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FOMRHI Quarterly

FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS

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FELLOWSHIP of MAKERS and RESEARCHERS of HISTORICAL INSTRUMENTS

Bulletin 31 April, 1983

As so often, we're going to be late with this one — my fault. We didn't get to Kiev (I never had any reply to my letter to our member there, Anatoly Zajaruzny) but I needed a holiday so we went elsewhere and only got back the day before yesterday; it's now 15th April, so we're well behind schedule.

With this Q we start new posting arrangements. Margaret Crowe has offered to take over this task, which has the advantage that, since she is the Treasurer, she knows exactly who has paid and who has not and who has paid for airmail and who for surface; also, perhaps her post office may be more efficient at despatching the Qs by the method we've paid for than the idiots at Sheffield were. We'll see, and perhaps those of you who have paid for air would note the post-mark (if there is one and if it's legible) and report back on the time this takes to get to you. We should record our thanks to Enzo Puzzovio for all the work that he has done in this respect. He has coped with mailing FoMRHIQ at the same time as running a hotel and we are most grateful to him.

GIRO ACCOUNT: We now have a GIRO Account number: 27 316 4406. This should make payments easier and cheaper for members abroad (and here too if their advertisements mean what they say) but you must send payments to FoMRHI (with Margaret Crowe's name on as well if you wish) either to her address or through the proper GIRO channels. One person sent a cheque directly to her local post office which a) caused a lot of bother because the Sub-Post Master had to endorse it, and b) could not be identified, so that whoever sent it is not getting his or Qs (it was cheque no.1151 if that means anything to anybody)

SIGNATURES ON CHEQUES: Margaret says that the bank is now charging us £1 for what they call illegible signatures. This is always on dollar cheques or Eurocheques (I presume especially on those which don't have printed names) so please try to help them in this respect. They are also now charging us on unsigned cheques; this means that if you forget to sign (and probably also if you put the wrong year), we're going to have to charge you extra when we send it back to you for signature or correction; otherwise you won't have paid the full sub.

GIRO CHEQUES: These always come with a pink slip of cardboard, which is the only part that has your name and address on it. Do please fill it in properly and legibly; one has arrived here in the past fortnight with the stamp of a Milan hotel on the front and the cryptic "Mrs Shaw" on the back. This doesn't mean a thing to me, with the result that Mrs Shaw isn't going to get anything from us.

BALANCE SHEET FOR 1982:

Income:	Payments during 1981 for 1982:	£ 1079.35
	Income during 1982:	3252.53
		4331.88
	(less payments in 1982 for 1983:	1127.76)
	Corrected income for 1982:	£3204.12

Expenditure:	Postage, etc:	£ 945.46
	Bounced cheques & other deductions:	95.96
	Printing:	1843.21
	Envelopes & address labels:	143.42
	Expenditure for 1982:	£ 3028.05
Surplus of income over expenditure:		£ 176.07
Accumulated surplus (1975-81):		£ 1119.18
Total surplus carried forward to 1983:		£ 1295.25

JM would like to make two comments on this: Do watch out that you sign your cheques and that you do so legibly; that's what the 'other deductions' is mainly, and it's simply a waste of money (presumably none of you are responsible for the 'bounced cheques' since only those of you whose cheques cleared through will read this). Help us reduce the surplus by sending us Comms.

COMMENTS ON 'ARE WE FIZZLING OUT?' & DJILDA'S SUPPLEMENT IN 30:

Odd Aanstad:

> First my opinion of your question about lateness of Fomrhi Q. If I have figured it right this is a non-profit organization working as cheap as possible for the members. I vote for (b) (It may be easier to make it in a 4, but you need more paper, and that make it more expensive to mail). It is not that bad to wait one week more for a good Q. (It is worse to wait one year for earlier articles)

Peter Ecker:

> **Jeremy's fear that FOMRHI may be fizzling out might be justified. The expressed interest of our fellowship is in the making and researching of historical instruments as an apparent end in itself. I contend however that there is only one reason for researching and making an instrument and that is to make music on it. An obsession with glues, metals, varnishes and timbers is not enough. We should pay as much attention to the purpose and capabilities of our building efforts. In connection with my own guitar-building I have elsewhere written 'it is a great joy to glue together various oddly-shaped pieces of timber, to sling six strings on the result and to play Bach on it.'**
> **I suggest that we amend our title to Fellowship of Researchers of Historical Instruments and Music (FROHIM) and include in our undertakings a study of the music written for and performed on the instruments we make. We might arrange conferences at which we give performances on our instruments to illustrate their effectiveness (or otherwise) in rendering the music written for them.**

Marcel Glover: As for the discussion on the format of the Q, I am quite happy with it as it is. Delays do not worry me either. Its unexpected arrival is a delight and a cause of burnt dinners as I tend to get too engrossed in reading the first section to attend to the cooker.

Uta Henning: I myself would be either for publication at irregular intervals (i.e. wait till you have enough material together that makes up for so-and-so-many pages) or for regular intervals with whatever has been sent in (and the usual look also). Not that I

dislike Eph's contributions (quite the contrary), but I think it is simply not fair on him to make use of his good-will to such an extent. Like this you can exert a slight "moral pressure" on the people: if they start complaining, you can appeal for their own sense of cooperation.

Cary Karp:

As to the FoMRHIQ format and publishing schedule: I'm all for anything that makes production easier. Looseleaf Q's are no less attractive in principle than is the current format, and might have the advantage of single sheets easily being updated (or deleted) when reprint time comes around. I have yet to see a Comm. which was worth holding up a Q. Rapidity of communication is worth more to me than is fatness of Quarterly.

Can't say that I like the idea of the F. .Q becoming a pure medium of instruction for newcomers, though. If there isn't enough material to maintain the thing without "artificial respiration" on the part of a dedicated few, I can see no shame in closing up shop. Thirty-odd issues is no mean feat in itself. I do not, however, seriously believe that the end is at hand. (At least I hope that it isn't.)

Serials Librarian of SACAE, Magill Campus (Mrs.Redding):

I note that as from FOMRHI Quarterly no. 29, the'R' stands for "Researchers" instead of "Restorers", and that another change of name may occur in the near future.

As this library is one of the few libraries which, according your membership lists, subscribes to this journal, I feel impelled to write to explain that each time your organization, or the journal, changes its name, we must recatalogue the journal. Of course,sometimes changes are necessary, and we Serials Librarians recatalogue the offending title albeit with teeth gritted. However, the thought of having to recatalogue a title twice in a very short time is not welcome.

May I therefore make a plea to you to think long and hard before changing your organisation's name in the next year or two? If a change is deemed necessary, please make our records a little neater by changing at the beginning of a year.

Keeping up with title changes or changes in the names of organizations which publish journals consumes much of a Serials Librarian's time, but I realise that problems created for us are not generally considered when changes are contemplated.

Jeremy Montagu: To my mind a Quarterly must appear (more or less) quarterly; FoMRHIQ is a periodical, not a spasmodical. Also I am very much against a change of format; I have several periodicals in my library that have done this, and without exception they are a bloody nuisance. Either they are shelved in two different places or space is wasted, or some issues sit in the normal position and others lie flat or sit on their faces and get bent. Mrs Redding (above) didn't comment on that issue, but I bet she would have done so if she'd written again. My own feeling is for dead-line, thin or thick as it comes (I reckon that it's part of my job as Sec. to nag you fairly often to write more; as a member, I'll take it as it comes) and never to hold it up just to pad it out (there won't be any reviews from me in this issue because I'm back late and I don't want to hold it up while I write them — one is expected to read the books first and that'll take several days). Other have commented on the issue of padding-out — see the end of this section.

John Rawson:
I am not sure why Djilda wants to confuse the problem of the possible lateness of the Journal with that of changing the format.

If it tends to be late because of the amount of work involved in doing it you could either (a) start on each issue two weeks earlier, or (b) change the cover to show the name of the following month.

I agree that the format must be a difficult one to make late changes in - but it is very good. The centre stapling does give a book-effect at minimal cost. Stapling down one edge is very tatty, and more difficult to read. You might also find that it cost more as you would have to cut all the paper in half and staple trough double the thickness which might not be possible. I am assuming that you would stick to the present A5 size. If you went to A4 edge stapled you would have two pages up on each sheet. which would be hard to read. Also you would need bigger envelopes.

If you want to change the format there are obviously lots of possibilitie but I reckon you shouldn't.

Carl Willetts: Format of the Q — do whichever is cheapest! 'Researchers' in the title is perhaps a little broad and is more the province of the Galpin Soc. I have always felt that the accent of FoMRHI should be on practical matters, or at any rate things that have repercussions in the workshop. If Djidla's thoughts on authentic solutions only are to be taken literally then your 'interest categories' of computers and tuning devices go out of the window! Afte all what really matters is the authenticity in sound and playing style of the music which is what the instrument is there to serve. The knowledge that the maker has used the correct materials and old fashioned methods of manufacture may, of course, help psychologically to put the player into the right frame of mind to give an historically accurate performance.

Miscellaneous: I have also had odd comments over the past months, some in writing and some verbal. The overwhelming majority (perhaps because comments are only worth making when they are complaints) have been against padding-out with articles which are not really relevant to making, workshop, etc; more or less what Carl says at the beginning of his commment immediately above. Most of these odd comments come from people who, of course, recognise Carl's second point but who feel that FoMRHIQ is not the place for articles on such subjects, especially when it means, as Djilda says, another week or more delay in the appearance of FoMRHIQ.

This is the beginning, I trust, of a continuing discussion. Only eight of you have written in so far. I hope we shall get opinions from a few hundred more. After all, you pay for FoMRHI; what do you want for your money?

FURTHER TO: bull.28, p.3: The Churchill Trust have sent me a list of all those who have been awarded Fellowships thisyear. There are nine instrument makers: Derek Adlam, who is studying construction of early keyboards in Germany and USA; Paul Fischer, who is studying alternative timbers for instruments in Brazil; Dominic Gwynn, who is studying documentation of historical keyboards and its contribution to restoration and reconstruction techniques in Europe; Carl Hanson, who is studying renaissance recorders, their acoustics and workshop practice in Europe; Lewis Jones, who is studying European keyboard instruments of the 15th century; Graeme Lawson, who is studying ancient musical instrument remains in the USSR; Eric Moulder, who is studying surviving 16th century double-reed woodwind instruments in Europe; Robin Stocks, who is studying folk musical instruments in Bulgaria; Peter Toolan, who is studying steel drum making and tuning in the West Indies. So it was obviously well worth applying, and I hope that not too many of you were turned down (there are 99 awards out of nearly 3,000 applications). I imagine that they'll keep us on their mailing list and I'll let you know if anything relevant turns up in future. I imagine that you know that they change the categories and subjects each year.

Bull.29,p.7; bull.30,p.4 Worms. Cary Karp writes:
The consolidation of worm-eaten wood, and the use of proprietary substances are sources of constant concern to museum conservators. There are so many practical and ethical considerations involved that these people devote entire conferences to these matters. I am, therefore, disheartened by JM's request for a recommendation of a material for filling worm holes,"as easy to use as Brummer which would be safe to use on more valuable instruments". This is a problem for which there are no clear-cut solutions. Noone in their right mind could make safe and simple recommendations for do-it-yourself conservational procedures of this type. (With reference to "brass rot", woodwind oil, etc., I suppose it justified to ask Jeremy to stop expecting there to be convenient solutions for all the conservation problems which beset him.) Some superficial guidelines: An odd worm hole penetrating the wall of a bore can probably be filled without too much need for worrying about dire consequences. Pigmented waxes are useful for this as they can both be gotten into and out of the hole. An instrument in danger of collapsing due to extensive insect damage should never be treated casually. This is an expert task if ever there was one. The consolidant must be chosen in light of both mechanical and acoustical criterea. Since this procedure is as irreversible as anything can be, the choice of the consolidant is critical. I cannot imagine any problem more difficult for the conservator.
A "woodworm" can do alot of damage before it eats its way to the surface of an instrument and leaves a flight hole. Frass -- the sawdust and crap powder that worms produce -- may however fall out of pre-existing flight holes and thus reveal active infestation. Filling holes on an instrument which may be infested is, therefore, plain stupid unless there is an urgent mechanical reason for doing so. When insect infestation is suspected the first thing to do is disinfect the object, which in itself may cause problems. When this has successfully been accomplished, consolidation may be considered. In light of Djilda's statement of editorial policy on pp.11-12 of bull.30, I hope that I will offend noone by registering a plea for the Bulletin, as well as Communications, to be held free from comments -- other than queries -- about any aspects of conservation (such as those about the reasons for filling worm holes) which do not have a firm basis in the practical experience of their authors'. (Apologies to anyone whom I may have misjudged on this point.)

