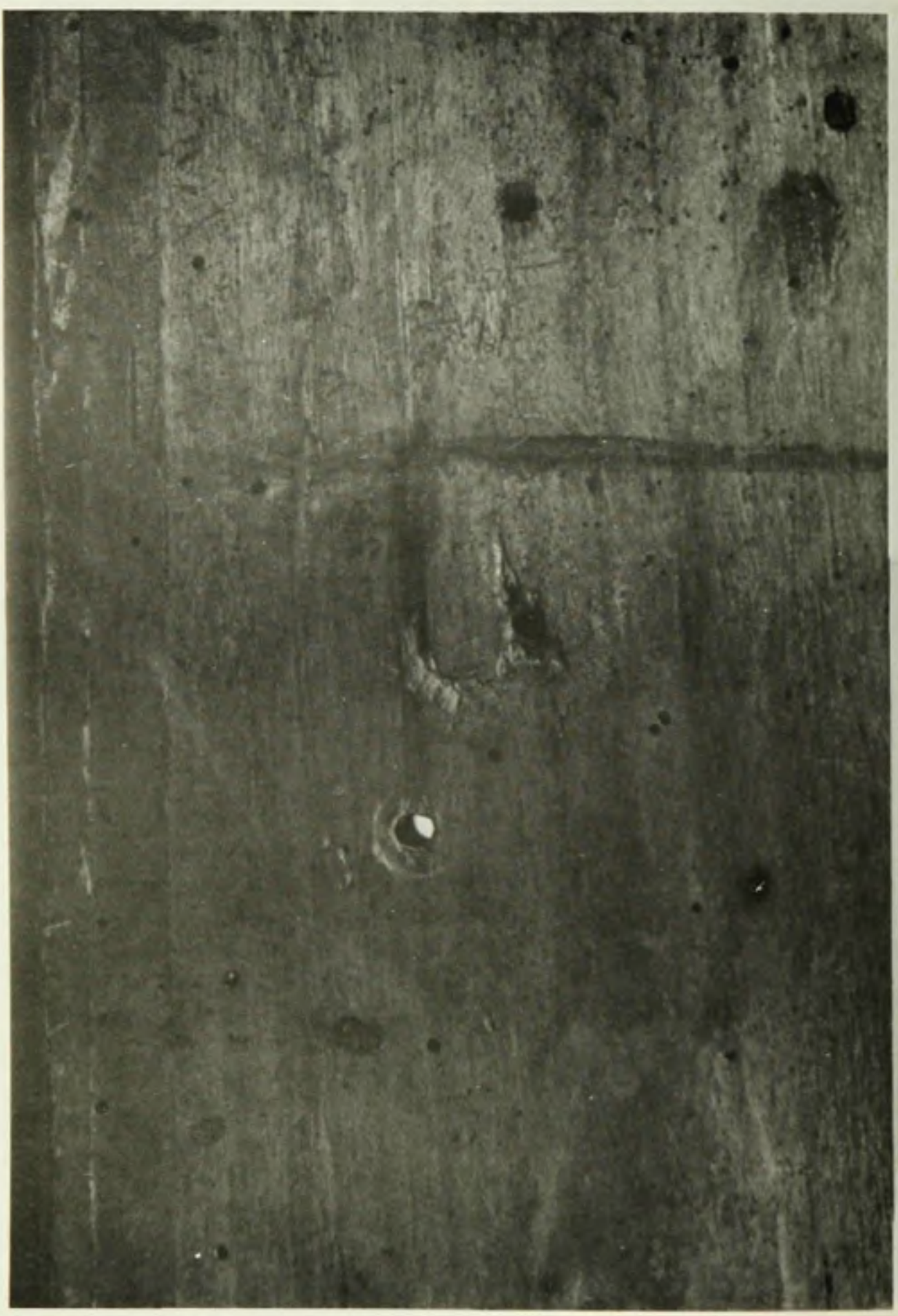


Plate V.



.Pl. VI. Det. Bottom at spine



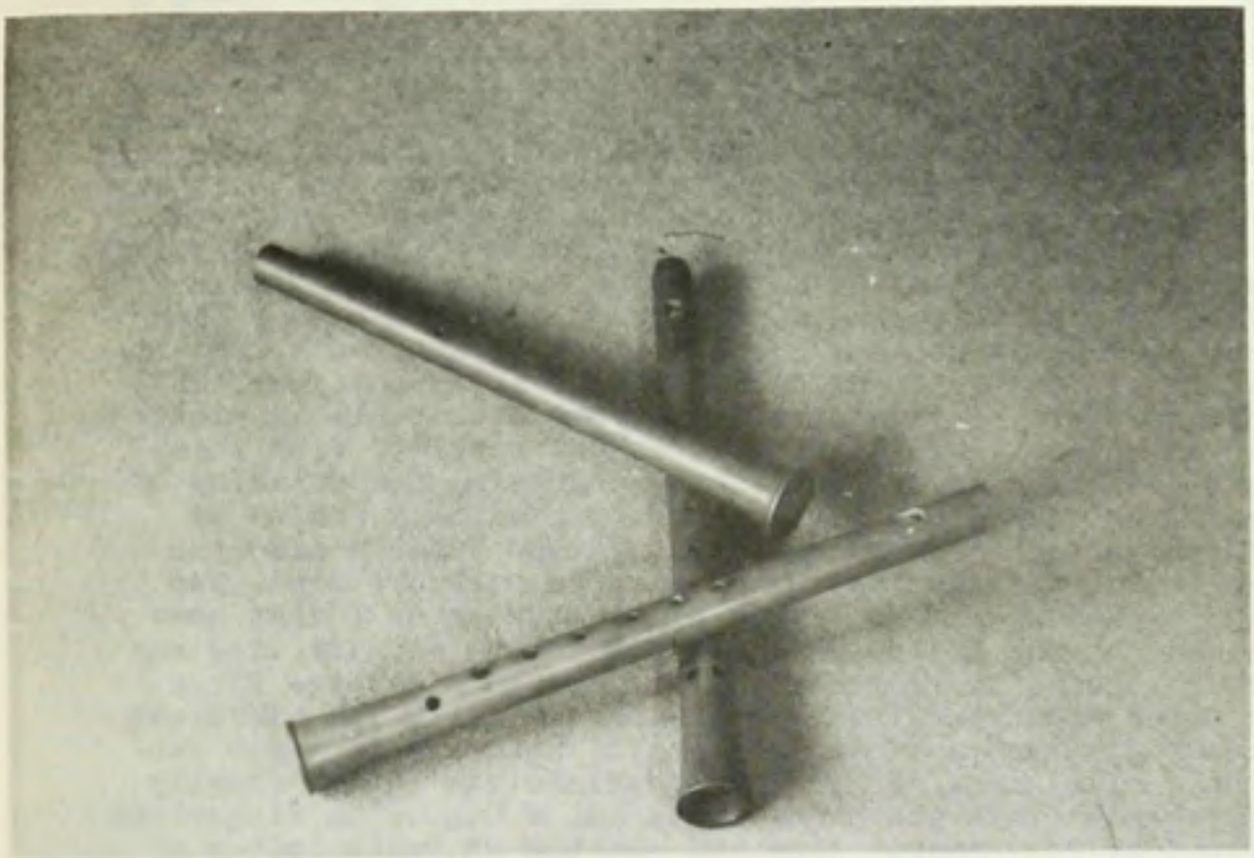
Pl. VII. Det. bottom at cheek.

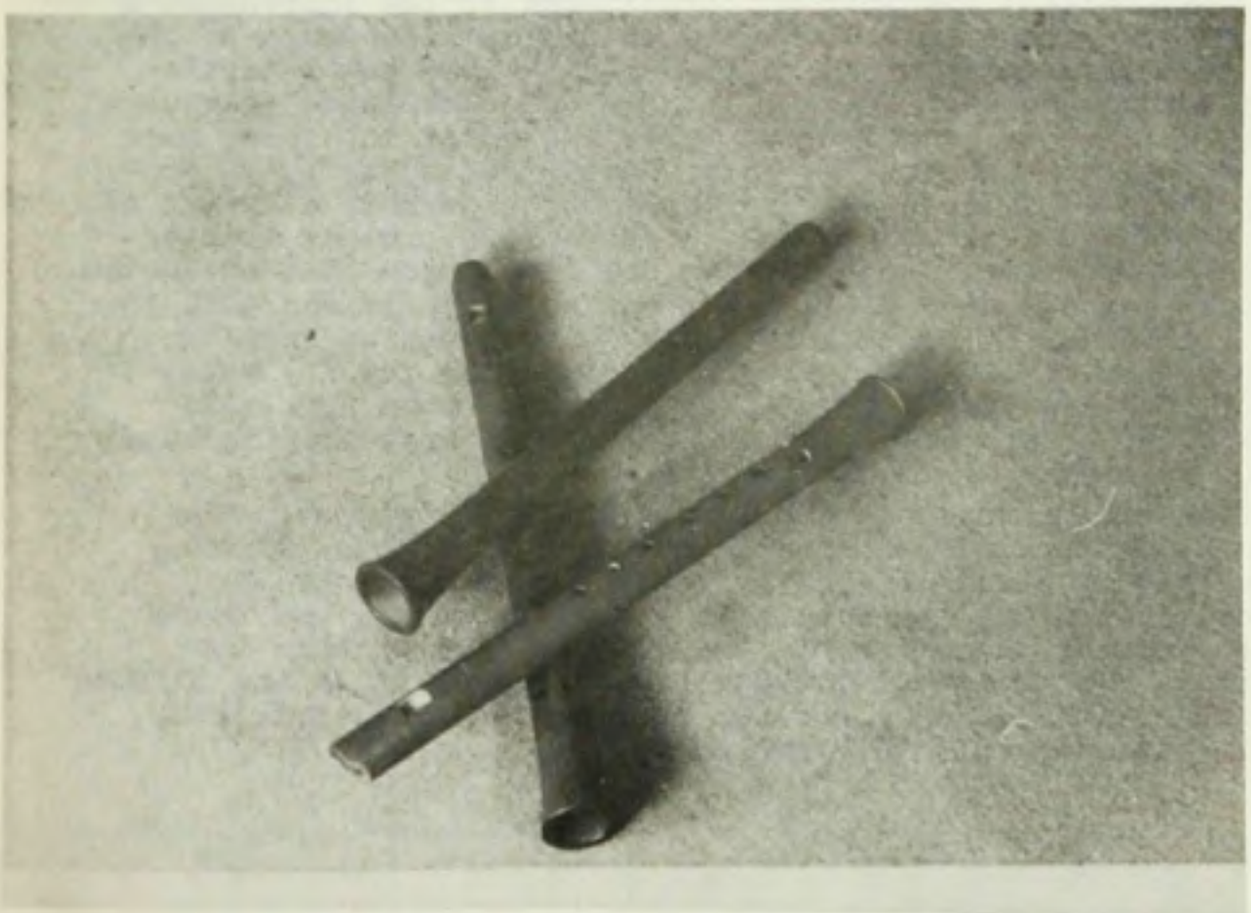
. Pl. VIII. Det. middle of the
. bottom (spineside at lower
. edge of the picture).