On the same subject Paul Gretton writes:

Most commercial plastic wood shrinks, but for small holes such as worm-holes this is negligible. At an organ-builder's where I once worked they made their own stopping by adding wood-dust from the sanding machine to scotch glue or white glue. I've used this frequently since for such jobs as covering countersunk screw-heads on my instrument cases. It's cheap, and colour-matching is perfect if the dust is taken from the same sort of wood as the work-piece. The great trick is to sand immediately after application -- it's almost invisible. I've used a similar mix on a resin-glue base to reduce holes on small-pipes for tuning purposes. In a letter he asked me to add: "I am not suggesting the use of such concoctions to fill holes in museum instruments".

Paul also comments on another subject on the same page:

Arundo donax (yes, the real stuff) is grown abundantly in middle-class Dutch gardens. At least one maker of Flemish-type bagpipes uses it as his standard material for drone reeds, with excellent results. I've never seen it in diametres greater than about finger thickness, which is fine for drones and oboes but not much good for anything else. The quality is variable and the cane ranges from far too soft to extremely hard. Grow your own?

And Pat McNulty says that he got some cane from Alan Mills and has found it excellent for Uilleann pipe reeds and good to work with. He'll report in more detail when he gets round to writing up his researches on reed qualities, variables, etc.

Bull.Suppl.29, p.12: Paul Gretton again:

A reaction to "Bulletin Supplement", p.12 of FoMRHIQ 29 "As editor ....George Stoppani at NRI."

An editor's job is indeed to edit, but I'm not so sure whether a FoMRHIQ editor should set herself up as the Mrs Whitehouse of authenticity, deciding what filthy, "inauthentic" spray-gun-and-plastic porn we may or may not read. If D.S. had already done so back in 1978, the Great Communication 100 Controversy would never have arisen -- presumably Bryan Tolley's contribution would have got the censor's chop before it had a chance to affront out virginal eyeballs. (Numerous members protested at the shameful, holier-than-thou put-down, but Bryan still dropped out of FoMRHI.) Ah! There's none so intolerant as converts -- I remember the old days when the NRI pundit-pandits used to enthuse about electric drying-cabinets, calor-gas and electric bending-irons, and (send for the vice squad!) fibre-glass lutes. All very useful -- do DS and ES now think they are BS? Would they now be left out?

Don't get me wrong. In my own work I pursue authenticity as much or as little as any FoMRHI member (see Comm.390 for proof of arrant pedantry) and I also have severe reservations about synthetic lute finishes. Nevertheless, for me personally, as a consenting adult, one of the best things about FoMRHIQ is precisely that it prints more or less indiscriminately what it gets sent. One can always slam, bang or bash foolishness next time round, but only if one is given the chance to decide for oneself what is or isn't foolish. Let's not forget that there would have been no revival of early instruments if makers and players hadn't been prepared to take short-cuts and to make compromises for the sake of practicality -- no lute revival without nylon strings, no cornett revival without Chris Monk's plastic instruments, etc. etc. Who is to say whether such compromises are now no longer necessary? Who is to say which methods are allowable or not? As a FoMRHI fellow once wrote elsewhere "we are not really ready to light more fires at Smithfield yet." Paul Gretton

(I wonder if the above will be printed? Maybe it's too coat-trailing, but the subject seems to me to be of basic importance to FoMRHI's purpose.)

Incidentally, Paul sent several pieces and at the top of each sheet is pencilled "Gretton". This makes my life immensely easier and do please follow his example; it avoids the risk of 'anon' when your typedscript gets separated from your letter between arrival and

when I put the Bull. together (and it does happen if I'm not careful, because it all goes into a file and sometimes something else slips in between them).

Comm.440 Ferrous wire, Cary Karp writes:
Schütz's high regard for Meuler's strings may, of course, have been due to their functioning at stresses higher than those which Meuler's competitors' products could withstand. Although Eph "can't imagine" any other possibility, it seems to me to be at least as likely that Meuler's strings simply sounded better. There are several mechanisms which might account for this.
First, a marked feature of the old wire which has been found on keyboard instruments is its not being particularly round (so much so that one specific diameter can rarely be ascertained for any given sample). On a keyboard instrument this should cause less trouble than it would on a fretted instrument, where irregularities along the length of a string might become noticable as the effective string length is changed by fretting. Therefore, if Meuler were doing nothing more than making truly round wire, his product might have been worth the fuss Schütz made over it. The problem here is one of drawplate design and the amount of wire drawn in a continuous length. It could thus be expected that superior wire was more easily made in short lengths, as Meuler's wording seems to suggest (referring to the manufacture of strings, rather than spools of wire). A second feature -- which also depends on drawplate design, length of run, and the choice of lubricants -- is differences in the surface qualtity of various wires. Presumably this is also more important for fretted instruments than it is for keyboards. Meuler may also have been providing wire in finer diameter gradations than was otherwise common, something which yet again may have been more important for fretted instruments.
One way or the other, Meuler's fellow masters did not want him to market a product of higher than guild standard quality. This suggests that the other masters were unwilling to make whatever it was that Schütz wanted. It does not necessarily suggest that they were unable to do so. Meuler may have been unique in nothing other than his willingness to spend more time and take greater care with the manufacture of his wire than were any of the other masters. This does not, of course, eliminate the possibility of his having been in possession of some important technological "secret" which enabled him to produce ferrous wire of higher tensile strength than anyone else could. Eph's observations notwithstanding, I remain unable to see how the Schütz letter provides evidence for this actually having been the case.

Comm.443: Luis Esteves Pereira writes:

The other comment is about the Cary's Comm 443. It seems to be a never ending matter to number the octaves ? Starting were ? It seems agreed that the fundamental octave pitch of the organ which serves as reference to other instruments is the 8 feet (12 palmos) pitch. This octave is represented  and I am used, since I started to learn music to designate it as octave n° 1. The central octave, in the piano, which includes the 16 (a) 440 Hz is, therefore, called octave 3. Quite recently, my son-in-law (who works with me in the organs and other instruments) bought an electronic tuner (made in Japan) which designates this last octave as n° 4. This puts the n° 1 with the 16 feet (24 palmos) pitch, like Cary's Comm. I have a book by H. Riemann which puts the octave n°1 with the 32 feet pitch. When we stop to have diferent designations for the same things ? It seem to me that there are a lot of these odd things that the musicologic community should settle once for the future.

Further to Comm.445, Luis says that he has also been caught by people whom he has helped with information and photographs and who have used them without acknowledgement (it's probably wiser not to quote him in detail). I suspect that it has happened to a good many of us at one time or another, and it not only prejudieces us against the chap who did it but makes us more reluctant to help the next one.

FEED-BACK: Marcel Glover sent a Comm for this issue and says: "When preparing a comm. of this sort I have considerable difficulty in deciding whether a few notes for experts or a 'compleat idiots' guide would be more useful. More feed back from readers would, I think, help the occasional comm. writer to get a feel for the sort of level the writing should be pitched at. The two comms I have had published produced no reaction so at least they were not controversial, but were they useful?"

REGISTER OF INSTRUMENTS: Odd Aanstad writes:

> Does it exist a world-wide register of earlier instruments? If not: Does anybody have a good example of a fill-in formula and posibility to use modern Data tecnic? This would help all of us in looking up missing details, and may be of great help to Organology too.

The answer to his first question is 'No'. We are beginning to get regional registers; Ellen Hickmann has been compiling one for Saxony (I think it's Saxony) and Cajsa Lund has been working on an archaeological inventory for Scandinavia. The problem is that a major museum has no time to produce a complete check-list of all its holdings, on the one hand, and nobody knows of all the tiny musuems which have the odd one or two instruments, sometimes very important ones, on the other, still less do we know all the private collectors and the people who have just one recorder or one harpsichord.

EUROPEAN MUSIC YEAR: Marco Tiella writes: "Having been admitted to the Committee for European musical heritage (Ancient Musical Instruments) of Council of Europe (European Music Year 1985) I send you a brief programme of launching conference, whose final document recommends (point 11) the care of ancient musical instruments. Therefore it would be of great interest if some members will give attention to what their national committee is doing."

The text of point 11 is: "La collaboration internationale dans le domaine musicologique dans le but de réutiliser des instruments musicaux appartenant au passé lointain et récent, envisageant également la formation de compétences et professionalismes si rare aujourd'hui."

I have no idea who the National Committee is in England; has anyone else? If their aim is to re-use the instruments of the past, I can see a good deal of controversy building up. As you know, we do so in the Bate, but as you also know (see Comm.389 and previous and later comments) many people disagree with this policy and would regard it as incompetent and unprofessional. Perhaps we can look forward to some fun and controversy as well as to the music. Meanwhile, if we can get in touch with the National Committee, it might be useful.

COMPUTING: Peter Foster writes "on one small area I might be able to help — I teach computing in Birmingham. Things like Comm.443 are interesting since I can probably get some of my O & A level kids to program it. If other members have ideas which might be programable I'd be interested to hear about them. Could make a good A level project."

PLANS: Rod Nelson says that he has a measured drawing of Michael Morrow's !! !! basset recorder, now in the Bate, and that he would make this available to FoMRHI members for £2.50. I only got the letter when I came back two days ago, so I've not yet written to him myself and therefore can't tell you what it's like.

We have here drawings by Fred Morgan of Edgar Hunt's Bressan treble recorder. There are two of them: a section on each sheet which costs £1 and a reduced size one-sheet drawing like those in the Brüggen Catalogue which costs 25p (in each case plus postage). Fred asked specifically that we sell them at not much over the cost of photocopying them.

We also have plans and descriptions of four clarinets drawn by Alan Mills: Miller 4008 & 4009 in Bb (the ones in the Zoffany picture of the Sharpe Family on the boat), 9pp, £2.50; Baumann 40 in C, 6pp, £1,50; my Milhouse Bb, 6pp, £.150 (again plus postage).

In addition there are various makers' working drawings or measurements of instruments here, but while we have permission to make copies of these for others, several of the makers have asked that we don't advertise them for sale; they are available only to prevent others from measuring the instruments again unnecessarily. Unfortunately we haven't the funds at the moment to ask those concerned if they would draw us a finished plan such as other museums sell, though I have this in mind as a future project when we are next discussing the possibilities of obtaining grants for various purposes.

MATERIALS: I said in the last Bull. (p.8) that George Bowden was sending me a list of materials available from Droguerie le Lyon, Rue de Laeken 55, 1000 Brussels. This has now arrived and there is far too much of it to reprint here. It covers the needs of painters, decorators, furniture restorers, picture restorers, luthiers, polishers, etc etc. The list includes gums, resins, waxes, colours, polishing materials, pigments, oils, varnishes, chemicals, and so forth, as well as the equipment for applying and using these. How their prices compare with others I don't know, but to take a few at random (in Belgian francs): copal varnish 160 per litre; carnauba wax 350 per kilo; 'colle forte d'os' which I take to mean strong bone glue, 120 per kilo; pure copal 210 per kilo; gold leaf, according to the gold fix. The catalogue is here if anyone wants to see it; otherwise write to them. George said they were very helpful.

Denzil Wraight writes:

Skin Glue: Bill Jurgenson gave me a sample of some Hautleim which comes from:

Fritz Häcker und Sohn, "Bester Kristall Hautleim"
7143 Vaihingen-Enz,
Postfach 1265.

I have shown it to people who know much more about warm glues than myself and they say it is excellent. Anyone working with leather ought to have some of this. I think they will only sell a decent-sized sack of it, but if enough interest is shown in it an order could be placed

Rémy Gug, who has a Comm. on harpsichord strings in this issue, says: "We make our harpsichord strings by the old traditional methods (reconstitution of alloys, handforging and craftsman cold drawing). They are available in iron, brass and copper. Diamter intervals of 0.02mm, from 0.40mm to 0.18mm (iron); 0.50mm to 0.18mm

(brass) and from 0.70mm to 0.46mm (copper). Other diameters can be provided on request. Price is 4.80 French francs per meter per reel of 50 meters minimum for each diameter. Samples are available on request. Written orders only."

Karin Rost of Gillenfelde Strasse 11b, D-5400 Koblenz-Metternich, produces wood mosaics for instruments. They have approximately 100 different rosettes for guitars (they sent me one as a sample which is a bit highly coloured but obviously well made) ranging from 42mm to 130mm in diameter, approximately 100 different chips and inlets, edge stripes (presumably purfling) and so forth. They will also make small quantities (50 pieces) to makers' sketches. To complicate matters, from 1st June their address will be Hauptstr. 69, D-5449 Macken. They export to North and South America as well as selling in Germany and they obviously understand English.

Not strictly a material, but Marcel Glover says that he discovered that the cleaning rod for his .410 shotgun is just the right length and diameter to oil the bore of such long-bored instruments as a bass curtal. If you do use a gun-rod, do make sure that you cover the end of the rod with the cloth.

QUERIES: Margaret Crowe asks if anyone can tell her what sort of strings might have been used on a Collard & Collard square piano c.1856. The strings at present on it are very rusty, so she is also unable to find out what pitch it was at, as trying to pull the A up to 409 broke it. There are two strings to a note except in the bass, where there is one, covered. The two strings for the one note pass right round the hitchpin, thus one length of string does for one note.

John Paul asks if any members can provide him with brief information on the advantages and disadvantages of the various lower priced electronic tuners. He would like to be able to pass this information on to his customers who want to buy one. He would also like to know the stockist or supplier of the Korg which was mentioned in the last bull.

Odd Aanstad asks:

I need some help conserning date of makeing of a Clementi Grand Piano. The owner says 1798, but I would guess 10 - 15 years later. I have also looked in the book "The Piano forte" by R.E.M.Harding, but it is not accurate enough in this very matter I belive. On front, over keyboard is written Clementi & comp n, London. Inside on a paperlabel left on soundboard is written: No 26 Cheapside and no 195 Totenham Court Road. Clementi,Collard, Davis & Collard. Patent Pianoforte Manufactures Musical Instrument Makers & Music Sellers. To their Majesties the Prince Regent & all the Royal Family and to the Hon. East India Company. On the tuningpin-block is written Clementi & co and nr. 1140. Length 236cm. Width 115 cm. One little iron bar in upper treble, 6 okt. from FF to f"". sounding part FF=176 cm No spun strings. Brass from FF to $G^{\#}$.3 strings on every note. Oblong tuningpins without hole. Two footpedals like modern Grand, but with the possibility to lock the keyboard in Una Corda poss. The instrument has still about 80% left of orginal strings. If somebody can help please answer to Odd Aanstad, Hovlandveien 138, N-3250 Larvik.

One-keyed flute by KIRST Query from Peter Spohr

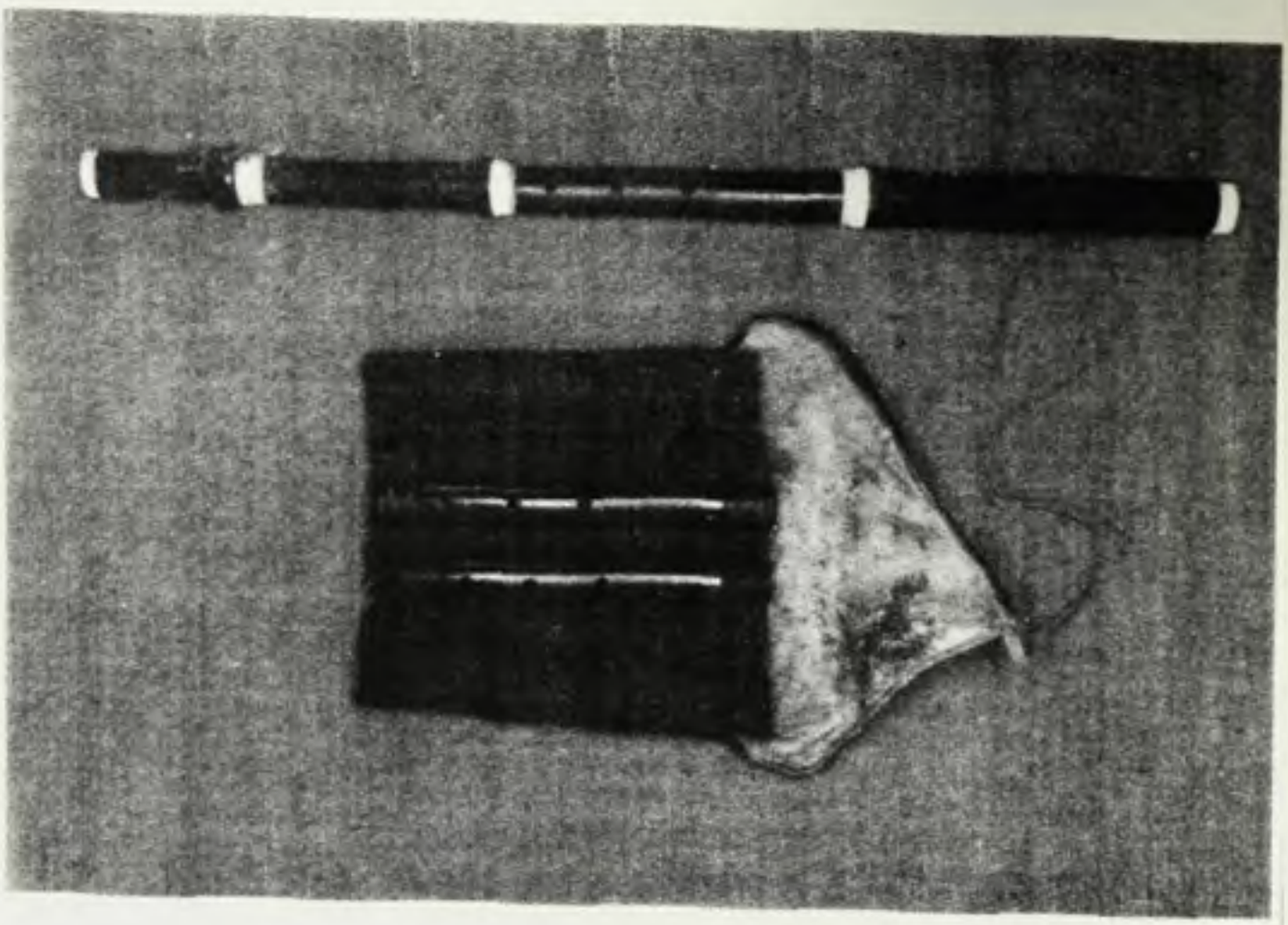
Comments and questions

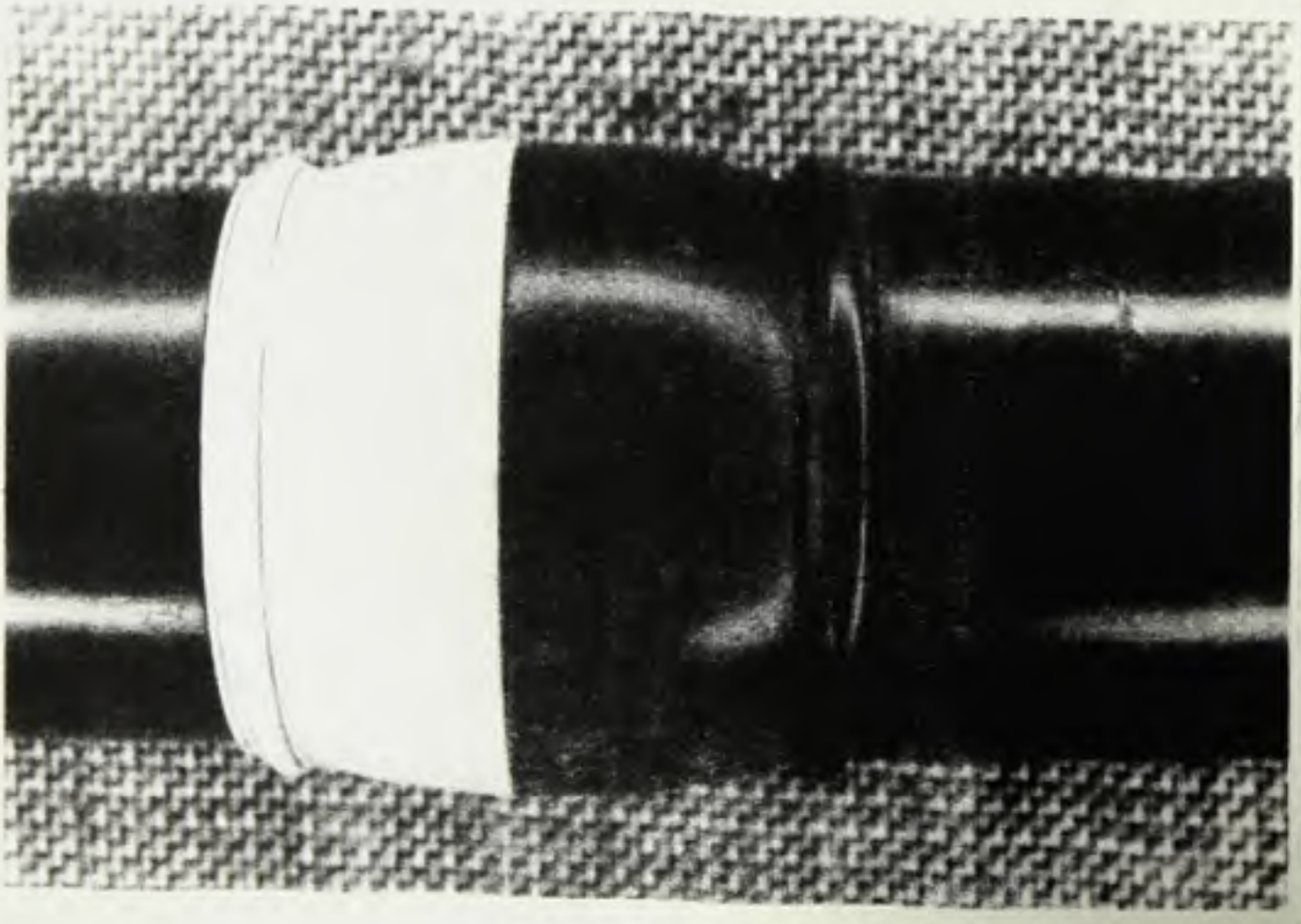
- probably an early KIRST-flute because
  - it is made from ebony
  - of the older shape of the bulbs with a small turned ring (like those made by Quantz and C.A. Grenser)
  - of the extended shape of the foot-joint
  - the longest centre joint marked "I" has a length of 178 mm without tenons
  - of the almost round mouth-hole
- the head-joint has been shortened twice: above the small turned ring it has been taken apart and shortened (see detail-photo) and the wooden part of the bulb right above the ivory ferrule has been shortened too which can be seen from the different diameters of wood and ivory and from the profile which does not correspond with the profile of the bulb at the lower centre joint
- the rest of the head has two repaired cracks and the bore is repaired by a wooden bush in its lower part
- lengths of the flute are:
  - total lengths of centre joints without tenons
    "I": 178 mm
    "2": 164 mm
    "3": 150 mm
  - total length of the flute inclusive cap but without salient cork screw
    with "I": 632 mm
    with "2": 618 mm
    with "3": 604 mm
  - sounding length (from centre of mouth-hole)
    with "I": 546 mm
    with "2": 532 mm
    with "3": 518 mm

Of course I am very interested to know the original measurements of the head-joint to re-restore it or to make an additional head. According to the information in Ph. Young's book "2500 Historical Woodwind Instruments" three of the KIRST-flutes (No. 1, 2 and 4) have as longest centre joint one which is as long as my second centre joint. Possibly his No. 5 has got the same centre joints like mine. If I assume that the total length of the flute with centre joint "2" should be 634 mm (like No. 5) my flute was shortened for 634-618=16 mm which would make much better proportions.

I would be much obliged to anyone who could help me with one or several data of KIRST-flutes:
- total length, sounding length (depending on lengths of centre joints)
- length of the head joint and position of the mouth-hole in the head-joint
- length of the bulb of the head-joint and lengths of the wooden part and the ivory part of the bulb
- diameter of the head-joint bore (pure cylindrical or expanding at the lower end ?)
- estimated pitch (depending on sounding length and cork position)

Peter sent a couple of photographs. The one of the whole instrument will probably be too small by the time it's reduced, and whether colour will come out at I don't know, but we could try. Come to think of it, if I send them to Djilda instead of sticking them in, she can see if they'll work;





Paul Gretton has a string of questions:

He needs a drawing and/or measurements of a good musette (kind unspecified) and detailed information of reed sizes.