FoMRHI Comm. 118

A GANASSI FLAUTO

Bob Marvin

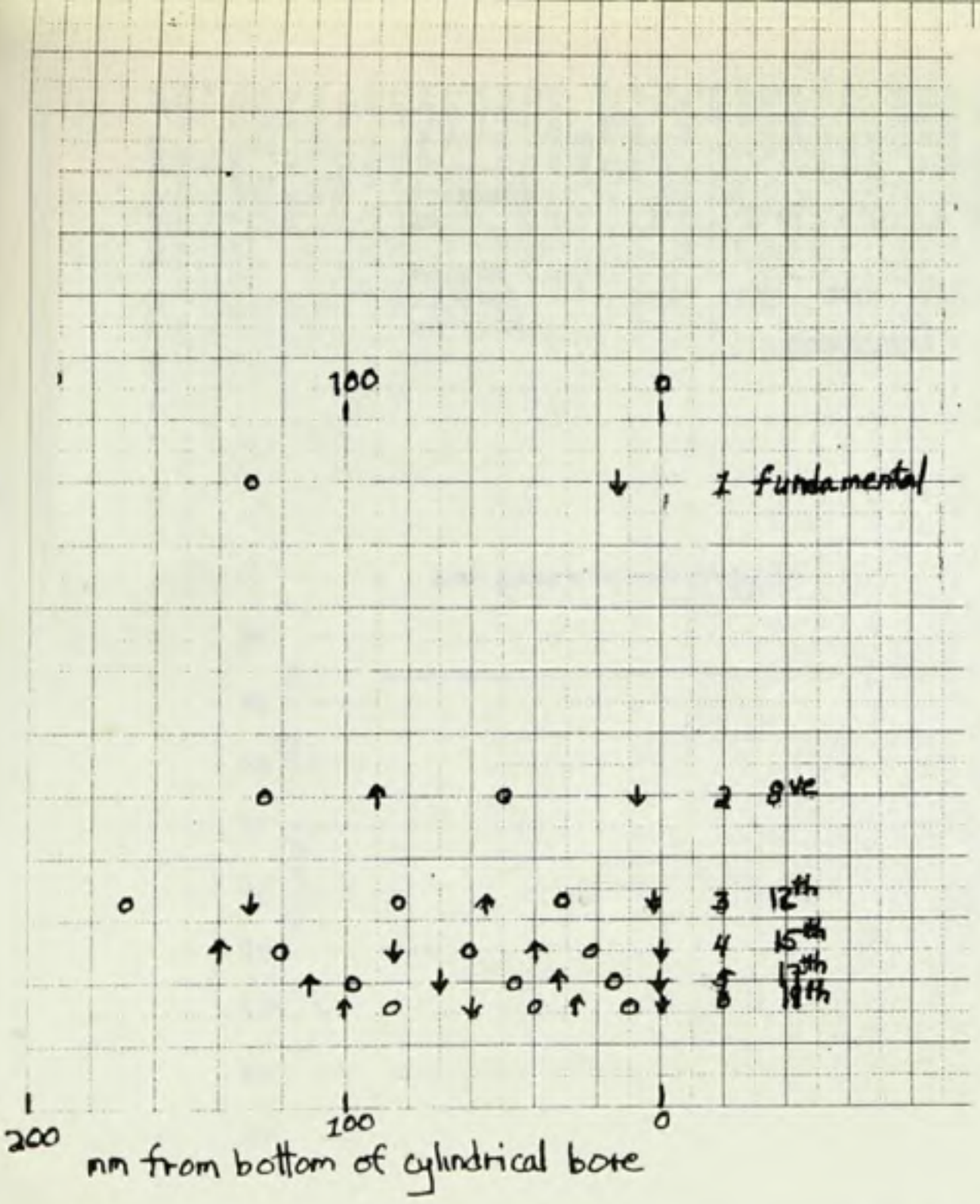




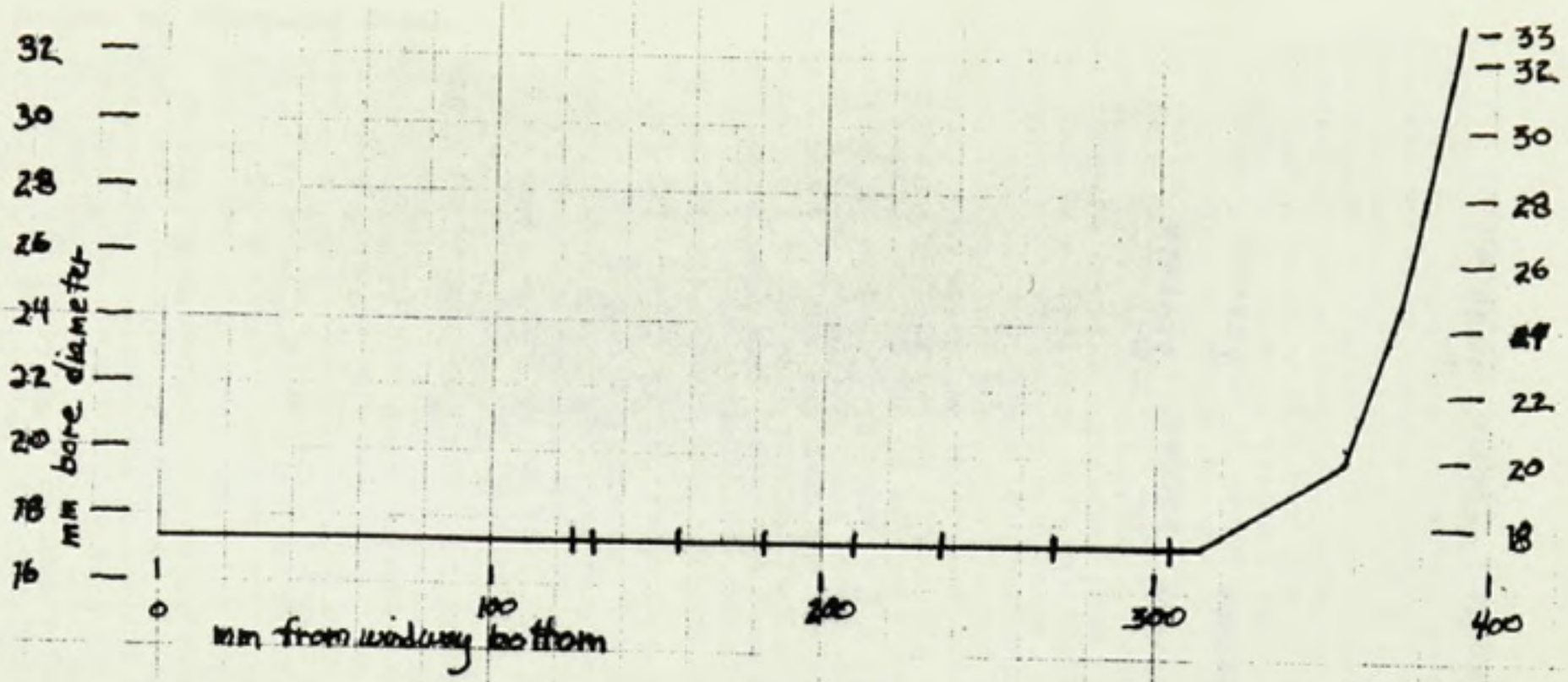
For several years I looked at the fronticepiece to Ganassi's Fontegara without noticing that the flauti illustrated there had little resemblance to the recorders I was used to. When I started making recorders, learning that decent bores taper smaller towards the foot, I took more note of G's flaring shape but managed to dismiss it as an artist's abberation, a confused generalization of recorder, shawm, and cornett ("flauffernetto"). But then I began to take the idea of an expanding bore more seriously. Collections of original instruments suggest that what survives might not be an accurate sampling of what people played. The collections (meager as they are for real sampling) seem to be reflections of whims and accidents of history, rather than cultural aluvium in which a cross section of artifacts were imbedded. Experiments cylindrically-bored flauti showed me that instruments could be developed from types found only in pictures, but not in collections, with satisfactory results. With these thoughts softening up my resistance, a growing accumulation of pictures from the 15th & 16th centuries gradually eroded my unwillingness to accept such flaring bores. Finally came the picture that broke the instrument maker's backward mind. One too many expanding flauto with a big bottom bore. I went home and reamed out the end of a "choke bore" 16th century type recorder. It seemed to respond to G's fingerings better. For a time I tried modifying these "choke bores" (with the narrowest part about 3/4 the way down the length) but without great success. So I tried next working from cylindrical bores, finally getting a model that played two 8ves and a 6th, with fingerings close to G's. The general tone and playing characteristics of the instrument, furthermore, seemed suitable to Italian music of the 15th & 16th centuries.

G's fingerings for the first 13 notes tell nothing about the bore; they reflect the whim and traditions of the instrument's tuner. Higher fingerings, however, do reflect the shape of the bore. The fingerings for the 15th, 17th, & 19th notes particularly seemed based on the 4th, 5th, & 6th overblown "overtones" of the bottom note (the fundamental). The notes inbetween seem to be vented variants of the "overtones" just below them. Producing tones with these fingerings seems to be more a matter of an instrument's voicing, cutup, and bore size, rather than of bore shape. The bore shape affects the intonation of these notes. A typical baroque bore will give them increasingly sharper. Indeed, the fingering for the 15th note (two 8ves up from the bottom note) is a standard alternate fingering for f''' sharp on an f' flute-a-bec. A typical renaissance choke bore will play most of these notes, but a little too sharp. A cylindrical bore is even sharper in the third 8ve.

To find what changes in a cylindrical bore might give the high notes in tune, I "narrowed" the bore in various places using a lump of plastilene on the end of a wire, recording what positions along the bore made the pitch go up, and where the lump lowered the pitch. In the diagram, arrows show the direction and position of maximum pitch change, while the circles indicate no pitch change, for the fundamental, 2nd, 3rd, 4th, 5th, and extrapolated 6th "overtones".


100
0
1 fundamental
2 8ve
3 12th
4 15th
17th
19th
1
200
100
0
mm from bottom of cylindrical bore


Fingerings
Note
Ganassi
Marvin
XV
XVI
XVII
XVIII
XIX



mm from windway bottom	Fingerholes							
	125	131	158	183	211	239	271	304
mm diameter	7.0	7.0	8.0	8.0	8.0	8.3	10.0	8.3

Since a flare will have the opposite effect from a constriction's, an enlargement at the very bottom will raise the pitch of all the notes. An enlargement between the bottom and 130mm will raise the fundamental, but its effect on the other notes will be more complex. An enlargement between the bottom and 40mm will make the 6th "overtone" flatter in one place, but sharper in another, with little overal change in pitch. So a flare between the bottom and about 50mm will flatten the high "overtones" relative to the fundamental. "ἁρμονία " one might say, if bathing. With the flare, the flauto must be made longer to give the same pitch for the lowest note, so the positions of the fingerholes and flare should be measured from the top. A further restriction on how far up the flare should reach is the 8ve III-X, which is a little too small on cylindrical insrtuments. To extend the flare beyond the lowest hole will start to make this 8ve even smaller. I made three reamers of different tapers (.08, .2, .5) with which to make a number of experimental bores. One that worked well is shown below.

Trying to get dimensions from G's picture, using human dimensions for scale, gives the following rough figures (based on the central player and his instrument). Taking the distance between eyes as 75mm, the sounding length of the flauto is about 380mm (perhaps a little more, because of perspective shortening). The outside diameters are about 30mm (top) and 60mm (bottom). The player to ours' right has an instrument with a smaller bell. The bore at the bottom is about 40mm. Such an instrument would play a g' at about a'465-470 for its bottom note, which agrees with G's pitches of f,c', & g' for his flauti, and the general pitch of 16th century recorders at about a' 460-465.

Other dimensions were taken from plots of various measurements of original instruments. The graph of bore diameter (maximum) plotted against length suggests that an instrument this size should have a bore between 17.0mm and 19.0mm. My bore of 17.4mm is on the small side since it's essentailly a cylindrical bore, and I wanted to facilitate the upper register. A cutup of 4.0mm was similarly chosen from a range of about 3.7mm to 5.2mm. Minimum windway width is 11.2mm, from a probable range of 10.5mm to 12.0mm. An outside diameter (at the window) of 30.4mm (from a range of 28.0mm to 32.0mm) agrees with the dimension derived from G's picture.

What is the likelihood that what I got really represents what people used in the 16th century? The coincidence of fingerings that resemble G's and a shape that looks like his picture seem strongly positive. On the other hand, my instrument works better with fingerings which are only close to G's. Following his fingerings to the letter gives notes that are close, but often withpoor attack. I also wonder how closely we can expect the bore to follow the outside shape. With the instruments that survive, there is some attempt to do this, and allow the wall thickness at the fingerholes to remain somewhat constant. I think a choke bore could be modified to use G's fingerings (as Fred Morgan has done), but it would seem reasonable that the exterior of the instrument would have a "waist", reflecting its bore. Otherwise, the wall thickness around the holes 5 & 6 would be enormous. The accuracy of G's fronticepiece is supported by the reasonableness and uniformity of his instruments, but the too-low placement of the holes suggests a limit of accuracy.

What are the characteristics of my instrument? First, a rather pure, hard sound, especially in the lower register (which the flare seems to prevent being played very strongly). Cylindrical bores tend to get "reedier", richer in their lower registers, but the flare seems to reinforce the hard quality of the cylindrical bore, emphasising it at the bottom. It seems unlikely that such a bore would have been developed just to play the third 8ve; it would seem more likely that the tone quality was what was sought, with the upper register a serendipidous bonus. Part of this pure, tight sound comes from the voicing dimensions, chamfer, and the like, which were kept small to favor the upper notes.