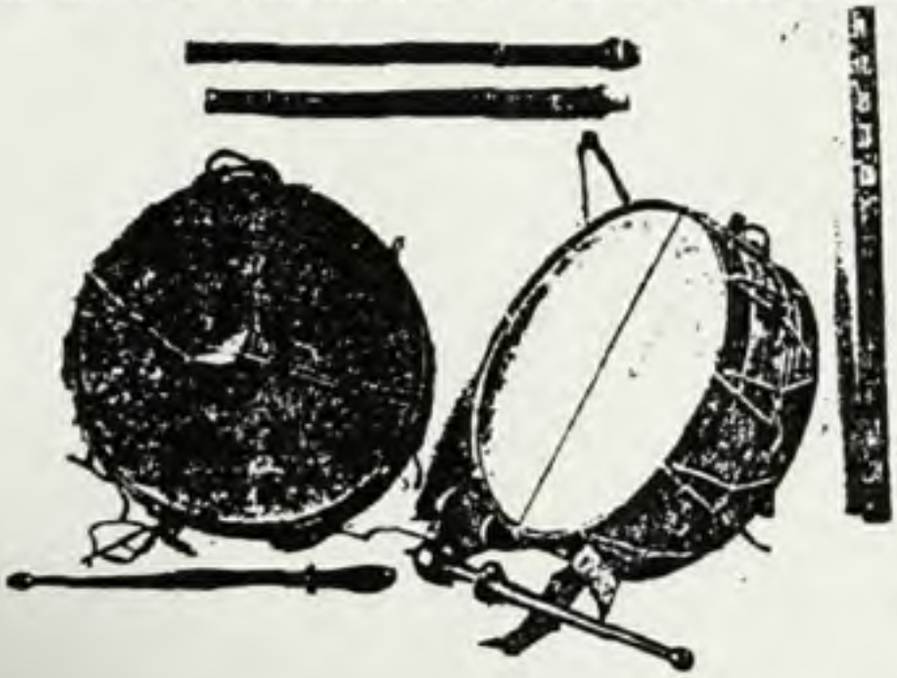
Also measurements of a highland small-pipe chanter.

Two others:

Mute cornett Can anyone supply me with detailed, accurate measurements of a good original mute cornett in g which plays at, or very close to, a=440Hz? By "a cornett in g" I mean an instrument whose basic scale is g and whose lowest real note is a. Both Brussels and Vienna have such instruments at 440, or close.

Glues I recently heard an interview with someone responsible for cable TV tests in the UK, who said that they intend passing the cables along sewer pipes and glueing them to the sides thereof. The glue had been developed by the Admiralty for use on submarine decks. Can anyone supply further info? This sounds to be not a million miles from ideal for glueing cornetti.

Carl Willetts has sent a xerox of a phot of some pipes and tabors from the Cotswolds, collected by T.Carter for Percy Manning and published in the Folklore Journal of 1897. He would like to know where these ar now, whether anybody has seen beaters like these elsewhere and whether anyone can help him. I would also like answers to the same questions. With luck his picture will come out:



COURSES: Pat McNulty is running master classes in Uillean Pipes in Edinburgh. Too late for thisyear (the fourth that he's done) but if you are interested for future years, get in touch with him. He does them in connexion with the Edinburgh Folk Festival.

The Lute Society of America Summer School this year will include a separate curriculum for builders, led by Joel van Lennep and Mike Lowe. Dates are July 24-30; place Hartt School of Music, University of Hartford, West Hartford, Connecticut, cost $330 up with bed and board, $184 without. Applications, with $50 deposit, (refundable if you cancel before July 1st) to Beedle White, POBox 1328, Lexington, VA 24450, USA.

Daniel Papuga sent:

The Norwegian folk music magazine Spelemannsbladet nr. 1, 1983, lists a course in Hardanger-fiddle building from may 23 to june 11, 1983. Tuition fee is NKR. 300, while food and lodging costs NKR 3000. The course is taught by Sverre Sandvik, 3658 Miland, Norway (Tlf. 036/96334). The course is being held for the fifth time at: Akadamiet i Rauland, 3864 Rauland (Tlf. 036/73100). Further information can be requested from them.

Anyone visiting Norway between june 23-26, 1983 is recomended to attend the Landskappleik (traditional folk music competion)occuring this year in Kongsberg. Most of the living fiddle makers will be there. Las t year there were 51 instruments on exhibition.

Uta Henning is involved with courses on Musik des Barock (25 Sept to 1 Oct), Mystiches und Profanes Mittelalter (13-18 Nov) and Italienische Consortmusik der Renaissance (10-17 March 84). These are at Schloss Weikersheim, but there is no information on where that is nor on whom to contact; if you're interested, try her.

OTHER SOCIETIES: Ray Holliday tells me that the Australian Association of Musical Instrument Makers had a good AGM in Canberra, with a workshop and a display of instruments by thirteen makers.

NEMA, the National Early Music Association, has finally got off the ground with an AGM, a new secretary (or rather administrator) Gavin McGuire (42 Woodstock Road South, St.Alban's, Herts), John Thomson still as Chairman (it's really thanks to him that it exists) and a President: Robert Donington. It is already a successful pressure group; it has already held one forum for critics and performaers to try to get them to recognise that there are somewhat different criteria between early music performances and the ordinary performances of the same music; the two different sorts of ensembles are trying to achieve different things. Also to try to persuade them to come and listen and then to write them up. They are planning a second such forum. They are also pressing hard to get recognition for our instruments from the various examination boards (only Trinity covers any of our instruments, and they not many) for a lot of kids in schools are learning early instruments now and have to withstand the 'why haven't you passed Grade xx, when little Sally over the road has Grade 5 already on trumpet' sort of remarks. NEMA is well worth joining, if only because it can't really do its job unless it represents us all. The membership is £10, for which you get various social occasions as well as forums etc. They are charging £25 for societies and ensembles, which may be OK for a playing ensemble, but no way is FoMRHI going to pass five of your subscriptions on to NEMA; they will have to be content with me and with as many more of you as I can persuade to join as individuals. Further information from Gavin McGuire as above.

LIST OF MEMBERS: The 1983 List herewith. That's why I haven't put addresses for any of the people who have queries etc in this bull. Do use it. Do take it with you when you travel (you'd be surprised how many members ring me up when they are visiting this country to ask who makes what or who lives where. It's all in the List.

DEADLINE FOR NEXT ISSUE: July 4th, and let's see if I can get cracking on it straight away. Please excuse any typing errors in this Bull. I started it this morning, and I've finished it this evening as it's a rush job.

Jeremy Montagu

BULLETIN SUPPLEMENT

Djilda Segerman

I'd like to join Jeremy in thanking Enzo for the thousands of FoRMRHI's he must have mailed to all of us. And to Margaret who is now taking over. Having done it myself when we started FoMRHI, I know what a lousy job it can be; it takes forever to stuff those envelopes and messes up your whole living room; when the job goes OK people hardly seem to notice, and when it doesn't all you get is complaints and worse! We must be grateful that both Enzo and Margaret can do such a job and keep our fellowship alive; we cannot thank them enough.

COMMENTS ON JEREMY'S BULLETIN

On going "Loosleaf" To J.M page 4 - we could still keep the same size and fit your bookshelf. To J.R. page 5 - looseleaf format can accomodate last-minute contributions, even ones received two or three days after printing has started. In the present format we cannot start printing until the whole issue is together. For my part, having read everyone's comments, there's certainly not a strong enough feeling to be worth the upheaval of changing format. As for last-minute items, I am willing to hold up to a day or two but no more. Incidentally, I've also received comments from members, all favouring keeping FoMRHIQ as it is.

On Editorial Policy

To C.W. page 5 - Your tuning device will, no doubt, be used to train modern ears into authentic temperament, and do it more conveniently and reliably than any "authentic" method. So, as far as I'm concerned it is IN. The use of modern technology to try to understand early music and instruments is appropriate in a magazine about historical instruments. But I draw the distinction between modern gismos etc. that further this understanding, and those that don't. I apply the same principle to compromises in instrument making. It all depends on whether the compromise is to the detriment of our attempts at understanding historical instruments. It is acceptable if if the real thing is unobtainable, or ridiculously expensive, or in the "unfair to elephants" category. Concerning modern workshop technology, if it can help in making "historical" instruments as they were, as far as we can tell, then it is FoMRHIQ material. If members wish to broaden the scope of FoMRHIQ, the appropriate action is to write a proposal to Jeremy and have the Fellows vote on it.

To P.G page 7. I would simply add to the above that the job of editor is not to be confused with that of censor.

A PLUG FOR JAAMIM This is the Journal of the newly-formed Australian Association of Musical Instrument Makers, run by Kevin and Ann Mercer, Old Council Chambers, Menangle Street, Picton NSW 2571. I like it, and feel sure many FoMRHI members will, like me, want to subscribe. Their first issue has:

Making Pads for Flute Keys - R.A.Holliday
Some Bows in the Museum of Applied Arts and Sciences Sydney - I. Watchorn
Violin Making and Research in the USA - G.W.Caldersmith
Small Tapered Files and Reamers - K.J.Mercer
Flat Top Bridge Removal - J.Williams

To whet your appetite I've reproduced Ian Watchorn's bow drawings, to fill up a bit of extra space at the end of this issue. I doubt if all his measurements will be readable, and there is a lot more information in his original text.

Could we please request a member of JAAMIM to send us a summary of each issue, like the one Paul Gretton does on Bouwbriefs?

WORKSHOP We have had no takers for the extra space in our workshop, mentioned in No. 29 Bulletin Supplement. If we do not find someone soon we will have to rent it to a non-instrument-maker.

ROSEWOOD Enzo Puzzovio has several sacks full of small billets at a very good price - surplus stock from a local cutlery firm.

FoMRHI BOOK NEWS Jeremy Montagu

As I said in the Bulletin, I've not written any reviews for this issue, and the only one there is is more a warning than a review, especially with the publisher's note which came in the other day and which I've appended to what Arnold wrote about it. There was not time to write any before I went away, and I don't want to hold this up now. The books waiting are:

1) Hugh Cheape, A Check-List of Bagpipes in the Edinburgh University Collection of Historic Musical Instruments (£2.00 including postage in UK, add 50p for overseas). I was wrong last time; there was this one list to come. That is now the lot, and complete sets are also available for £9 in UK, £13.50 overseas. Also available from them (Reid School of Music, Teviot Place, Edinburgh EH8 9AG) are copies of the Catalogue of the Galpin Society 21st Anniversary Exhibition, 1968 at £4 in UK, £4.50 overseas. Cheques for all these in £ sterling only, made out to University of Edinburgh. Also available is the text of Anthony Baines's talk at the official opening last October (well-worth reading) On the Benefits of a University Collection of Musical Instruments, at £1.00.

2) Ringve Museum, Spæll åt mæ! a temporary exhibition catalogue of folk instruments from the county of Trøndelag (in Norwegian).

3) Catalogue of the European Muiscal Instruments of the XVIIth, XVIIIth and XIXth centuries in the Ueno Gakuen Collection, Tokyo, 1980. In Japanese and English in parallel columns, well illustrated.

Then you ought to know about:

Flute à Bec, a periodical published by l'Association Française pour la Flûte à Bec, which is edited by our new member, Hugo Reyne. He has sent me a copy of no.5, December 1982, which will be here for anyone to see at the Recorder Weekend or any other time. If you're interested, get on to him.

Vierundzwanzigsteljahrschrift der Internationalen Maultrommelvirtuosengenossenschaft, which despite its spoof title is an excellent first issue of what I hope will become an extablished periodical or spasmodical on the jews harp. The first issue is free to those interested as long as stocks last; nos.2 & 3 cost $12.00. If you want copies, write to VIM, 930 Talwrn Ct, Iowa City, Iowa 52240, USA. The editor and moving spirit is Frederick Crane whose excellent book on Extant Medieval Musical Instruments should be familiar to all of you.

John Henry van der Meer & Rainer Weber, Catalogo degli Strumenti Musicali dell'Academia Filarmonica di Verona, which I have been sent for review elsewhere. It is available from the Accademia, no price stated. While some of the instruments will be familiar to readers of GSJ there are a fair number of others.

I'm trying to think whether I've bought anything recently that you may not have heard of; if I did, it was probably from Tony Bingham who has an excellent stock of books on instruments and so has Brian Jordan; both are members and both have said in the past that they will not charge postage to fellow members, which is a considerable concession today.

Summaries of Bouwbriefs 26 and 27 — Paul Gretton

26. 2.5 There is a German bagpipes magazine "Der Dudlpfeifer" which appears every two months, costs DM 8,00 per half year and is available from Lothar Junghänel, Oberer Kirchhaldenweg 177, D-7000 Stuttgart 1. (I have seen three copies of this -- very enthusiastic but little use to makers and mainly concerned with the "folk-revival" scene in Germany. There is, however, a fair bit of information about Bohemian and Arabic bagpipes -- a reflection of the editor's own interests. PG)
9.1. F.Tieman. Antique paints and varnishes. An explanation of just what paints and varnishes are and general info about various ingredients.
9.2. Huib van Putten. Resonance frequencies of violin bellies and backs. A detailed article, reacting to a previous article by H.Zwetsloot.

27. 1.3. From 1983 on the Bouwbrief will include adverts costing f100,- for a full page, f50,- for ½ and f25,- for ¼. A line of normally-printed text will cost f1,- Don't forget that they print two columns to a page. Otherwise the format is the same as FoMRHIQ. The address is Utrechtsestraat 77, Postbus 350, NL-3400JA IJsselstein.
2.1. Bouwbrieven 16-21 (1980-1981) have been reprinted and are available for f15,- excluding postage.
2.2. The Dutch/English/French/German technical vocabulary has not been reprinted, but photocopies of the old version are available for f10,-
3.1.There seems to be demand for a technical drawing of a small harp. Can anyone say where such a drawing is available?
3.2. A drawing of a bentside spinet after Délin is available for f40,- from Theo de Haas, Kleine Houtstraat 84, NL-2011 DR Haarlem.
3.3. Drawings of a semi-chromatic octochord psaltery (NvRB-26, f37,60) and a chromatic psaltery (NvRB-22, f40,-) are available from Muziekcentrum Het Duintje, Bennebroekdreef 20, NL-2121 CN Bennebroek.
8.1. Hans Lemmen. How to make a long flexible drill to drill out elder shoots.
9.1. H.Zwetsloot. Commentary on article 9.2 in Bouwbrief 26.
9.2. Wim Krijger. A set of linked organ pipes -- i.e. joined together in one piece. These are intended for portatives or organized hurdy-gurdies. Drawing with full instructions for making.
9.3. Fred Manders. Determining fret positons on stringed instruments.
10.1. Info requested about Aeolian organs and their construction. Hans Lemmen, Rijksweg 188, NL-6247 AN Rijkholt.
11.1. The city of Milan runs courses in restoring and copying historical instruments. Total of 4000 hours over 4 years. Info from Marco Tiella, Via Rialto 30, I-38068 Rovereto.
11.4. The next "Super Instrument -Building Day" is 28th May 1983, near Utrecht.
11.6. The violin-building competition in Kassel (Bouwbr.25, 11.2) is for professionals only.
Further info about any of the above from the Hon.Sec. of FoMRHI, not from me.

Re my last summary (FoMRHIQ Oct 1982 p.13) I'm not fed up! J.M. has missed the point -- my fault for being ironical. I wasn't complaining at any gross imposition involved in doing Bouwbrief summaries, which takes all of half an hour every three months. My intention was merely to point out the rather sad fact that an ever-increasing proportion of the Bouwbrief seemed to consist of translations from FoMRHIQ. They obviously suffer also from members' not contributing. My implication was a gentle "if it goes on like this for a few more numbers there'll be nothing left for me to summarize." In fact my fears haven't been justified by numbers 26 and 27, so keep watching this space for more exciting Bouwbriefs (Bøûwþfiëvęñ to you Jeremy) from your very own P.van de G.! Groetjes en tot ziens!

Contents of Bouwbrief 28, Feb.1983

2.1. The following sources of info about building small harps are suggested:
Gildas Jaffrenou Folk Harps; Dennis Waring Folk instruments, make them, play them.
The latter is published by the Hyperion Press, Winnipeg, Canada.
2.4. Catalogue of the Galmarden bagpipe exhibition available from Baljuwhuis, Kammeersweg 2, B-1570 Galmaarden, Belgium. (Probably available, according to Bouwbr)
3.2. Working drawings of cornamuse, schryarii, racket, kortholt and sordone are available from Gregory Lewin, 54 Huntsman's Walk, Rugeley, Staffs, WS 15 2SN.
8.2. Jan v.d.Meer: Building a Harpsichord stand in Louis XV style --7 curved legs, as illustrated in the Encyclopédie. Detailed drawings and instructions.
9.1. Ben Nieuwhof: Making a file to profile recorder windways. Another version of the sort of thing described in article 8.2 of Bouwbr 23.
9.2. Commentary on article 9.3 of Bouwbr 27. Placing of frets. H.Zwetsloot
10.1. H.J.K.Eskes. Propolis for violin-builders. Cremonese varnish seems to have had a very low propolis-balsam content. For further info: Valkenberglaan 59, 7313 BM Apeldoorn, tel 055-551794.
11.3. Three-day course in building hurdy-gurdy and celtic harp. During Whit. Info from Jan Ament, Krullelaan 37, 3701 TB Zeist.

The Superbouwdag is on 28th May 1983, in Het Veerhuis in Nieuwegein-Zuid, near Utrecht. For further info contact Vereniging voor Huismuziek, Postbus 350, NL-3400 AJ IJSSELSTEIN. A stand costs f100, but if you demonstrate your activities (i.e. turn, carve, gouge etc) it's free.

FoMRHI Comm. 448

THE TRAPEZOIDAL TRIANGLE - A PRACTICAL SOLUTION.

M GLOVER.

This design for a medieval triangle is based not on any fundamental researoh but on reading J M's books on early percussion instruments followed by a good deal of brain racking. It does, however, produce a triangle which is both trapezoidal in shape and free to vibrate without shedding its rings. The mechanically minded require only the drawing to be able to make onesso the following method is intended to guide any other intrepid soul who wishes to have a go.

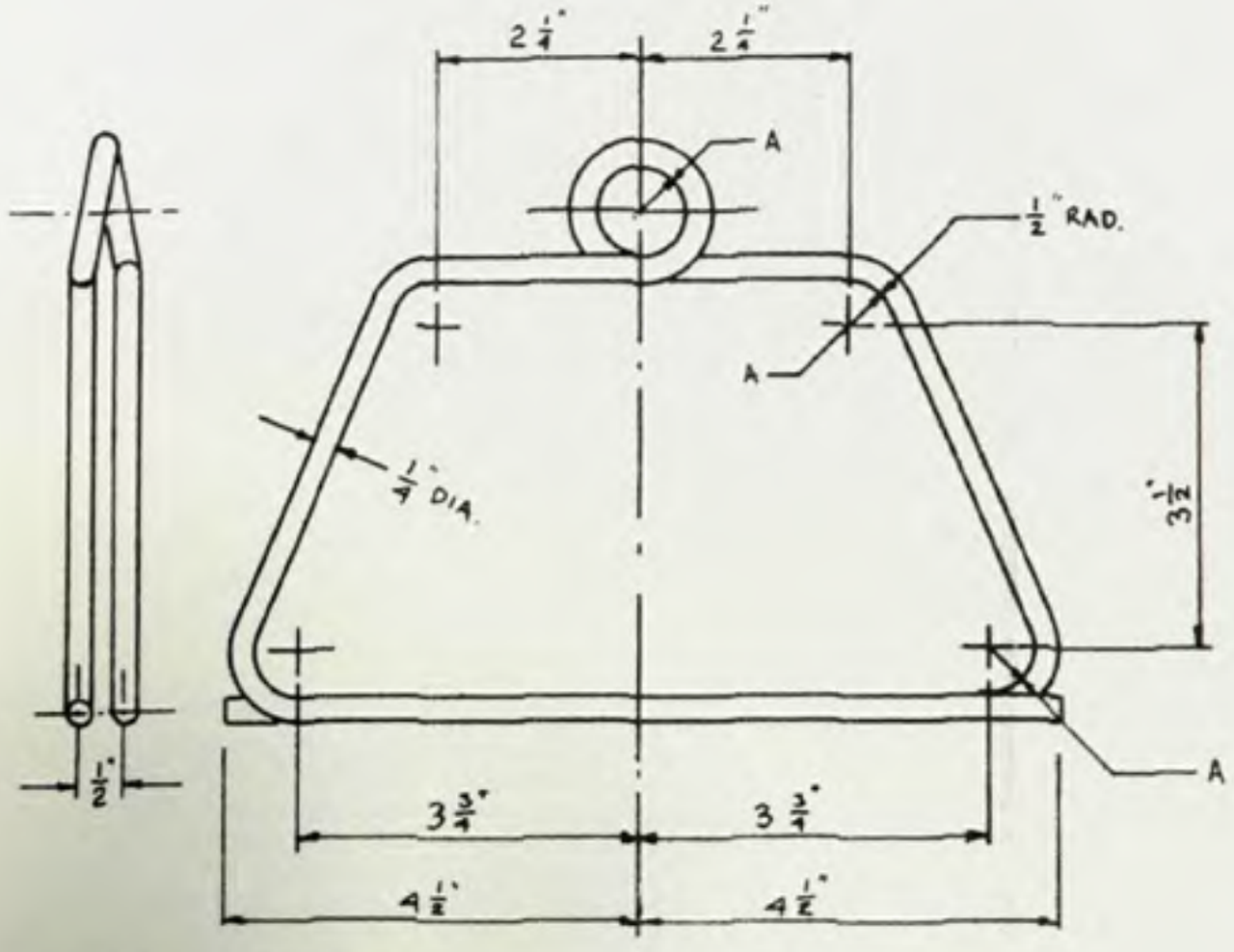
The material I used was En19 (0.3%C, 0.65%Mn, 1.1%Cr, 0.32%Mo.) because it is less likely to crack when subjected to village blacksmith style heat treatment than other easily obtainable steels. If perfect symmetry is desired or a number of instruments required then a jig should be constructed by welding short lengths of pipe onto a thick steel plate. For a one-off, a little care will yield a perfectly satisfactory instrument using only a rule and a piece of pipe held in the vice.

Take the bar wich is to become your instrument and mark the centre. Heat two inches either side of the centre to a bright red heat (oxy - acetylene is the best source of heat as it can be concentrated into a small area). Wearing heat resisting gloves, of course, grasp both ends of the bar and bring the centre mark up to the pipe then quickly form the loop. If you cannot get it all the way round first go then re-heat and complete the operation. The four bends which complete the frame should be made in the same way. When all the bends have been made they should be checked for twist and any twist corrected until the two arms at the bottom lie parallel to one another.

When you are happy with the shape of the instrument it should be heated to a cherry red and plunged into a container of oil (old sump oil will do). The container should be of metal and have a lid which can be dropped on to extinguish any flames which may occur. The oil should be free of water and the whole process should be done with great care and in the open air. After a couple of minutes in the oil, remove the instrument and wipe dry. Polish a couple of patches to reveal a bright steel surface. Heat slowly and evenly until the bright spots turn dark blue then quickly quench in the oil. Polish off any scale with emery cloth and your triangle will be finished.

The rings can be made by winding a number of coils of 1/16" dia. steel welding rod around a 1" dia. tube then sawing through the coils along the axis of the tube. Four rings should be enough. The striker should be made from a piece of the same steel as the triangle is made and heat treated in the same way. A loop on one end is optional.

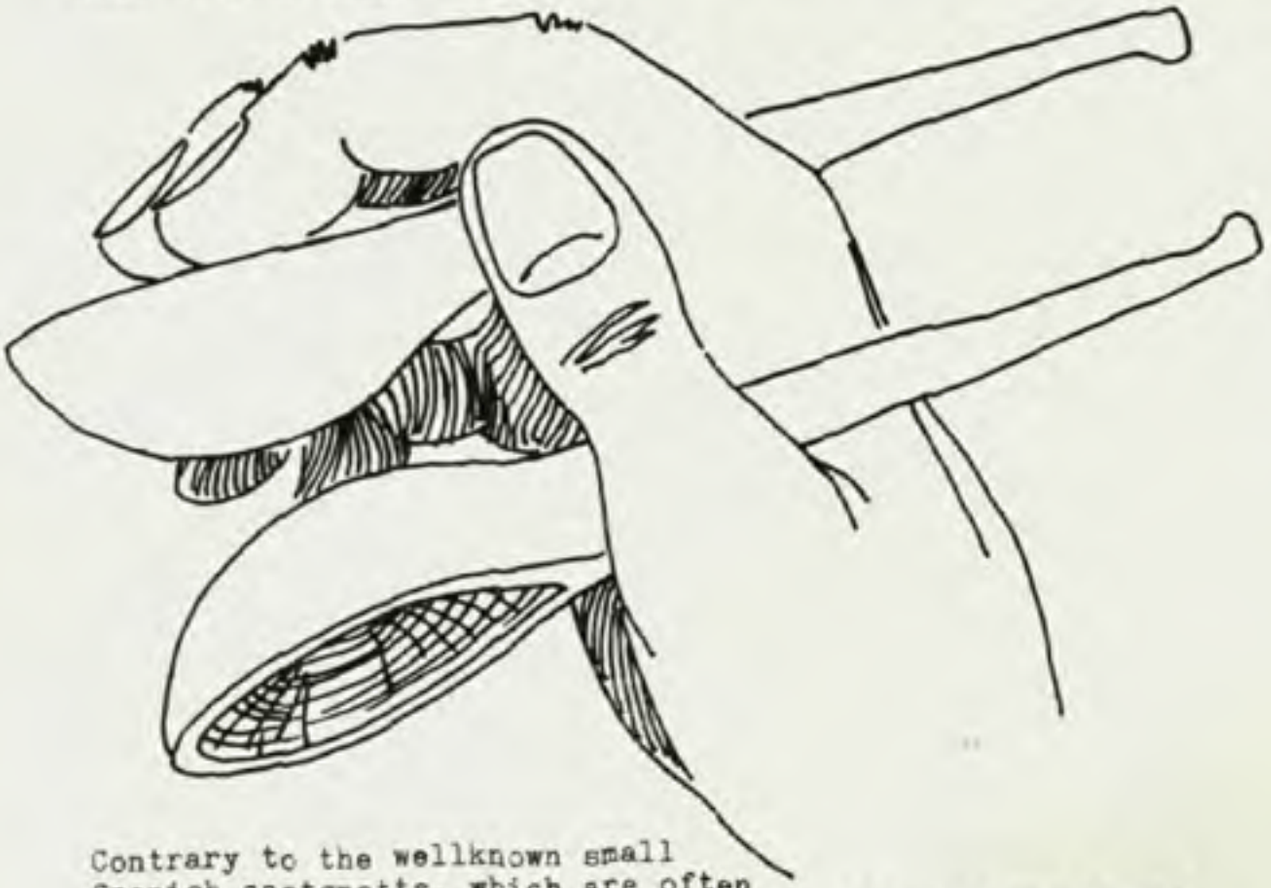
WARNING If you are not completely confident in your ability to handle hot metal then take the drawing to someone who is. Hot metal can damage your health!