While the third 8ve is "there", it is not easy to play, and I doubt that much satisfactory music can be made up there. A player can get the notes, but to play expressive melodies seems terbily limited by the poor response of the notes and the difficult fingering transitions. (But the same criiicisme can be repeated for many flutes-a-bec, compared to the gentle, graceful execution on violins, hautbois, or traversi). Note XIV is difficult to attack (although this may come more from the small fingerhole sizes for meantone tuning).

In the future, I would like to see more experimentation with outwardly tapering bores on recorders, especially those very narrow instruments that are so often pictured, frequently as double flauti. My own experiments along this line are not very encouraging, so I'd appreciate hearing some good news concerning attempts to produce instruments that resemble those pictures. A possibility with the very narrow flauti is that they played only in their second 8ves, and that the flare was a tone-controlling device, to make perhaps a more piercing tone. one that could be forced very hard without "cracking". It would be good to see more variations of dimensions and voicing details (the tendency when something comes along that's at least workable, is to stop searching and start congratulating), to see what musical variety can come from this type of instrument. I will be very happy and grateful to hear from anyone with experiences or ideas relative to all this.

Bob Marvin
Woburn, P.Q.
Canada

FoMRHI Comm.119

THREE FULL-SIZED LINE DRAWINGS OF HISTORICAL WIND INSTRUMENTS

1. Stanesby Junior ivory flute from the Jeremy Montagu collection drawn for Bill Elliot by David Cox and measured by Andrew Glatt
2. Baroque boxwood flute by Tuerlinkx (early 18th C) from Brussels measured by G.J.v.d. Heide and drawn by A.M. Moonen
3. Renaissance flute by Rafi from Brussels measured and drawn by A.M. Moonen

The idea of general publication of key historial instruments is excellent and it is hoped that many others will follow.

The first question to be asked is whether the information in these drawings is accurate enough and sufficient enough for a competent maker to produce an exact copy? The answer is almost, but not quite.

The Stanesby flute has been carefully measured and the bore diameter taken at 10mm intervals, but unfortunately the detail of undercutting of the fingerholes and embouchure has been omitted. This information would be vital to a reconstruction of the instrument. The pitch is noted at A437 which is so near to "modern" pitch that my suspicions are aroused, since Stanesby Jnr. died in 1754. Has the instrument been subsequently raised in pitch by enlarging the embouchure? Are there any signs of tampering? We are not told. Neither are we told the material of which the key is made, presumably silver.

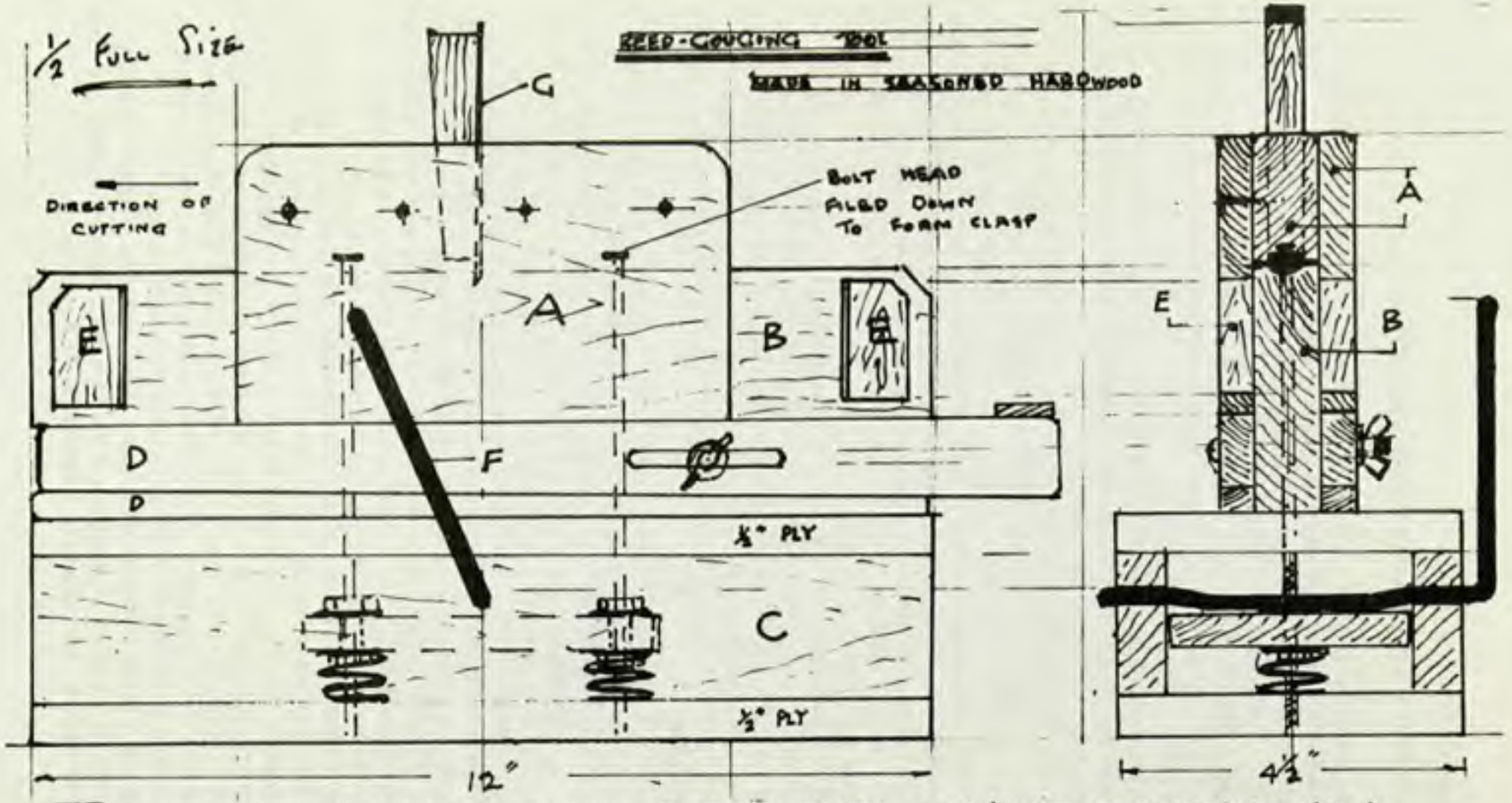
The Tuerlinkx flute is more fully documented. Again the bore diameters are given in 10mm steps and an expanded bore profile is given which clearly shows the far-from conical nature of the bore. All undercutting is well represented (presumably from an X-ray photograph) and the pitch (830) is given. This is altogether a very complete record. The legend is in Flemish, but a little inspired guesswork will probably make all clear.

The Rafi flute is probably the most interesting of the three being the rarest. Here again de heer Moonen has lavished great care in the recording of all relevant detail, with one startling exception- the pitch of the instrument is not stated. Whether this is an oversight, or whether he was not allowed to blow the flute to ascertain the pitch I do not know. I would guess that it stands at about modern B (perhaps 16th C.A) certainly it is considerably lower than the usual tenor flute in D. The brass ring at the foot end has the appearance of a later addition since no tenon has been turned, but it has simply been slotted over the end, probably to repair a split. The cork is noted to be 21mm from the centre of the embouchure; of course, this has almost certainly been moved about in the course of time; this setting is about correct for a modern flute, but would give a very flat second octave in this instrument.

A slight inaccuracy has crept into the measurement for the embouchure it is given as 8 x 9mm but seems to me to be nearer 9 x 9mm; at any rate, the longitudinal diameter is greater than that of the first finger hole, yet both are listed at 8mm. The bore is remarkably narrow at 17.7mm (are we sure there are no slight chamferings) which is about average for a D flute, so that if one wished to scale down these measurements to a modern tenor D pitch. One would be left with a very awkward problem of whether to reduce the bore as well as the length or not.

I hope that many more drawings will follow these, with the possible addition of an assessment of the musical qualities of the original. In other words, we wish to know whether we are copying a good instrument or a bad one.

John Cousen. (Typing NRI)



A SCRAPER PLANE, which slides to and fro over B CENTRE BLOCK - with ½" diameter groove in top edge, in which the cane segment rests and is clasped firmly at each end by heads of ¼" by 6½" bolts. C BASE BOX - to which B is fixed securely. The base box houses the device (¼" steel crank, hardwood block with ¼" nuts and washers both sides, and two return springs which lift the two long bolts as the crank is turned) thus releasing the cane after gouging. D TWO LONG WEDGES - 1/16" slope in 12" length - these permit minute adjustment to depth of cutting. E TWO STOPS leather faced, against shock (four stops in all). F STEEL BAR slightly cranked to provide rapid clasp and release.

G CUTTER (broken hacksaw blade) curve modified on oilstone.

REED-GOUGING TOOL. Henry Holmes.

A few months ago and oboe-playing friend of mine set me a problem, making a tool for gauging reeds. I know little about reeds but I was made to understand that the main difficulty is to gauge the cane segment to form: ⌒ about 20/1000 thickness at centre tapering to near zero at the edges. Also that reeds vary according to personal taste and many oboe players prefer to make their own.

My friend has used the "machine" for some time now, and has shown me some forty or fifty reeds made on it. He tells me it is entirely successful for his purpose. So I can assure you that it works! It cost about 75 pence for materials to make, and some hours of interesting handicraft.

A few words need to be said however, about the handling. The drawing is a little rough perhaps, this reflecting my impatience with drawing but it does show all essential parts and their function, together with relative sizes. The enclosed specimen reed(discarded) will show at once the manner of holding the cane and the limits of scraping the inner surface.

First attempts at scraping are almost bound to fail owing to the very natural tendency to press down on the plane A when starting to scrape. This downward pressure is very likely to be far too severe as a result of the necessary firm grip on the plane as it moves forward. After one or two tries, one realises that the scraping must be very light indeed for a full length forward stroke. Yet the grip on the plane must be very firm! I found that I could get a satisfying grip by applying a twist to A thus causing it to rub hard on the sides of B (centre block). This steadies the movement of A and permits a very light touch of the cutter on the cane. The spoil of scraping can easily be removed with a thin stick. As the depth of cutting nears completion, then quite heavy pressure can (and must) be applied until no further scraping is possible and the two bottom edges of A bear firmly on the top edges of D. D is of course adjustable within limits of about 5/1000.

Comm. typed at NRI. For the benefit of readers not in the habit of thinking in Imperial measure, I read the fractions: 20/1000 and 5/1000 as fractions of inches. (D.A. Ed.)

FoMRHI Comm.121

WOODWIND MEASUREMENTS Paul Whinray

As a new member perhaps I could put my views on instrument measurements which in many cases seem to involve looking so closely at the trees as to lose sight of the forest. An understanding of the processes used to arrive at the end result (say a given woodwind bore) seems to be as or more important than the accurate measurement of it, useful and important though this is: For example, why did this maker push the reamer in only this far and no more. The means used to produce an instrument are so inextricably bound up with the end product that it seems shortsighted say to accurately measure a renaissance flute and then "copy" it on a highspeed electric lathe. I perforce started making instruments without electricity, "progressed" to anelectric lathe, and am now going back to a bow-lathe in order to get the right "feel" to my instruments. Besides, turning boxwood on a pole lathe is a delightfully sensuous experience which is not to be missed.

Another related grou.h is about the use of metrics to measure instruments which were originally conceived in inches and feet. Why such abstract standards as a proportion of the earth's circumference or a given number of wavelengths of light should be regarded as more suitable for measuring objects which complement the human form is hard to understand. I was in the process, somewhat reluctantly, of changing to metrics when I accidentally turned the ruler over while measuring a flute head of 228 $\frac{1}{2}$ mm overall length and 152 $\frac{1}{2}$ mm embrochure length. It was immediately obvious that the maker, poor fellow, obviously thought that the relevant dimensions were 9" and 6" and that his fingerhole spacings were 3" and 2 7/8", ivory mounts $\frac{1}{2}$" etc. etc. Since then I have my calculator (sic) set to divide by 25.4 to convert all metric measurements to inches. Some remarkable correspondences come to light in this way which render irrelevant the question of whether a length is 76.2 or 76.3 mm. i.e. it's just 3". However this seems such a waste of effort to have to do such back-tracking - similar to having to transcribe back into lute tablature what some editor has carefully transcribed into notation.

FoMRHI Comm. 122

A SHAPER FOR RECORDER BLOCK BLANKS

Paul Whinray

The diagram shows a general view of a gadget I developed in 1976 for shaping block blanks for recorders. At the same time I made a template guided machine for cutting the underside of the lip and the windway top but I would not like to try sketching this with my meagre draughting ability. I use a parallel socket slightly bigger then the head bore to give a step for longitudinal location of the block, and the usual curved-top, widthwise-tapering windway.

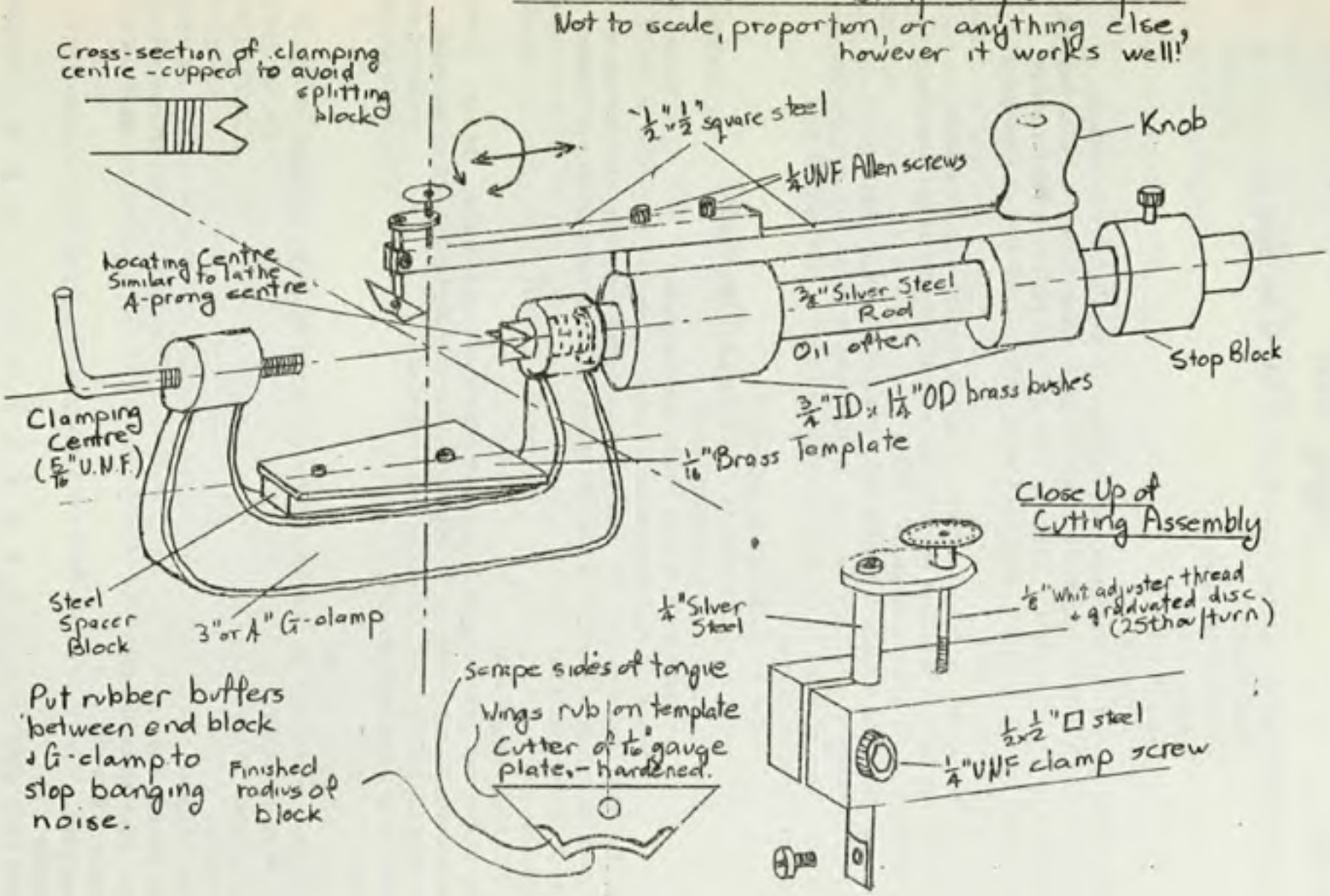
The blanks are first turned in a rod about 1/8" oversize (for a treble) and then cut into pieces 1/8" over length (i.e. 2$\frac{1}{2}$") to allow for a couple of overshoots on the bottom chamfer and for cutting off the clamping centre mark on the front face. The circular portion is then scraped down in steps of 20 thou at a time until the correct "snug" fit is achieved. I work in tolerances of one thou quite easily and once the stabilities etc. of the block and head woods are understood a perfectly fitting block is achieved every time. If the fit is too tight it can be replaced in exactly the same position on the locating centre and another few microns scraped off.

The geometry of the cutter and template has to be carefully thought out with the aid of much squared paper. The template is cut so as to leave the tongue about 1/64" bigger and when the circular portion is correctly sized the blank is driven into the head, which has a temporary reinforcing ring left on until the beak is turned and cut at the end of the job. The bruise marks left on the sides of the tongue are then carefully chiselled off and when the tongue is finally fitted the "working surface" of the block is shaped in the usual way.

The advantage of this system is that when one overshoots or makes a mistake another block can be made within ten minutes as well as building up a drawerful of discards which eventually get used in other instruments. (It is a source of constant amazement to me how after spending hours shaping a perfect block according to whatever theory is uppermost in my head I can go through the discarded block pile getting results twice as good from apparently unsuitable, asymetric blocks.) Also if one is not worried about making mistakes the learning process proceeds much faster - e.g. after six blocks one deduces what characteristics of the sound are present every time and hence are produced by the head geometry.

Recorder Block Shaper / Scraper

Not to scale, proportion, or anything else, however it works well!



FoMRHI Comm. 123

INFORMATION ON REGALS AND FOREIGN LANGUAGE DICTIONARIES.

Arthur Young (Typing : NRI)

The most authoritative text that I have found to date on the Regal is:

"Das Regal"
by Reinhardt Menger
published by:
Hans Schneider
Tutzing 1973

It contains descriptions and measurements for over 40 regals found in various museums around the world. The measurements are in detail for keys, case, bellows, and especially for the reed pipes. There is also abundent picture material either of existing instruments (including individual parts of these) and also picture material from contemporary literature.

There are two disadvantages to the text. English readers may have some difficulty with the German text and secondly, as with all such technical literature here in Germany, it is damned expensive: DM75-.

I have been planning a Regal for some time now and have collected a lot of material on the subject. Perhaps the most difficult info to get is where to get the proper pipes. The following is the pipe description I gave to hundreds of pipe manufacturers around Europe:

Regal 8' -4 chromatic octaves C-c'''
short round resonators in 75% tin alloy (pipemetal)
diameter of C-resonator 10mm
resonators set in lead blocks without boots
Sound characteristics: hard, basic, growily

The following companies gave me positive answers but the prices are wide-spread. I won't mention prices as my info is from 1974 but the manufacturers are still there.

1) Reinhart Tzschockel/Tal
Rebhuhnweg 5
D-7151 Allmersbach/Tal
This maker can provide pipes with either square of round blocks. He can also provide an exact copy of the regal pipes used in the instrument by Antonius Meidting (Augsburg 1587) Prices are astronomical.

2) Suddeutsche Orgelpfeifenfabrik
Roland Killinger
D-7141 Seihingen-Neckar
Here you can also get the individual parts and make the pipes yourself.

3) Fa. Jacq. Stinkens
Orgelpijpenmakers
Antonlaan 8
Zeist, Holland

4) F.J. Rogers Ltd.
Organ Pipe Manufacturers
Elmsfield Works,
Town End
Bramley
Leeds LS13 4BN
England
This is the only company that sells the pipes already voiced.

5) Tuyaux D'Orgues - H. Klein
9, Rue de la Pepiniere
F-67360 Woerth
(This was the cheapest offer I got)

6) Carl Giesecke & Sohn
Postfach 227
D-3400 Gottingen

Another bit of info that may be of use to members. For those people who are put in the position of having to deal with info in foreign languages, I can recommend the following dictionaries. They are pictorial dictionaries called "Duden" in Germany. The publishers are: Bibliographisches Institut AG
Mannheim
They are by no means complete but they do cover most things in the field of music, musical instruments, toolsand machines. The big advantage is the fact that the same pictures and numbering system is used in all three volumes. They are available in English, German and French. It was in the French volume that I was finally able to find the names for all of the parts of a Regal pipe in French in order to send my pipe description to French organ manufacturers. This info wasn't even in the big French encyclopedia at the University library.

FoMRHI Comm. 124

AN ANALYSIS OF THE FRETTING OF THE CAMPI CITTERN AT THE ROYAL COLLEGE OF MUSIC IN LONDON.

by E.S.

By simple visual observation of the relative sizes of the spaces between frets we can arrive at the following sequence of intervals starting from the nut where d = diatonic (wide) semitone, c = chromatic (narrow) and e = equal (compromise) semitone.

Interval		d	c	d	-	-	d	c	d	c	d	e	e	d	c	e	e	d	-	-
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Fret (counting missing 4th & 18th)														(1)	(2)	(3)	(4)	(5)	(6)	(7)

If we compare this sequence in the first octave with our Table 1 in FOMRHI Comm 88, we see that the diatonic semitone between the 5th and 6th fret limits the first two courses (both of which are served by this fret) to B, E and A. Since practically all known cittern tunings have a tone between the first two courses, the first course is then B and the second A. This is suggested by the equivocal position of the 11th fret which reflects a compromise between the requirements of the B and A strings. In common with all cittern tunings we assume a 3rd course a fifth below second, i.e. D.

The available notes on the instrument for the first three courses are:

Semitone	d	c	d	-	-	d	c	d	c	d	e	e	d	c	d	e	e	-	-
Fret	0	1	2	3		5	6	7	8	9	10	11	12	13	14	15	16	17		19
	B	C	C♯	D		E	F	F♯	G	G♯	A	B♭	B	C	C♯	D	E♭	E		F♯
	A	B♭	B	C		D	E♭	E	F	F♯	G	G♯	A	B♭	B	C	C♯	D		E
	D	E♭	E	F		G		A		B	C		D		E					

When we now look at the second octave we find equal semitones on both sides of the 15th fret, which could be appropriate for the B string if they were diatonic, but not for an A string, and we find a diatonic semitone between the 16th and 17th frets which is appropriate for an A string but not a B. One can't have both, though it appears that perhaps Campi tried. It would have been appropriate to have a full diatonic semitone between the 14th and 15th frets and place the 16th at the compromise position between the 15th and 17th, so another possibility is that Campi erred by reversing this procedure (i.e. made $g_{15}e_{16}d$ instead of the correct $d_{15}e_{16}g$).

The nominal tunings of the other 3 strings are a matter of speculation with little guidance for direction. The uniformity of closeness (1.5 mm) of the sawcuts for string placement at the 'nut' would argue against thick bass strings of tunings such as those of Virchi or Kargel or VV, so we would favour the Italian hexachord tuning identified as the standard 6-course tuning by Lanfranco, Virchi, Cerone and Mersenne, and mentioned by Praetorius. The 4th, 5th and 6th courses would then be $F^{\#}$, G and E respectively.

This tuning uses these other courses unstopped to diatonically fill in the gap of a fifth between the 3rd and 2nd courses. It provides a fully chromatic choice of lowest notes for chords with only sparse diatonic fretting. Unfortunately there is only one surviving book for this tuning but it requires a unique type of diatonic fretting that does not appear on any surviving instruments we know.

Campi was working around or after 1600 (since he made an arch cittern) so a b' first string in steel is perfectly reasonable on the string length of this instrument. If maximum string stress short of breaking on the highest string is not required, an octave lower in brass and silver is also possible. The favoured key with this tuning would be D.