THIRD ANGLE PROJ.

Spoon - Castagnetts of Turkey

In his book "Folk Musical Instruments of Turkey", Oxford 1975, Laurence PICKEN informs us, that the folkdancers in Turkey like to use in each hand a pair of spoons as castagnetts in order to stress and enrich the rhythm of their dances. When you look at these spoons carefully you will find that the deeper part of it takes one third of the whole spoon. The rest is for the handle. This proportion makes the spoonhandle light and the other part heavy. That is important for the function of using the spoons as castagnetts. You will easily recognise, that, when you take normal wooden spoons out of your kitchen drawer and try to use them for p playing. The long handles have a bad influence on the quickness of your fingermovement.

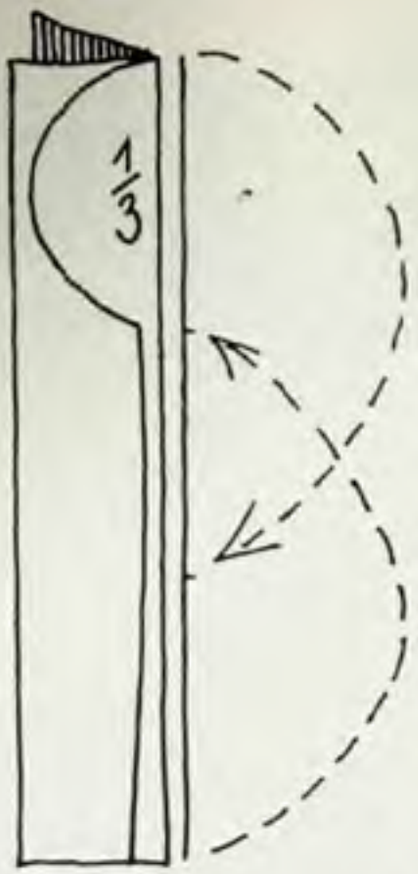


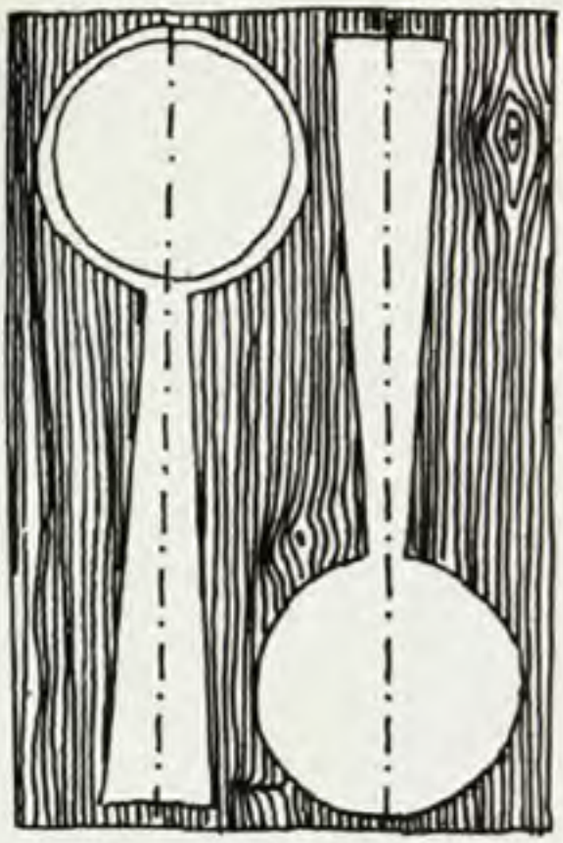
Contrary to the wellknown small Spanish castgnetts, which are often bound together in pairs, these spoon - castagnetts are not held for playing with their ladleparts face to face, but back to back.

Steps of making:

Take a piece of paper of the size of the spoon. Divide the long side by folding into three equal parts, turning the short edges inward. Then fold the two long sides upon eachother and mark the centre-line. Then draw the outline of halfvof the spoon. The ladlepart may be of a circle or any other individual outline. Cut it out and glue it on the wood with a water soluble glue. You may also draw a line along the mould.

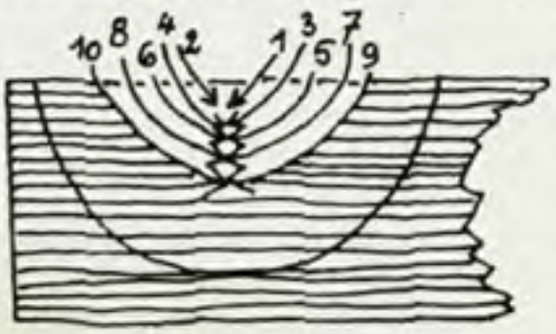
The mould should be put economically on the wood. Place it twice in opposite direction. Then cut the ladle cave with





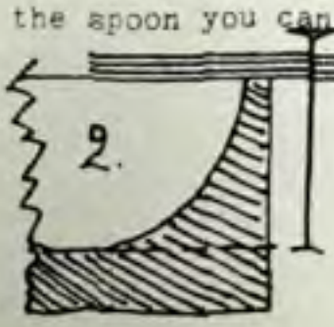
a sharp edged gouge. I want to stress the importance of a sharp tool, as it is of great advantage not to use a hammer for carving but to cut only by pressure of your hands, slightly turning the gouge with the hollow of your palm. The edge of the tool gives a better trace when it is led in both directions at the same time, forward and sideways.

Mind also the grain of the wood! The best way is to cut alternatively from two sides into the cave:

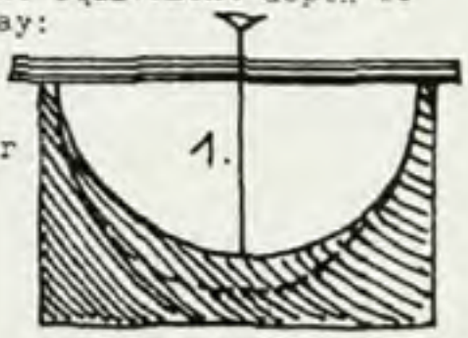


The outline of the cave may be known. Then the carving should start near the middle line and be led by cutting and countercutting into the depth. The drawing shows the sequences. The countercutting always leads to the same depth and the carved wood falls aside. To carve against the grain is dangerous and should be avoided because of the narrow outline. The moment of the meeting of alternative carvings has to be felt with sensitiveness in order to prevent any offset in the wood.

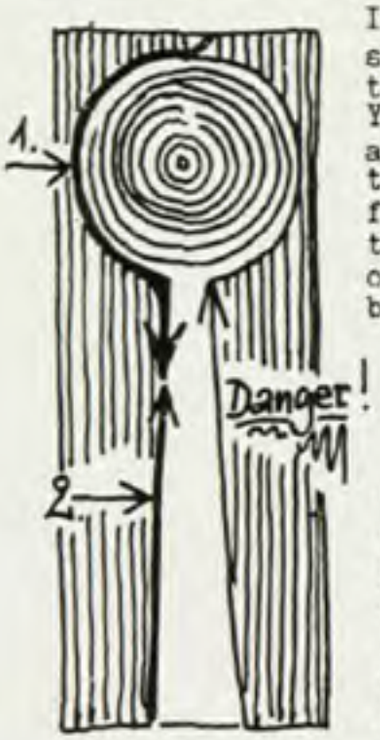
To find the equivalent depth of the spoon you can use a very simple way:



Put a nail into a piece of plywood or even cardboard, which covers the cave. then press the nail down to



the carved depth. Take your feeler - construction off and meaeure on the outside of the spoon how far you have carved until now.



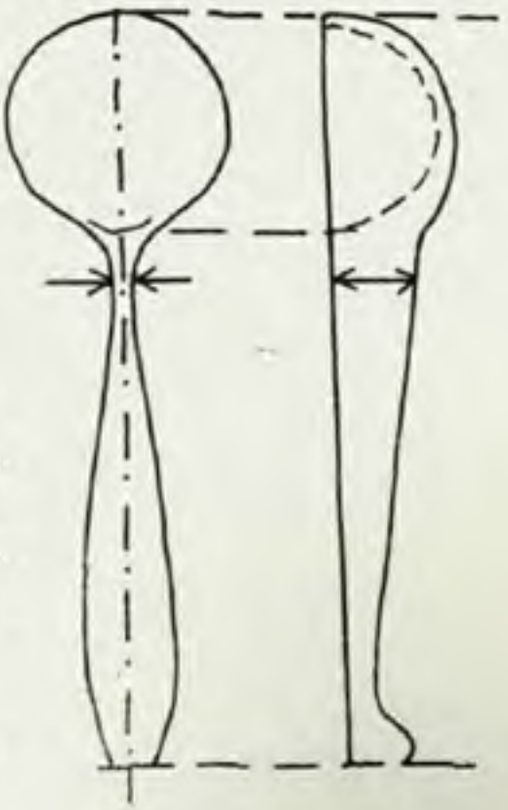
It is of advantage to carve all the four spoons one after the other and then cut the outlines with a ripsaw.
You better start sawing at the ladlepart and go then along the handle until you have to turn it in the vice to saw the rest from the other end. But if you start at the handle end there will be the danger of splitting the cave, as that part has been carved already as thin as possible.

After that the outer surface has to be formed. A trained carver may do it with his knife. But it may be done also with a rasp, file and sandpaper.

We found out, that the handle is very convenient for playing, when it gets a narrowxoutline immediately behind the ladle. The fingers can easily be put tog together and hold the spoon without any stress. The upright beginning of the handle supports the holding position of the spoons and they cannot turn round between your fingers.

I used for the work only gouge, knife, rasp, file and sandpaper with my students and children. A vice for holding the wood when sawing it with a ripsaw, and a wooden block as support for rasping and filing, like the goldsmith does it.

We didn't use boxwood, as PICKEN mentioned it in his book, but only simple pinewood from the rubbish corner of our carpenters workshop. The possibility of deep or flat spoons depended on the wood we found. Also we didn't cook the finished spoons in olive oil, but drained them with linseed-oil-varnish, as mentioned in Otto Möckel:"Die Kunst des Geigenbaues", Hamburg 1979. He uses this treatment for the neck of violins, told on page 280.



Nikolaus Harders, 10. 6. 82.

FoMRHI Comm. 450 P. and A. Mactaggart.

Ref. Jeremy Montagu's review of Flutes, Flautists and Makers by Andrew Fairley. Comm. 445. The behaviour of the author who apparently used photographs of instruments in the Bate Collection without acknowledgment, brings to the fore some of the confusion that is in many people's minds regarding copyright. It is often not realised that apart from a few exceptions – notably unpublished writings – copyright does not apply to objects where the author has been dead for more than fifty years, but it can apply to a photograph of that same object. Even when the object is within the period of copyright, the mere ownership of the object does not automatically confer the copyright on the owner of the object. Unless a contract exists to the contrary, ownership of copyright normally rests with the author of the work in question or his heirs. Nor does the owner of an object have any control over the copyright of a photograph of that object taken by someone else, unless the photographer was acting on his behalf or a contract was entered into regarding the copyright. It follows that in the case of Andrew Fairley's illustrations of flutes, there will have been no question of copyright with respect to the flutes themselves, and if the author took his own photographs or had them taken on his behalf and there was no agreement to the contrary, the copyright of the photographs would be his by law, and he could legally publish them as he liked. However, let me make it clear that despite any legal right, I feel like Jeremy, that morally he appears to have behaved abominably, and I am sure that no serious worker would deny acknowledgment to the owner of an object.