We have constructed a chart on graph paper which plots Table II of Comm 88. In the bottom is the distance from the nut, with the 12th fret position 25 cm. from the nut position, and up from the bottom is m from 2 to 5, with one cm. per m unit. We then mark out the fretting on a given instrument along the edge of a piece of paper, scaled so that the 12th fret is 10 inches from the nut. This paper edge is then held at an angle above the chart representing Table II so that the nut and the 12th fret are in vertical alignment. By then following the lines on the chart down from the fret positions to the m-vs.-distance-from-nut plot, we can estimate the tempering of each fret. Where factors like differential contraction of fingerboard wood with age or repairs or a slip of the scale while the maker was marking out could be operative, we can compensate for this by slight shifts and changes of angle to line up frets which are relatively insensitive to variations in m on either side of the one to be measured. In this way we have determined that the tempering of the frets varies around m = 4 as an average value. We now give a table showing deviation from equal temperament on a corrected Campi fingerboard using this temperament and the calculated resultant fret positions (assuming a string length of 42.6 cm.) with a comparison with positions measured by Ian Harwood.

TABLE.

Fret Number.	Deviation from equal temperament (cents)	Calculated Fret Positions (cms.)	Fret positions measured by Harwood (cms.)	Difference (mms.)
1	+ 10	2.62	2.58	+.4
2	- 4	4.56	4.59	-.3
3	+ 6	6.90	6.92	-.3
4	—	—	—	—
5	+ 2	10.72	10.68	+ .4
6	+12	12.69	12.70	- .1
7	- 2	14.14	14.15	- .1
8	+ 8	15.89	15.90	- .1
9	- 6	17.18	17.20	- .2
10	+ 4	18.75	18.88	- 1.3
11	+ 2	20.06	20.20	- 1.4
12	0	21.30	21.45	- 1.5
13	+ 10	22.61	22.80	- 1.9
14	- 4	23.58	23.70	- 1.2
15	+ 6	24.75	24.75	0
16	+ 4	25.73	25.70	+ .3
17	+ 2	26.66	26.75	- 1.1
18	—	—	—	—
19	- 2	28.37	28.40	- .3

From the differences between theoretical and measured fret spacings, we see that the problems start with the 10th fret where a slip of abour 1⅓mm. on Campi's scale will account for the deviations up to the 17th fret (except for the already discussed aberrant 15th and 16th which might differ from their neighbours because they were tuned by ear - other possible explanations have already been made above.). The 19th fret is marked out at twice the nut to 7th fret distance at the very beginning when one designs the fingerboard.

To close we might add the speculation that if the fingerboard were true there is a possibility that this cittern would have been played to death and not laid aside to be eventually studied and copied today.

FoMRHI Comm. 125

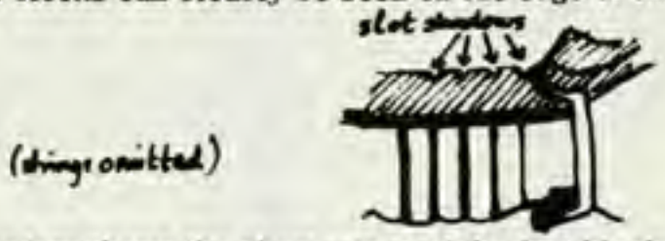
ON COMM 97 CETRA FRET BLOCKS. E. SEGERMAN

Christopher Allworthy's contribution was a valliant attempt to defend the simplest and therefore most attractive explanation for the construction of cetra frets. We believed in that explanation for years until we couldn't make any sense out of the intonation (Comm 89 P.63). The fret block long edges that could represent the intervals of a 4th and 5th above the open string are much farther from being at 1/4th and 1/3rd the open string length than the precision of the rest of the depiction would lead us to expect and the relative pitches of the other fret-block long edges do not fit any known mode (and we tried rather unlikely ones for late in the 15th Century, such as Ptolemy's Diatonic Hemiolon). It is because of these difficulties that we

re-examined the pictures more carefully looking for alternatives.

We will now present strong evidence against each of Allwothy's specific points. The Gubbio Intarsia is not the only representation showing the space between each fret block and we shall show this to be a general feature. Let us first consider the Luca della Robbia "Cantoria" (1431-8) carving. The photo in Wintenitz (Plate 13b) has the lighting from the upper right and the photo in Buchner (Plate75) has the lighting from the upper left. The fret blocks and spaces have the same appearance in both photos, so a shadow effect resulting from one block being lighter than the other is ruled out.

Let us next consider the citterns held by both Musica and Mercury in the Agostino di Duccio reliefs. In the photograph of Mercury in Winternitz (Plate 4a) the direction of the light is almost parallel to the frets so the dark stripes cannot be shadows of one fret on another as Allworth claims but must be grooves. The light comes in appropriately obliquely in the photograph of Musica in Winternitz (Plat 5a and b) but the slots for the spaces between the fret blocks can clearly be seen on the edge of the shadow of the whole neck.



This shadow shows the short edges of the fret blocks along the right edge of the fingerboard to be all in one line.

The final evidence for his shadow interpretation of the iconographic data given by Allworth is the Fra Giovanni da Verona intarsia depicted in Winternitz plate 13c and 48a. The dark lines on the bridge side edge of each ret block cannot be the shadow of that fret block on the next one because the line extends undistorted along the full length of the fret even when the next fret is shorter. Shadows just don't do that. The black lines can be shadows of the fret block onto the spaces between them or the more likely the edges of the blocks themselves seen in the space. That there are spaces, is shown by the ends of the dark lines which have a cutoff like this.

If there was a marked rise in height of the fret all of the way across it one would see a wedge shape to the edge of the fret block which is not seen on this or any other cetra illustration we have seen.

We conclude that Mr. Allworth has misinterpreted the data and that the evidence excludes his hyperthesis. It does not exclude a small difference in height between the two long edges of the fret block, i.e. a version of his model which includes spaces between fret blocks. This version is argued against on the intonation grounds mentioned earlier. We should also add that all we can claim as yet is that our hypothesis (of a sculptured slightly -domed top to the fret block) is not excluded by the data. Closer examination of the reliefs and sculptures may provide positive support. A great advantage of our hypothesis is that it has a good chance of working musically.

TWIST YOUR STRINGS TO IMPROVE TONE AND FRETTING ACCURACY.

E. Segerman and D. Abbott.

PROBLEM

At the Catgut Acoustical meeting in Cambridge last summer Arthur Benade mentioned that various string players asked him to explain their observation that when they twisted the plain strings (be they nylon or metal) on their instruments before tuning them up, they sounded better. Benade suggested that perhaps asymmetries in the string cross-section could be averaged out by the twisting. We believe that the primary answer is in our 1974 Galpin Society journal article on early strings. There we showed that a string with twisted fibres is more elastic (has a lower elastic inodulus) than one with the same diameter but having untwisted fibres. This greater elasticity improved the tone by making the various harmonies more in tune with that fundamental pitch and with each other. The effect that makes the harmonies out of tune is called "inharmonicity" and it affects thicker strings much more thet thinner ones, so the improvement that twisting gives is more marked for the thickest plain strings on the instrument. Another effect that we have called "pitch distortion" is the sharpening of the pitch by stretching during playing, either by pressing the string against a fingerboard or by strongly vibrating it by vigorous bowing or plucking. This causes difficulties with strings at lower pitches and it is improved by making the string more elastic. Thus a twisted thicker string will fret more truly.

PRACTICAL

Tie your string to the bridge or tailpiece in the usual way. Knot a loop at the other end of the string and put a metal hook through the loop. Lock the stem of the hook in the chuck of the hend drill, and while pulling turn away. Make sure not to loosen the tension on the string or the string could kink up and it will often not be possible to avoid a permanent bend at the kink even if one untwists and starts again. When the string is well twisted grasp the string with the fingers of the right hand at the point where it will be threaded up to on the tuning peg, and with the right arm or a third hand, pull the string upwards to keep it taut between this point and the bridge with the left hand, but off the loop and thread the free end into the tuning peg. When in place tune it up (keeping it taut until the tension provided by the peg is great enough to do this itself). We haven't done this with metal strings but find it works with nylon. John Duncalf our lute maker has made high-twist plain nylon strings which work down to a lute 5th or even sometimes a 6th course. To do this he uses a vice instead of the instrument and after the nylon is twisted he relaxes it in the twisted state with heat from a hot air blower. A disadvantage of high-twist nylon is that it is very sensitive to humidity changes and needs re-tuning often.

THEORETICAL

The proper quantitative theory behind increased elasticity by twisting is lengthy and requires the use of calculus. We shall here show by simple algebra that with the same elongation of the total string the elongation of each fibre in a twisted string is less than that in an untwisted string.

Let us define a fibrous string as one in which the main bearing of tension is by elongated structives in the string materal. A solid nylon string is such, since the polymer molecules which provide its strength are aligned along the string direction by stretching during extrusion in the manufacture. Some metal strings could also fit our category since the drawing which gives them the strength leads to the formation of elongated crystals which tend to align themselves along the string direction. More obviously fibrous string materials, such as gut, or silk, clearly belong to this class of strings without further explanation.

Consider such a string where its elongated structures are all parallel to its axis. Imagine it is stretched from a length L_1 to a length L_2. Its original cross-sectional area was $\frac{1}{4}\pi d_1^2$ where d_1 was its original diameter. When it stretches along its length, the diameter shrinks so that the total volume remains constant. Thus:

$$\text{Volume} = \frac{L_1 \pi d_1^2}{4} = \frac{L_2 \pi d_2^2}{4}, \text{ so } \frac{d_2^2}{d_1^2} = \frac{L_1}{L_2}$$

The 'fractional elongation' of the string is:

$$\frac{L_2 - L_1}{L_1} \quad \text{or} \quad \frac{L_2}{L_1} - 1 .$$

Now let us start again, but first twist our string so that it has n full twists over its length. For the moment let us concentrate on the fibres on the strings surface. They form helices along that surface, with the distance along the string axis for one full turn being L_1/n. Let us conceptually unroll one full turn of such a surface fibre. That fibre lies along the diagonal of a rectangle of lenth L_1/n and height πd_1. The length of the fibre is:

$$\ell_1 = \sqrt{\left(\frac{L_1}{n}\right)^2 + (\pi d_1)^2}$$

Now let us stretch the twisted strings to length L_2 as before. The rectangle distorts into another rectangle of length L_2/n and height πd_2. The length of the fibre is now $\ell_2 = \sqrt{\left(\frac{L_2}{n}\right)^2 + (\pi d_2)^2}$. The fractional elongation of the fibre is $\frac{\ell_2 - \ell_1}{\ell_1}$ or $\frac{\ell_2}{\ell_1} - 1$. Now

$$\frac{\ell_2}{\ell_1} = \frac{\sqrt{\left(\frac{L_2}{n}\right)^2 + (\pi d_2)^2}}{\sqrt{\left(\frac{L_1}{n}\right)^2 + (\pi d_1)^2}} = \frac{L_2\sqrt{1 + \left(\frac{n\pi d_2}{L_2}\right)^2}}{L_1\sqrt{1 + \left(\frac{n\pi d_1}{L_1}\right)^2}} = \frac{L_2\sqrt{1 + \left(\frac{n\pi d_2}{L_1}\right)^2\left(\frac{L_1}{L_2}\right)^2}}{L_1\sqrt{1 + \left(\frac{n\pi d_1}{L_1}\right)^2}}$$

Substituting $d_2^2 = d_1^2 \frac{L_1}{L_2}$ leads to the expression for the fractional elongation:

$$\frac{\ell_2}{\ell_1} - 1 = \frac{L_2}{L_1}\sqrt{\frac{1 + \beta\left(\frac{L_1}{L_2}\right)^3}{1 + \beta}} - 1$$

where $\beta = \left(\frac{n\pi d_1}{L_1}\right)^2$. Since L_1 is less than L_2, $\left(\frac{L_1}{L_2}\right)^3$ is less than 1, and so $\sqrt{\frac{1 + \beta(L_1/L_2)^3}{1+\beta}}$ is less than 1. Thus the fractional elongation of the fibre is less than the fractional elongation of the string, which, as before, is $\frac{L_2}{L_1} - 1$. If the elongation is small, it can be shown that the ratio of fractional elongations is:

$$\frac{\text{surface fibre}}{\text{total string}} = \frac{1 - \beta/2}{1 + \beta} \quad *$$

* FOOTNOTE

If $\beta/2$ is greater than 1, ($n\pi d_1/L_1 > 2$ or angle between surface fibre and string axis > 55%), the surface fibres would tend to be under compression with a tendancy to pull off from the rest of the string. We have never been able to go this far. Incidentally, if we consider the winding of an overspun string, the same mathamatics applies. If the core is not prestretched and is not at our playing tension when the winding is put on, the winding will go loose and then buzz as the core stretches on the instrument. This is an example of the above effect since $\frac{\beta}{2} > 1$.