Jeremy suggests in his final paragraph, that copyright belonging to a firm lasts as long as the firm is in being. This is not so. If the actual author of the work in question can be identified, (the writer of a catalogue for instance), the firm controls the copyright until fifty years after the death of the author. If no author can be identified, the work counts as anonymous, and the copyright lasts only for fifty years after the work was first published.

A point which is often relevant in research is that one cannot duplicate copyright material to issue to students but, within certain limits one can make a single copy of material which is subject to copyright without the permission of the copyright holder, for ones own private study or research or for review or criticism. One can also show slides of a copyright object at a public lecture without infringing the copyright. This is a point which seems to be misunderstood. I recently bought a postcard (as no slide was available) with the intention of making a slide from it for a lecture and was told that the institution would 'waive its reproduction fee' if I made a duplicate transparency for them. I complied for the sake of good will, but in fact it is very doubtful if they had any right to a reproduction fee at all.

While I entirely understand Jeremy's intention of insisting that some form of contract should be signed before he allows photographs to be taken, there is a case for saying that museums and public collections are there to make material available to the public and not to insist on their rights of restricting access so that they can control the copyright of their own photographs of the items in their care.

This comm. is not intended to be an exposition on the law of copyright. I merely hope that it will make people aware that it can be relevant to them. Copyright is extremely complex and full of apparent anomalies which can trip one up, – for instance, painters do not have quite the same rights as sculptors with regard to portraits, and the period of copyright on photographs take before 1 June 1957 is not the same as of a photograph taken after that date. However, there are two useful layman's guides to the jungle – both were in Blackwells in Oxford when I was last there –

Copyright by Christopher Scarles; C.U.P. £1.95, and the Museum Association Information Sheet IS No7, by C.H. Gibbs-Smith £1.00. The first is better on the international aspects of copyright particularly as it relates to the written word. The second is mainly concerned with the law in Britain as it applies to museums and researchers in the fields of fine and applied arts. They are complementary, and I recommend both to anyone who owns, or looks after, material that other people wish to copy, as well as those who write and research. This, I suspect, includes a high proportion of the people who subscribe to FoMHRI.

FoMRHI Comm. 451

Another recipe for copal varnish

Paul Gretton

An eminent harpsichord decorator gave me the following redipe for copal varnish a few years ago. He used it for painted wooden instrument cases and the outsides of Flemish virginals. I haven't tried it myself because it's easier to buy the stuff ready-made at an artists' suppliers, but I can vouch for the very tough attractive finish which is possible with it.

Ingredients: 16 parts "copal dur" (="copal de Manila")
30 parts pure alcohol (e.g.methanol)
4 parts Venetian turpentine

Powder the copal in a mortar and place in a glass flask. Add some broken glass. Add the alcohol. Leave overnight. Shake, or rather "swish round",well. Add the turpentine. Swish round. Leave for a couple of days and then swish round again. Strain through linen. The result is quite stiff but can be thinned with more alcohol -- this makes it milky, but that clears.

The above method is safe, involving neither your local fire-brigade nor a respiratory diseases specialist. Clean your brushes fast with a 50/50 turps/alcohol mixture. If you prefer a more matt finish you can take the shine off with a linseed/pumice slurry applied with a piece of canvas.

Painted surfaces can also be protected with a hard wax made from carnoba wax + beeswax + turps, which is matt. (This is effective on painted surfaces done "en détrempe" using paints on a rabbit glue/washed chalk base -- it may perhaps dissolve other paints, so test it first.)

Incidentally, the same man gave me the following recipe for a mixture to clean the grime from the wooden parts of the antique tools he collected, without destroying the patina:

1 part linseed oil
1 part vinegar
1 part turpentine substitute
¼ part meths

Rub on using a pad of 0000 steel wool. When finished, apply a hard wax polish.

THE STORY OF A HARPSICHORD STRING, YESTERDAY AND TODAY

FoMRHI Comm. 452

by Rémy GUG, translated by V. PORTEOUS

This is a somewhat condensed version, for FOMRHI members, of the lecture given by the writer in January 1982 at Bourg-la-Reine and published in "Musique Ancienne". For technical reasons, only 17 out of 37 engravings and photographs from the original text are included here. Similarly, the bibliography has been omitted; however, the complete text with references, in French, can be found in "Musique Ancienne", n° 15, available from : C.A.E.L., 6 chemin du Tennis, 92340 Bourg-la-Reine (France).

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The itinerary of a metal string, from the extraction of the ore to its eventual sounding on an instrument, is indeed long; and the question which has kept me preoccupied for the last five years is : what could possibly be the sound of old harpsichord wire? The idea of trying to answer that question arose from a somewhat simplistic analysis of a few samples of old harpsichord wire. An easy fingertip test made me realize that they were very different from those we use nowadays. Such a difference could presumably be highly important for the quality of sound produced. Hence, to have a precise idea of the sound of old strings, I was left with the prospect of making similar wire, proceeding by three stages :

(1) bibliographical research, intended to collect as much technical information as possible about old strings, which could come in useful during practical tests in the workshop ;

(2) Laboratory analysis of harpsichord wire samples which we had collected ;

(3) Concrete experiments ; practical application of the lessons derived from the two previous stages and specifically the making of strings according to traditional methods.

Metals of course do not exist in their pure form in nature and the copper, zinc and iron with which we are concerned here are found in the forms of ores mixed with various other elements which must be removed in order to obtain metals which can be used for our purposes. After extraction, the ore undergoes a series of operations , the first of which, even today, is roasting. Heaps of the ore to be treated burn for several days, the purpose being twofold : firstly oxydation-reduction and secondly, liberation of the maximum quantity possible of volatile substances such as sulphur and arsenic.

COPPER

After roasting the ore is treated in the refining shop and goes through four furnaces for different reactions. Briefly, the mixture from the first furnace consists of roughly 30 to 40 % pure copper, the remainder being a heterogeneous mix of rocks and other melted elements. The high percentage of "rocks" in this alloy explains the name given to it of "copperstone". This material is loaded into a second furnace. After many hours of burning, the receptacle at the foot of the furnace fills up with a liquid mass which, upon hardening after cooling, gives what is still known as "black copper". This, because of its already much higher percentage of pure copper comes closer to what we are looking for, that

is a red copper which can be drawn to wire form and bear tension. To reach this stage, the "black copper" must be refined ; the process can be described with the help of an engraving from the "Pyrotecnia" by Birringuccio (Plate 1)

Plate 1

The cake of "black copper" is laid on a simple forge fire in order to make it liquid, at which stage a blast of air must be directed on it to "hollow" the molten mass. This is the decisive moment when the oxygen in the air from the bellows extracts the sulfur (contained in large quantities in "black copper" and known as harmful in any metal). The drawback with this process lies in the fact that the oxygen in question is also harmful to the copper obtained so that after the extraction of sulphur by oxygen, a means must be found to extract the latter in its turn.

Deoxydizing the copper ; the process used by the Ancients to do so may seem surprising. It was described almost a thousand years ago by the monk Theophile in his famous treatise, and was still used twenty years ago in Upper Alsace. Known as "poling", it is a good example of a masterly traditional skill and consists in stirring the molten copper with a pole of fresh green wood. At such a high temperature, the wood is consumed and succeeds in de-sulphurizing and almost completely deoxydizing the copper, which is now known as "rosette copper" or more commonly "red copper". Ingots of this quality were commercialized and were consequently available to wire drawers.

The discovery of electricity was to change these age-old methods. Indeed, the process of extraction just described is entirely of a thermic nature. The copper thus obtained possessed the necessary characteristics for the essentially mechanical and decorative uses for which it was required.However, it did not fulfil the requirements for good conductivity. Thermically extracted copper contains too much foreign elements, harmful to the efficiency of conduction of electricity. But this problem was to be solved thanks to the refining of "black copper" by electrolysis, a process which is now widespread. Loaded into vats, the "black copper" separates into practically pure copper which settles at the cathode while the foreign elements accumulate either at the anode or in the electrolytic mud. Modern copper is therefore exclusively electrolytic and consequently extremely pure to the great satisfaction of those who require high conductivity from it. And, to the great disappointment of harpsichord makers

who cannot use it in that quality for harpsichord strings ! Why ?

Let us say simply that a wire can only sound on an instrument if it does not stretch indefinitely and finally breaks. A metal which is too pure will systematically possess this tendency because of the absence of those foreign elements which would otherwise prevent the slipping of the metallic cristals, just as pebbles in a stream will slow the rate of flow.

Modern copper is almost entirely devoid of these "beneficial" elements, whereas old copper possessed them naturally thanks to the processing method. Different methods give different results.

To conclude this section on copper, perhaps we could illustrate the differences by table A which shows the percentage of the main elements contained in each metal respectively (average values):

	Copper	Silver	Lead	Tin	Zinc	Iron	Nickel	Bismuth
Old	98.45	0.20	0.62	0.05	0.005	0.02	0.04	0.001
Modern	99.96	0.0007	0.0002	0.0001	0.00002	0.0004	0.0003	0.00002

BRASS

The second kind of harpsichord string used by the old makers was brass wire. At this juncture, it should be stressed that there were only five kinds of metal wire available to old makers until approximatively the end of the 18th century : <u>silver</u>, <u>gold</u>, <u>red copper</u>, <u>yellow copper</u> (brass) and <u>iron/steel</u>. The present state of my research on bronze allows me to assert without further ado that makers and musicians of past centuries could <u>never</u> have known the sound, so characteristic, of phosphor bronze strings.

Let us come back to the story of brass, and what a fascinating story it is ! Riddled with misunderstandings and rivalries, be it only by the origins of this very peculiar mixture : red copper to which a "certain earth" is added and which finally takes on the colour of gold. Joy of medieval alchemists ! The open door to all kinds of speculations ! Auricalque ! Archal ! Goldmaestling ! Leton ! Airain ! Aes coronarium ! Electrum ! Goldschaum ! Myssinck ! Latun, Yellow copper and finally Brass ! A linguistic labyrinth, witness of the confusion which reigned in the Ancients' minds and stemming from their inability to isolate this mysterious substance responsible for the yellowing of the copper : zinc.

The whole problem arose from the fact that, of all the metals employed in those times, zinc was the only one whose boiling point is in a zone frequently used by workers. Actually, zinc melts at 420°C and its boiling point is around 900°C, not a very convenient temperature to extract the metal from its ore. It was therefore impossible to produce metallic zinc in Europe before the early 19th

century !

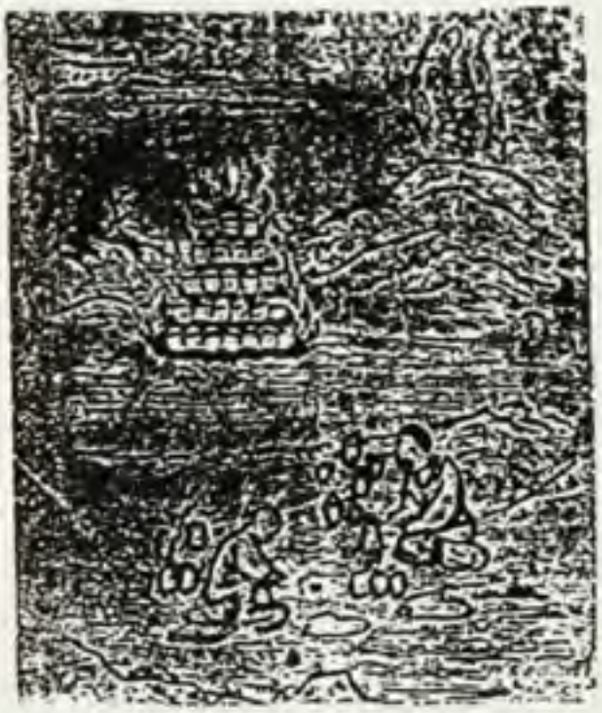

Plate 2

Plate 2, on the other hand shows us that the Chinese had well and truly solved the problem. The two characters in the foreground of this document (which dates from the first half of the 17th century) are busy making clay pots which, cleverly laid in a pyramid which is set to burn, form a "piece of apparatus" for distilling zinc. That was a solution to obtain relatively pure zinc. Ancient commercial archives show that zinc had been imported by the Europeans since the Middle Ages although under the name of "Indian tin". It is not until the early years of the 19th century that we see the industrial application in Europe of the system used by the Chinese.

It does not seem that the "Indian tin" was used currently in the making of brass. Was it suspicion on the part of the Ancients with regard to a substance whose extraction was unknown to them? Perhaps so ! The methods revealed by old written sources are quite concordant over several centuries : brass is the result of the fusion of red copper and "calamine earth", the latter being zinc ore. Now, red copper melts at around 1084°C. Zinc liquifies at 420°C and, as indicated previously, a third temperature upsets the apple cart : zinc volatilizes at 900°C, a temperature lower than that necessary to melt copper.