Now let us consider a fibre inside the string forming a helix at an original radius r_1 and stretched radius r_2. Exactly the same geometrical considerations apply for the unrolled cylinder which includes the fibre, so the same expression for the fractional elongation of the fibre $\frac{\ell_2}{\ell_1} - 1$ pertains, with $\beta = \left(\frac{2\pi n r_1}{L_1}\right)^2$. The difference in fractional elongation between the fibre and the total string is not so great since $2r_1$ is less than d_1. The total effect of twisting on the elasticity of the string involves an averaging of the elongations of all the fibres in the string.

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More comments on Communications 39, 39a and 39b.

Donald Gill

1. In Comm 39a,I,line six,for 'ninth fret' please read 'tenth fret'. There seems now to be very little doubt that the average vihuela had a neck long enough for ten tied on frets.
2. I want to withdraw Comm 39a,2. Bermudo does say a few things about the discante (see Book Four, Chap lx, 'About a new small Vihuela') He describes a vihuela with an open range of twelve tones, which fingered 'to the tenth fret of the first course gives eighteen tones'. He goes on 'this type of vihuela is much like (I hope this is the correct meaning of 'buena para') a large guitar strung with six courses like a vihuela, or like a discante'. The tuning he gives is G B d g b d', and its 'great excellance' is that more than one or two voices can be played with a plectrum.
3. The tunings. Accepting that Bermudo tunes from the lowest course, and accepting that the common four-course guitar is what he is talking about, the vihuela,discante, guitar tunings become D G c e a d', G B d g b d' and d g b e' (the bass of the guitar being an octave above the vihuela and the bass of the discante a fourth above the vihuela bass, not the vihuela treble). At the higher pitch the tunings would be G c f a d'g', c e g c'e'g' and g c'e'a'. There is an example of the fourth course being miscalled 'quinta' in Book Four, Chap lxvi, so if one mistake why not two?

Incidentally, this discante/vihuela relationship may throw some light on the Italian viola and lute duet playing.

4. The Paris vihuela certainly looks much more convincing with a long neck. Bermudo, BookTwo, Chap xxxvi says 'How many frets has a vihuela? Just as many as it is possible to fit. The range is complete if twelve frets can be fitted. Commonly one can put ten frets on this instrument, and this is a happy medium (or good way?), and more than eleven can rarely be fitted on a well proportioned vihuela. The vihuela that can hold twelve is way out of proportion. Not only are ten frets the happy medium for the vihuela, but also for the guitar.' (Elsewhere he qualifies the remark about the guitar).

FoMRHI Comm. 128

THE MAILER AND FREI LUTES - SOME OBSERVATIONS

John Downing

The workshop inventory compiled in 1552 at the death of Laux Maler, listed an incredible number of lutes in various states of completion - 1296 lutes and lute bodies and 1132 lute bellies.[1]

It is perhaps surprising that so little survives of this apparently large output - none of the extant instruments being complete and in their original form. The bodies of the surviving lutes are to my knowledge all built to a characteristic elongated pear or almond shape.

Hans Frei, who like Maler ran a workshop in Bologna, was active from around the time of Maler's death to the end of the century. Some of the surviving lute bodies by Frei are almost identical in contour to the Maler bodies.

The existence of these instruments has lead some writers to conclude that this particular form of lute was typical for lutes of the first half of the 16th Century. If this was so, one would expect to find a significant proportion of lutes of this type depicted in the iconography of the period.

Before studying theiconography, it is necessary to establish the original form of these instruments. In order to do this, the following five surviving lute bodies have to be compared in contour :-

1. Maler - Prague, National Museum No 65 1408E
2. Maler - Prague, National Museum No 655 1931D
3. Maler - Nuremburg Germanisches Nationalmuseum No M154
4. Frei - Vienna Kunsthistorische Museum
5. Frei - Warwick County Museum No 67/1965

Although differing slightly in size the profiles all agree closely - the Frei bodies being slightly wider relative to body length than the Maler bodies.

The belly of the Nuremburg instrument is thought to be original and bears the traces of the original bridge situated relatively low down on the belly, offset to the base side and wide enough to carry six courses.

The bodies are made up of either 9 or 11 ribs.

If it is assumed that the original instruments were strung with six courses, with the bridge in the low position[2] and with 8 frets to the body, then the body profile would have been as shown in fig.1 and string lengths would have been approximately as follows :-

Maler - No 65 1408E	71 - 72cm
Maler - No 655 1931D	73 - 74cm
Maler - No M154	73 - 74cm
Frei - Vienna	73 - 74cm
Frei - No 67/1965	75 - 76cm

Turning to the iconography of the 16th Century we can use the ratio of body length (L), measured from the bottom of the body to the neck/body joint, and body breadth (B), measured at the widest point, as a simple means of categorising body types. L/B for the above in their reconstructed form is 1.75 for the Maler lutes and 1.68 for the Frei lutes.

Examining fifty Italian paintings produced during the first seventy-five years of the 16th Century the following percentage distribution of L/B ratio was noted :-

L/B	% Dist'n
1.20	6
1.30	32
1.35	16
1.40	8
1.50	8
1.55	14
1.60	16

To cover the last quarter of the 16th Century measurments taken from some surviving instruments, built during that period, were as follows[3] :-

		L/B	String length cm
G. Hieber		1.38	59
W. Venere	1592	1.41	58
W. Venere		1.42	44
G. Gerle	1580	1.44	60
H. Frei	1597	1.45	-
H. Frei		1.47	67
M. Harton	1599	1.49	70
M. Harton	1599	1.49	78
W. Venere	1582	1.50	67
M. Harton	1602	1.58	94

LUTE BY LAUX MALER
RECONSTRUCTED PROFILE
STRING LENGTH 73 CM.

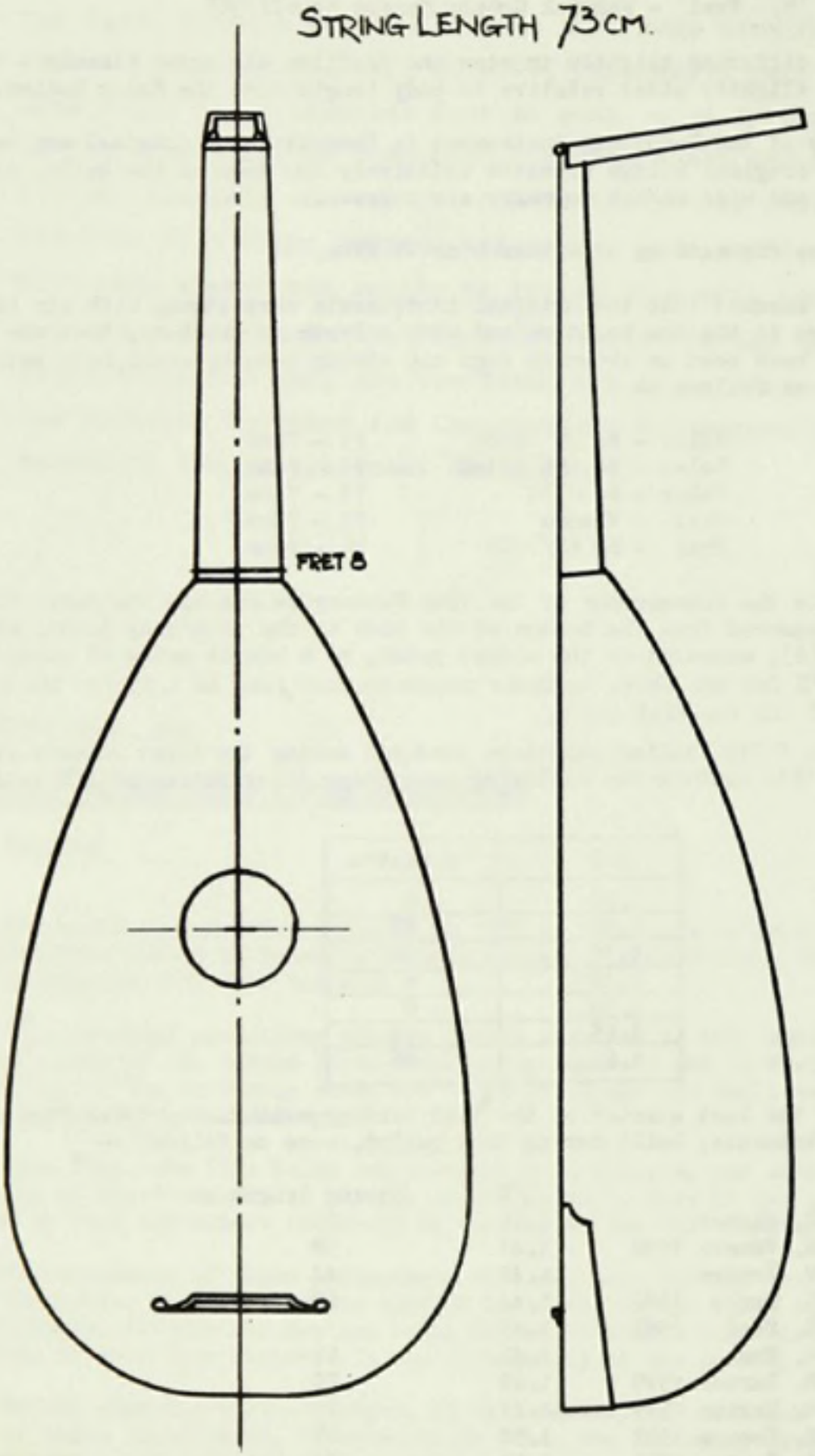


FIG. 1

Approx. scale 0.18 D.A. Ed.

LUTE BY LAUX MALER – MODIFIED NECK AND BELLY
BODY ORIGINAL

STRING LENGTH – 67 CM.

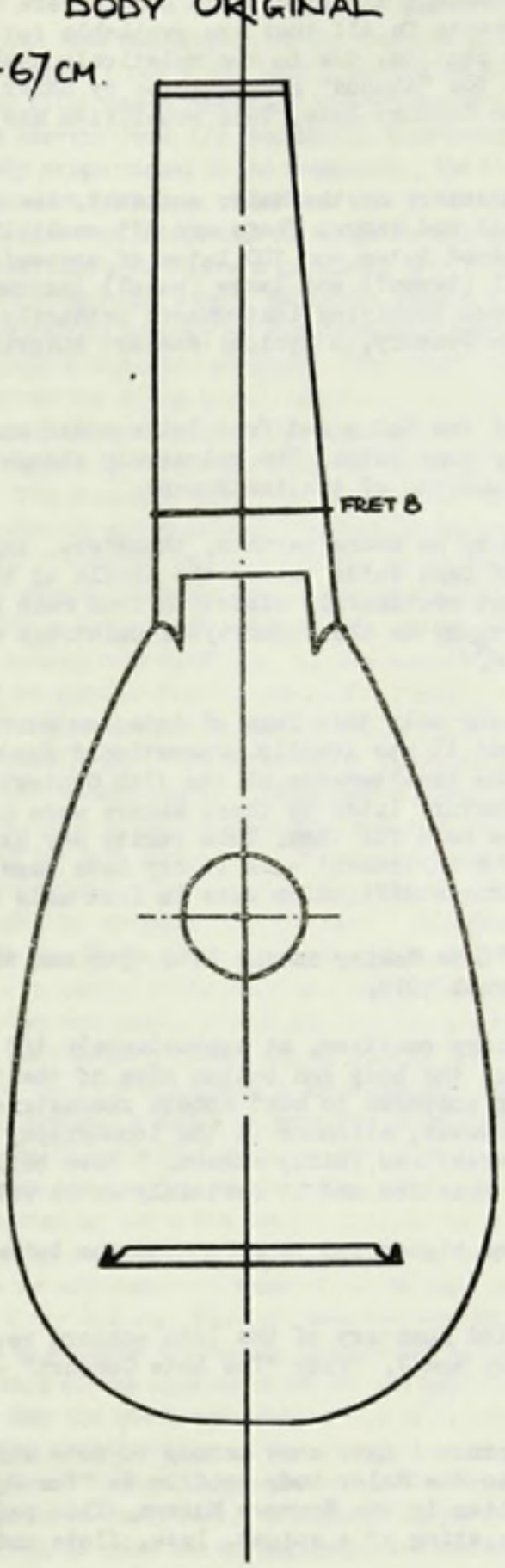


FIG. 2

Approx. scale 0.18 D.A.Ed.

The paintings and drawings making up this sample were taken at random. The data on surviving instruments is all that was available for analysis. Accepting the data given here with caution, due to the relatively small samples taken, it may be concluded that the "almond" shaped lutes by Maler and Frei were not typical of the early 16th Century lute. This conclusion may not be the full story, however.

Returning to the inventory of the Maler workshop, two main categories of lute are described - small and large. There are 375 small lutes recorded, 806 large lutes, 15 medium sized lutes and 100 lutes of unspecified size. The relative numbers of small (tenor?) and large (bass?) instruments would indicate that the Maler workshop was supplying instruments primarily for the lute consort by the middle of the 16th Century, a typical consort comprising of a tenor and two basses.[4]

The string length of the Maler and Frei lutes under examination demonstrates that they were originally bass lutes. The relatively slender body was probably designed to facilitate handling of the instrument.

It is possible, but by no means certain, therefore, that this form of instrument was typical of bass lutes around the middle of the 16th Century.[5] If this was so, one would not necessarily expect to find much evidence for their existence in the iconography as the majority of paintings depict solo players rather than lute consorts.[6]

Probably the reason why only this form of lute has survived from the middle of the 16th Century is that it was ideally proportioned for modification into an instrument suitable for the requirements of the 17th Century lute repertoire (see fig 2). By the 17th Century lutes by these makers were difficult to acquire judging by the high prices paid for them. This rarity may have been due to the fragile construction of the instrument - or it may have been because relatively few of the type suitable for modification were in fact made ?

[1] F. Hellwig "Lute Making in the Late 15th and 16th Century" - Lute Society Journal 1974.

[2] This low bridge position, at approximately 1/8 distance between the bottom of the body and bottom edge of the top block, may seem unusual when compared to most modern reconstructions of lutes. There is, however, evidence in the iconography to indicate that this arrangement was fairly common. I have built a bass lute with this bridge position and it certainly works well.

[3] Note that the higher ratios relate to the lutes of greatest string length.

[4] For a detailed summary of the lute consort repertoire and background see A. Rooley and J. Tyler "The Lute Consort" - Lute Society Journal 1972.

[6] The only picture I have come across to date which shows a lute comparable to the Maler body profile is "The Open Air Concert" 16th Century Italian in the Bourges Museum. This painting depicts a quartet consisting of a spinet, lute, flute and bass viol.

[5] However, note that 38% of the paintings examined depicted lutes with an L/B ratio of 1.5 and greater. These could be bass lutes. See[3]

STRING TENSION ON MERSENNE'S LUTE. EPH. SEGERMAN

It is possible to make a reasonable estimate of the tension used on Mersenne' s lute. He advocated equal tension and quoted (p. 79) the diameters of several strings, i.e. that the eleventh string was one line thick, the seventh (tuned a fifth higher) was $\frac{3}{4}$ line thick, the fourth string (an octave and a fifth higher than the 11th) was $\frac{1}{2}$ line thick and the second (two octaves and a third higher than the eleventh)was 1/5 line thick. Continuing his approach where diameter is inversely proportional to the frequency, the first would be 3/4 the diameter of the second or 3/20 line. The line was 1/12 inch in Mersennes Paris and an inch was 1/12 foot and a foot was 32.8cm. So a first string at the same tension as the other strings would have a diameter d of 0.34mm (the actual diameter of the first string being single while the others were double was probably greater. We cannot find out its diameter or tension but by this method we can find the tensions of the other strings). The cross-sectional area of A of that hypothetical first string at the same tension as the others ($A = \frac{1}{4}\pi d^2$) is .092mm^2. The stress S of the string is the tension T divided by the area A or S = T/A so if we can guess at the stress, we can multiply it by the area we know and get the tension. The stress at which the string will break is a measure of the strength of the material and should not depend on the string diameter or tension by themselves (but on the ratio of T/A as given above). So this gives us an upper limit for what the tension was on Mersenne's lute.

Mersenne (p.183) reported that a lute treble string broke at $3\frac{1}{2}$ pounds tension. Each of his pounds was 0.490 kg, so this makes his string break at 1.72 kg. tension. If we assume the diameter of 0.34mm, we get a breaking stress of 19 kg/mm^2. This is much less than the 32 kg/mm^2 breaking stress that we measure on modern gut. Possibilites for explaining this discrepancy are 1: Mersenne used a much thinner string than 0.34mm diameter. 2: The piece of gut Mersenne used in this experiment had poor strength compared to the gut generally used for lute firsts. 3: Mersenne's experimental setup had some sharp corners (possibly in a knot) which caused the break at too low a tension and 4: Gut today is stronger than gut then. Possibility 1 is unlikely since we would expect the diameter to be greater than 0.34mm. Possibility 4. is unlikely since we can deduce from the data provided by Praetorius (pitch standard, stated pitches and scaled drawings) that the breaking stress of his gut was the same as ours (within experimental error), and besides, we don't expect the material of sheep's intestines to have changed significantly since then. We accept possibilities 2 and 3 as probably including the explanation. Let me now assume the 32 kg/mm^2 figure for breaking stress and calculate that if the equal-tension first string on Mersenne's lute was at breaking stress (and so was only expected to last a few hours) it could have been at a tension of 2.9kg. For longevity one usually uses a tension rather less than 80% the breaking tension, so we estimate that most of the strings on Mersenne's lute were at a tension of 2.0 - 2.3.kg. The fact that the real first string was probably thicker and at a higher tension is immaterial to the above arguement since the same breaking stress applies to all gut stringsirrespective of diameter.

It is remarkable that the above calculation was made without having to know the string length or the stated pitches of the strings or the pitch standard. In one sense this is fortunate in that we can derive an absolute value for the tension of most of the strings on an early lute. In another sense it is unfortunate in that we would very much like to know the string length on Mersenne's lute and the pitch standard it was tuned to,and as we see it, these data are quite inaccessible.

FoMRHI Comm. 130

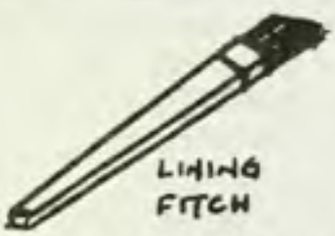
In reply to Sender Fontwits request for Harpsichord information ❦ Bulletin January 1978, page 6. Clean Edges on Gold Leaf.

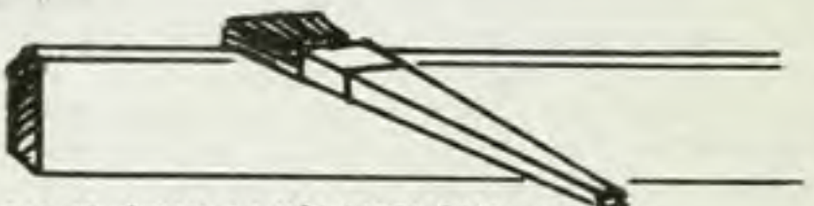
I am sure that in all painted decoration the use of masking tape is not to be recommended. There is no substitute for good brush technique.

I would suggest that where a geometric shape is concerned help can be sought from mechanical aids i.e. a long steel straightedge in the case of a straight line.

To make a straight gold band mark the position on the wood and, using a staightedge, score a light line into the timber with a sharp pointed knife or backed razor blade. In an exaggerated form this will give :-

the two "v" acting as a barrier - the gold size running into the grooves and keeping the lines straight. For such a line a long sable writing brush can be used, or a lining fitch which is used in conjunction with a straight edge.





LINING FITCH IN USE WITH STRAIGHTEDGE.

In either case the gold size must be mixed to flow and any brush must be well loaded to give an even full coat to all the area - particularly the edges.

If it is not possible to score lines with mechanical aids i.e. in free ornament, then the edges bounding the design should be done first using a signwriters sable brush, the inner areas then filled in with the same brush, or a larger fitch. A good flow is necessary to get an even, firm edge.

Following from this question may I give the few tips on the use of gold leaf applied to flat surfaces ?

1. See that the surface is free from dirt and grease and, if painted, that the paint is really hard.

2. Coat with egg size made from stirring about a teaspoonful of white of egg into half a pint of warm water. Coat this all over the surface and not just where the gold leaf will be applied. Allow to dry.

3. Mark out the design. If this is on paper rub the back of the sheet with whitning (or white chalk), place in position and go over the lines with a not too sharp pencil. The design will then be transferred to the surface in chalk. Dust lightly.

4. Coat the areas to be gilded in gold size. This is a varnish which has a drying time according to the balance between the oil to resin which the varnish contains i.e. a 1 hour gold size will have less oil to resin than will a 24 hour gold size. Providing time is not important the longer the size takes to dry the more permanent it will be.

5. The gold leaf is applied when the gold size has the right "tack". This is something which requires experience but the technique is to press ones finger on to the size. If it comes off on to the finger it is too wet. If it has has dried it has gone too far and the gold size will have to be re-applied. If it feels sticky but does not come off on to the finger it is just right.

6. Transfer gold leaf is a thin sheet of gold lightly bonded to a thin paper tissue. Apply this gold side down on to the design and press down evenly - then rub over the backing with the ball of the thumb (or with a pad of cotton wool) to burnish. Pull off the backing tissue. Each application must overlap slightly the gold already applied to avoid gaps in the finished surface.

7. Leave the surface undisturbed for at least 24 hours. It may look rough but leave it alone.

8. With a soft cloth and warm soapy water wash the whole of the surface. This will remove the egg size which in turn will remove all the surplus gold adhering to the surface, leaving clean lines within the design area.

9. When dry correct any blemishes by touching in with gold size and applying the gold when tacky.

10. Varnish can be applied altho this is not necessary since the gold does not need protection. My own feeling is that it dulls the quality of a good burnished finish.

G.I.Douglas. Worksop.

FoMRHI Comm. 131

SOME HISTORICAL NOTES ON ACID STAINING

David E. Owen.

The suggestion that the characteristic colour of many 18th century boxwood wind instruments was obtained by the use of nitric acid staining has caused raised eyebrows and other expressions of doubt and incredulity as well as accusations of non-authenticity when one uses these techniques when constructing modern reproductions of such instruments.

Nitric acid has been known since at least the 8th century, when in the writings of the alchemist Jabir ibn Hayyan (Geber, latinised) precise instructions for its preparation are given. So that it is certain that its effect on wood must have been observed for many centuries.

Two more recent sources of information as to its use by wood turners are from the classic works on the subject (1) Plumier "L'Art de Tourner en Perfection" of 1749 (2nd Edn.) (1st Edn 1701) and (2) Bergeron "Manuel du Tourneur" (2nd Edn.)1816.

Both authors give lists of recipes for varnishes, stains and finishing treatments for woods and other materials.

The Plumier recipe (paraphrased) runs:-

". . . . . another for yellow.

You take some hard wood such as walnut, olivetree, box, maple or others which you put into nitric acid; then expose the wood to the fire at some little distance, or to the sun; and leave it exposed until it no longer fumes. After that you polish* it. In order to render it more handsome, you may throw filings of iron, steel, copper or bronze into the nitric acid, that causes the effect to be more varied and you will have a different colour and marble-like veining."

The Bergeron recipe (paraphrased) runs:-

"Another sort of yellow.

Take an earthenware vessel of generous size, pour in a sufficient quantity of nitric acid. Throw in, bit by bit, some iron filings. From the surface will rise blackish vapours like thick smoke. Avoid breathing them as they are suffocating and noxious to the lungs. It is advisable to carry out this operation in the open air. Put in only a small quantity of filings at a time as there will be a strong reaction which could cause the liquid to escape over the side of the vessel. When all the filings are dissolved and the reaction has ceased the liquor and even the vessel will be hot and so they should be allowed to cool before use. The liquor is spread on the wood in several applications in order to bring the wood to a very dark brown and even to produce a marbled effect by application with a brush.

You may also produce designs on the wood by the use of wax applied with a brush – the wood brought to a yellow or brown as required; then when completely dry carefully remove the wax and the design will appear in the natural colour of the wood against a yellow or brown ground. It is in this manner that flutes are coloured yellowish brown and bassoons a very dark brown".

It is interesting to note that while the instructions of Bergeron are lengthier they do not suggest the use of the pure acid as does Plumier, i.e. without the addition of copper or iron. Practical experiment shows that the pure acid (concentrated) produces considerable yellow staining on box, pear, maple and other woods; the depth of colour depending (as would be expected) by strength of acid, temperature and length of immersion. Also the progress of the staining can be arrested by plunging into a large volume of water at the appropriate stage to dilute and wash away the acid.

It is also interesting that Bergeron refers specifically to the use by woodwind manufacturers of these acid staining techniques.

In extending this short note on acid staining it should be emphasised that nitric acid - particularly when concentrated- is EXTREMELY DANGEROUS. It can penetrate clothing in seconds causing severe burns to the skin etc. Also the fumes - as mentioned by Bergeron - are irritating and noxious.

* In the original the verb is PRESLER (PRELER) = to polish with shave grass (Dutch rush; bot. Equisetum hyemale) - a technique formerly much used in fine wood turnery before abrasive papers were generally used for wood finishing. (vide Holtzapffel, "Turning and Mechanical Manipulation" vol IV).

FoMRHI Comm. 132 TWO SIMPLE VARNISHES Frederick Rubin.

In my labours I have found two varnishes that are easy to prepare, offer good qualities and take a minimum of time and materials. The first is a varnish that uses denatured alcohol as the solvent. The formula is:

Dewaxed shellac	- 30 grams	These quantities can of course
Gum mastic	- 5 "	be increased as long as the
Gum benzoin	- 5 "	ration are constant.

Cover with alcohol and let stand until fully digested (1 month for my batch). Not all of the gum will dissolve, so filter through cloth and let what little solids remain settle out. It remains stable indefinately and can be "cut" as thin as one wishes by the addition of alcohol. My formula was arrived at by balancinh hard and soft resins. Shellac tends to be brittle and mastic is soft. Benzoin is a relatively soft resin. I have used this varnish on necks, and pegboxes and it is very transparent, not subject to chipping and seems to wear well so far. In a few years I should know better as to its wearability. A word of warning on brushing spirit varnishes such as the above. I have found the best method is to flood it on. i.e. load the brush enough to lay on the desired coat in one stroke. Due to the high volatility of alcohol it is difficult to go over an area a second time, without ruining it, before it is fully dry. Also, secondary coats tend to bite into previous coats, so it is best to let dry a full day between coats, and necessary to develop quick facility with the brush so as not to disturb your previous coats too much. The brushes I use are of chinese bristle and I have found them quite satisfactory. I especially appreciate their resilience and loading quality. I tried colouring this varnish but found coloured spirit varnishes very difficult to spread evenly, because of the biting characteristic already discussed. This effect is not discernable on a colourless varnish but is readily seen on a coloured one. I will discuss colouring at the conclusion of the next formula.

The second is a spirit varnish but uses turpentine as the solvent and has a small amount of oil. It is easy to prepare, remains stable and because of its preparation avoids the biting through characteristic of the alcohol varnish. This is a formula I found in Violin Varnish by Joseph Michelman, chapter 13, page 115. The formula is:

25 grams	- Mastic-Turpentine solution
10 "	- Raw linseed oil

40 grams of powdered mastic is dissolved in 60 cc. turpentine in the cold, with occasional shaking. When clear, i.e. settled, filter through cloth then add the linseed oil. The mixture becomes cloudy and settles in about 2 weeks (mine took a month to become completely clear). This varnish is wonderful. It brushes easily and can be smoothed over because of the much slower evaporation rate of turpentine. It can take 3 or 4 days to dry but if exposed to the sun can be dry to the

touch in one day. One should wait a week before rubbing out and adding another coat though. If not dry you can compound your problems and your varnish will be gummy. If not enough sun is available (I don't have this problem in Southern California) a drying cabinet can be set up easily and was described by David Miller in Bulletin 7, page 6. The addition of oil prevents the biting though. Michleman states that the films become insoluble in turpentine once exposed to sun light. I have found this to be the case.

Colouring is done by preparing an alcoholic tincture of the colouring agent, and introducing it into the varnish. Most of the colouring agents seem to be more readily soluble in alcohol than turpentine. Michelman has a method of actually chemically tying the colour onto a metal salt, but I will forego this, since it is much better to read Michelman's book for this information. Heron-Allen describes the system I've employed. - The colouring agent is extracted in alcohol. In the case of an alcohol-based varnish it is a simple matter of adding this to the colourless varnish, but in the case of turpentine it is a more difficult procedure. First the turpentine is volatilised with the air, i.e. left exposed in an unstoppered bottle until it is possible to take a few drops of alcohol and mix it thoroughly with an equal volume of turpentine, this took my turpentine about 2 months. Heron-Allen calls the turpentine prepared this way 'essence'. You then take your alcoholic tincture and evaporate it to ½ original volume, so as not to dilute the essence too much, then introduce it to the volume of essence you wish to colour. Place this in a double boiler and slowly raise the temperature so that the alcohol boils, but not the turpentine. I know that many who prepare varnish cook it to increase solubility, but some of the resins decompose with heat. Both of the varnishes were prepared in the cold with good results.

COLOUR AGENTS

Michelman found that most of the old dye-stuffs are mordant dyes and require certain metal hydroxides to produce (i.e. 'fix') the colour. All of them tend to fade upon exposure to sun light otherwise.

The resin colouring agents are: Gum Gamboge, Dragon's Blood, and Aloes.

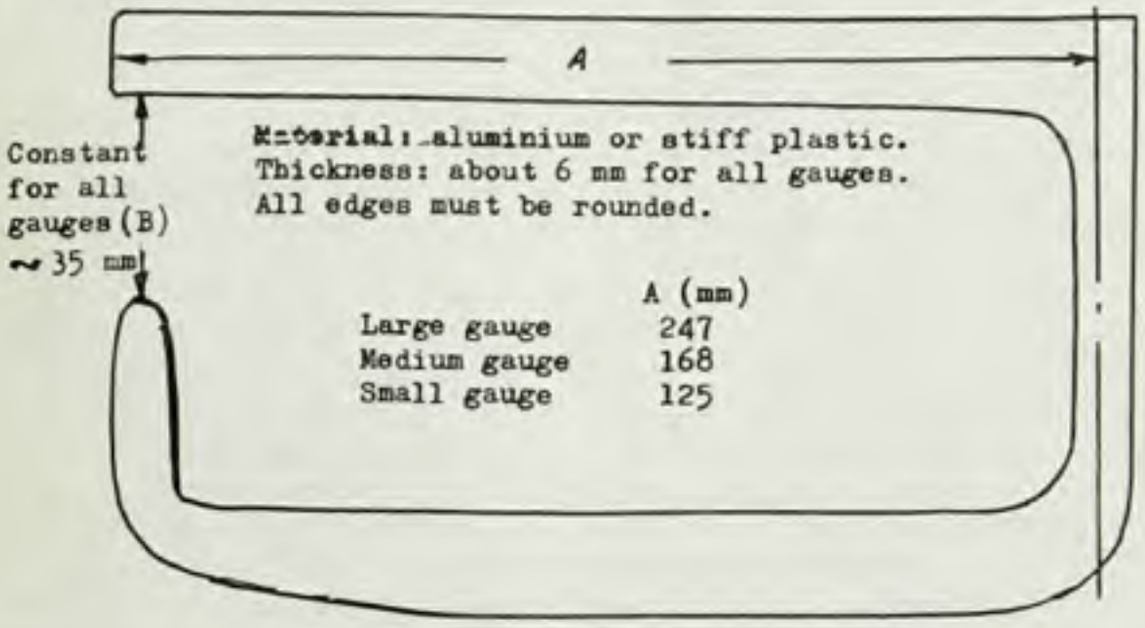
Other colouring agents are: Madder, Brazilwood, Logwood, Sandalwood, Saffron, etc.

I have been employing analine dyes that are alcohol soluble. There is a good range of colours available and by mixing them it is possible to get a beautiful range of yellows, oranges, reds, browns and many mixtures of these colours. These are light-fast dyes and do not affect the drying qualities of the varnishes.

The real problem with colouring oil varnishes is the tendency of linseed oil to kill colour. Michelman's findings show that linseed oil kills the colour whenever an extracted colouring agent is mixed directly to the oil varnish. The colour either fades of is killed entirely. (refer to Michelman, chapter 14 page 136) Even the colourless varnish can kill the colour of a wood, as I found out on an East Indian rosewood. The piece I varnished was red to red-purple and after the varnish dried it looked brown. This is not so apparent on maple, sycamore or any other white or tan woods. I've done well so far by laying down the colour coat with a thin spirit varnish, then applying the oil varnish over it. The colour is still there, though usually a little lighter than expected.

I hope this information will be found useful to my patient readers, and may inspire some to experiment. There is much more that I wish to try in the way of varnish preparation as time allows (I imagine that this will engage much of my life and be full of surprises). I would appreciate replies from others who have attempted varnish recipes, and hope that this encourages those of you who have, to report on your findings.

A Gauge for Measuring Front-plate Thickness Profiles of Viols



The gauge is used in conjunction with inside callipers and a graduated vernier calliper to measure the thickness of front plates of viols at various points across their surface. Three such gauges made to the same proportions but with scale adjusted proportional to the dimension 'A' will allow access to most points on the majority of front plates of viols ranging in size from treble to bass. Some points are difficult or impossible, for example under low fingerboards or, if there is an objection to removing the strings, near the bridge and beneath the tail piece. Bass-bar profiles, however, are easily obtained.

First, mark a grid of points where thickness is to be measured on the plate, using soft chalk. Choosing a gauge size to reach a selected group of points, insert the lower arm into a C hole, manipulating it carefully to avoid damage. The lower jaw is brought just below a selected measurement point, making sure of gentle contact. The inside callipers are then used to measure the gap between the top surface of the plate and the upper jaw of the gauge; callipers and gauge are manoeuvred around slightly until a maximum calliper opening is obtained. Finally, a vernier calliper or micrometer is used to take the measurement from the inside callipers(C). Plate thickness equals (B - C).

Trouble might be encountered with very narrow C holes, but I have not encountered such a problem so far. In any case, the cross section of the lower parts of the gauge could be reduced further, without excessive loss of rigidity.

David Strahle

FoMRHI Comm. 134. ON WIRE-COMMS AND WIRE-COMM COMMENTS. Cary Karp

Comm 105 Comments: In point 3 of these comments the assumption is made that Comm 83 contains data which can be compared to that in Comm 105, and that upon comparison the two sets of data are quite dissimilar. My remarks in Comm 83 in no way imply any such discrepancy. I reported having been able to cold-draw wrought iron to tensile strengths of 1250 MPa and suggested the likelihood of skilled workers being able to attain still higher values. I did not, however, claim to have found any wire with these tensile strengths on any old instruments. The range of the tensile strengths of the samples of old wrought iron wire which I examined was 770-1100 MPa. In as much as the lower portion of this range was generated by piano wire and Cug does not report having examined any such instruments, it would seem to me that our findings are remarkably well in agreement.

The tensile results of my experiments are in no way surprising in light of modern data. (See, for example, the material on wire drawing in, Parrish ed., Mechanical Engineer's Reference Book, Eleventh ed., Butterworths, London 1973.) Reference to a "Karp super-strong type" of wire, although flattering, is both unjustified and misleading. The strengthening "treatment" is nothing other than work-hardening and is an inevitable result of the cold-working of any low-carbon ferrous alloy of the type thus far found on old string instruments. Whether one speaks of these alloys as irons or steels is of no consequence in this regard.

Continued on page 30.

NOTES FOR CONTRIBUTORS - CHECKLIST

Communications are reproduced photographically direct from your typescript. So please send them as far as possible laid out as follows:-

1. **Paper size should be A4: 210 x 298 mm or $8\frac{1}{4}$ x $11\frac{3}{4}$ inches.**
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3. **Type single spaced.**
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8. **Post flat or rolled - do not fold.**
9. **Send to: Jeremy Montagu, 7 Pickwick Road, Dulwich Village, London SE21 7JN. Deadline dates are approximately at the end of March, June, September and December. For next issue the deadline is 26th June. Late contributions can be sent to Djilda Abbott, NRI, 18 Moorfield Road, Manchester, who will if possible fit them in up to the last minute.**
10. **In the interest of speedy communication, Jeremy and I do not undertake to observe the usual editorial etiquette, unless you specifically request it with your contribution. (See our notes on p.2 and 12.)**

Djilda Abbott