Electric furnaces, under vacuum or controlled atmosphere have today solved many of these problems. This was not the case in the brass foundry shown in plate 3, taken from a German work of the late 16th century.

Two problem had to be solved : on the one hand, extracting the zinc from its ore, and on the other hand "fixing" it in the red copper.

Although they did not use the distillation method, European foundrymen did exploit another physico-chemical principle. One has only to add zinc ore ("calamine earth" or "calamine stone") to copper and, highly important, powdered charcoal, all in an earthenware crucible which is carefully but not quite hermetically closed. During 8 to 12 hours of intense heat, the contents of the crucible are transformed into brass : the presence of charcoal (carbon) entails the reduction of the ore in situ, releasing the zinc which is promply absorbed into the copper. The skill of the master-foundrymen of the time, helped by several useful indications such as the colour of the flames over the crucibles or that of the smoke above the furnace, enabled them to make brass whose zinc content never varied more than a few percentage points.

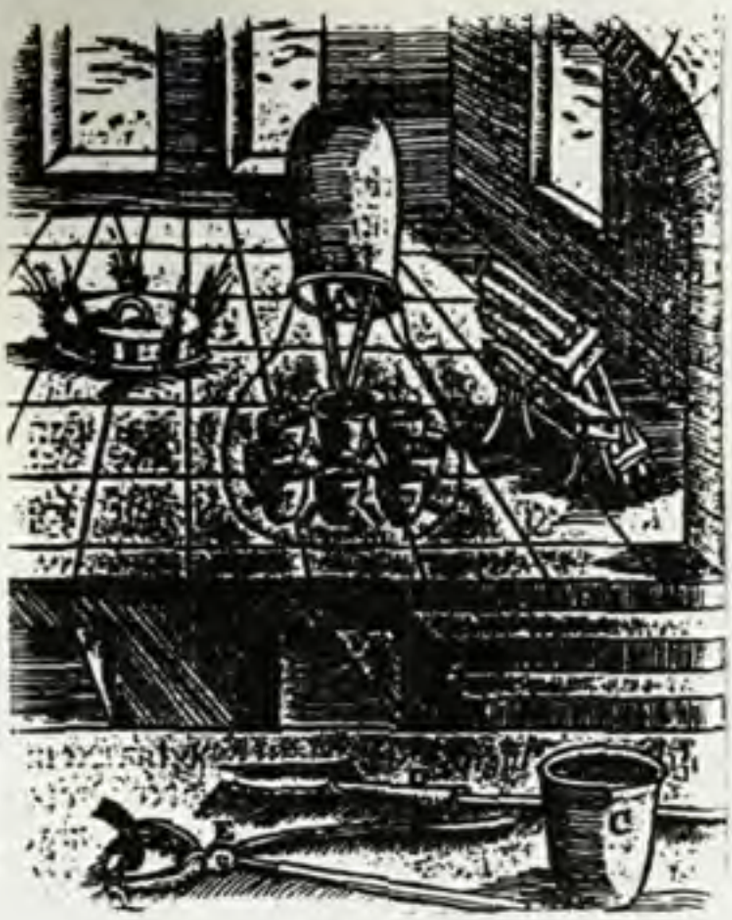

Plate 3

The description of Plate 3 sums up the operations. A mixture of piece of red copper, "calamine earth" and powdered charcoal is set out in the crucibles which fill the centre of the engraving. These eight crucibles are placed in the furnace B. Some 8 to 12 hours later, the foundrymen will extract them to pour their contents into the mould G. This consists of two stone slabs separated from one another by iron bars. The diametre of these bars permits control of the spacing of the two stone slabs hence of the thickness of the metal plate. It was in this plate shape that yellow copper was available commercially and this with very little change up to the end of the 18th century.

So, we now have two of the three raw materials necessary for our harpsichord stringe, namely : red copper in the shape of "salmon" which will be remelted and cast in plate form, and yellow copper already in plate form, ready to undergo its first transformation with the object of reducing it to wire.

IRON

The third metal (if we may classify brass as a metal) to hold our attention is iron.

Bloomery furnaces

At the beginning of the period we are interested in, that is the 14th century, the greater part of the iron used in the West is obtained by the direct method. This method is carried out in installations known as bloomery furnaces. Blast furnaces are as yet very little used : obtaining iron by the indirect method still arouses surprise, fear and confusion. At the end of our period, that is the last years of the 18th century, the situation is reversed; blast furnaces are predominant and only a few bloomery furnaces remain here and there in Europe.

Bloomery furnaces = direct method! Blast furnaces = indirect method! What do these terms mean exactly ? Two quite different ways which, starting with iron ore, both arrive to iron.

Like all metals, iron is found in nature in an unusable form. To extract the metal, one can apply a first physico-chemical principle which is the basis of the direct method : iron ore, charcoal and an air supply are heated to a temperature of around 800 to 900°C which produces a series of reactions which end up with iron, without passing through the liquid stage. The apparatus necessary is extremely simple : a small more or less semi-circular wall in the middle of which the mixture is placed, is provided with a rudimentary means for producing and directing an airstream. This is known as a bloomery furnace. The red glowing mass which we find there after hours' patient waiting is a lump composed of pure iron nodules and some undesirable matter. At this stage, the pure iron nodules must be separated from the other components. This is done by means of hammering : the repeated hammer blows will detach clinker and slag, and after several repeated operations, the pure iron is seen to agglutinate. This is the direct method for, beginning with solid ore, we finish with solid iron, with no intermediate molten state.

Blast furnaces

One day in the 14th century, someone had the idea of heightening the small stone wall of the bloomery furnace. And this is when everything changed. The heightening in the stonework in question leads to a complete change in the reactions.

The first effect of the change of the initial shape was a spectacular rise of the temperature at the lower level of the furnace. The iron workers of the Middle Ages called the liquid mass, which flowed from the bottom of the installation, "pig iron". This is the first denomination of what has since become familiar to us as cast-iron. This method is known as indirect since it passes by the liquid state to arrive at solid iron.

Once over their initial distress, the men of the 15th century will gain increasing mastery over the new material, a more or less homogeneous mixture of iron (ore), carbon (charcoal), and a few gaseous compounds (air). As before, a method must be found of arriving at pure iron. Cast-iron is not an amalgam of pure iron nodules inserted in material which can easily be broken up and eliminated by the hammer ; it is well and truly an alloy in the full sense of the word. How to proceed ?

The genius which so characterized the early years of the Renaissance found the required solution. A remarkable document enables me to hand over to Nicolas Bourbon, a poet and iron-master's son who, in his Poem on forges dated 1517, first of all describes the blast furnace operation, then that which consists in transforming the cast iron into forgeable iron :

> "Afterwards the ore is carried to the entrance to the furnace, a large mass in the shape of a square roughly built of ordinary stone ; inside are extremely hard pebbles which have the marvelous property of resisting the breath of the flames and the ravages of the fire. Two huge bellows of oxhide supply the furnace from the rear in response to a wheel which is endlessly driven by water. Nearby stands the caster (it is the workman's name), who skilfully makes

> the iron, known as fusible iron, flow, who slows or quickens the action of the bellows, who by means of iron hooks, separates the foreign substances and regulates the ardour of the fire : he separates the purified iron from that which has not yet been purified. Yonder, streams of iron flow from the furnace, the liquid metal escaping with a shrill whistle, spreading billows of flame and smoke which seem to mount to the stars. During the operation another workman assists the caster ; he is in charge of stoking the furnace with wharcoal and ore through its large opening as soon as space is visible ; this workman remains at the top of the hellish furnace like a watchful guardian. The iron which comes from the furnace cannot yet be called pure iron."

I should like to insist on the name of fusible iron, known in German as "Flusseisen" whence the name "Flussofen" for blast furnaces mentioned in old texts. As for the "foreign substances" removed "by means of iron hooks", these are obviously what are known nowadays as "slag" : a mixture of vitreous molten matter emanating from the rocks contained in the ore and of scoriae formed of various chemical compounds, mostly oxydes. "He separates the purified iron from that which has not yet been purified". This sentence deserves comment. The "purified" iron is not the final product, it is the cast iron which settles in the roughly hemispherical cavity (known as forehearth) which is dug in the ground immediately in front of the outlet of the blast furnace. "That which has not yet been purified, the part which floats at the surface and contains a great deal of slag, is loaded back into the blast furnace for the following cycle. The "purified iron" is the raw material for the making of "pure iron" (forgeable). Let us listen to the poet :

> "The iron which comes from the furnace cannot yet be called pure iron. Soon another workman subjects it once again to the action of the fire, purifies it a second time in a auge furnace, rendering the iron soft enough to be fashioned into balls. Then skilful workmen promptly polish it and stretch it. They use a huge iron hammer activated by water power. Once more they heat the iron, holding it with sturdy tongs in the midst of the flames and when it reaches white heat, they plunge it into already prepared vases. When it is pitted by the fire, it is beaten once more with great hammer blows. The one sees the blocks of iron stretch in an amazing way tapering and taking the shape of long thin rods : it could be taken for wax."

To transform the cast iron into iron, one must reduce its carbon content which derives from the droplets of iron filtering through the charcoal in the blast furnace crucible.

A slight digression at this point. Until the last years of the 17th century, blast furnaces were fired exclusively with wood charcoal. What we would nowadays call an "ecological catastrophe", by which I mean the alarming disappearance of woodlands, notably in

England, obliged the Ancients to find some other combustible : coal and later coke. It was around 1740 that the operation of coal-fired blast furnaces came to be mastered in a satisfactory manner. The difference between the two, charcoal and coal, is interesting for those who are concerned with old metals. As a matter of fact, coal contains quantities (which are unfortunately not unsubstantial) of an element which is both extremely harmful to the iron and difficult to eliminate : sulphur. On the other hand, iron processed with charcoal contains only a tiny quantity of sulphur.

How to reduce the carbon content? Perhaps by introducing another element for which it has as much affinity, if not more : oxygen. That is what the poet has described to us, since the workmen who "hold the iron" in the midst of the flames to get it white hot are doing nothing other than subjecting the cast iron to a decarburization. The more this process is repeated the more the decarburization progresses and the closer we get to pure iron. By the way, we may note that the process can be stopped en route to obtain various kinds of steel. Very hard "high carbon" steel with 0.5 to 0.8 % of carbon for example. Soft "low carbon" steel with about 0.15 % of carbon. Pure iron has a carbon content inferior to 0.05 %. As we shall see later, only this last was used to make harpsichord strings. Plates 4 and 5 illustrate Nicolas de Bourbon's description : production of cast iron and its refining to obtain forgeable iron.

Plate 4

Plate 5

The iron thus obtained must possess a certain number of characteristics in order to be drawn as wire. If we are to believe certain old writers, very few of the French forges were capable of producing such raw material. In his voluminous text, Baron de Dietrich indicates

only the forge at Bamberviller where, from cast iron produced in Franche-Comté, "are manufactured every year a hundred thousand units of iron converted into ridged bars and dispatched to the iron wire factories in Tours (Touraine) and Laigle (Normandy). The ductility of this iron allows it to be finely drawn, and harpsichord strings are made from it". Another"industrious nation" seems to have had the manufacturing monopoly of music wire : Germany, with Nüremberg as a prime centre.

OSEBORNIRON

The iron produced in forges according to the method we have described was of a quality adequate for the needs which it was to fulfill such as : tool making or other ironwork. However, it did not possess the necessary ductility for wiredrawing nor was it sufficiently pure to make wire capable of "holding" tension on an instrument. If the German metal strings enjoyed such a high reputation it is because they were made, for centuries, from a raw material known as "Osemundeisen" or Oseborniron. This iron, obtained by a method which has totally disappeared nowadays, was much sought after and very expensive in the old days.

It has been possible to find one description of the making of Oseborniron; Johann Heinrich Jung (1785) gives us the details as follows :

§ 918 :"If we wish to reduce iron to a high degree of fineness, which demands great ductility, it is not possible to use iron from the forge. The quality of the latter cannot be improved to a point which would enable it to be used for example for wire or even harpsichord strings. Another method must be used for this purpose but, since the iron obtained from it, known as Oseborniron, is extremely expensive, it can only be used for items which justify the cost."

§ 920 :"The method is as follows : the pig-iron is placed on the fire in a manner such that one of its ends can melt. At this stage, one takes an iron bar and places the tip in contact with the surface of the molten mass. By imparting a regular rotating movement to the bar, the molten iron will be progressively wound round the bar. This process brings about significant changes in the iron."

§ 921 :"We know that the hardness of a body increases when it is worked by drawing for example. This is due to the appearance of fibre-like structures in the matter which increases its elasticity. The quality of Oseborniron partly depends on this principle. While the workman imparts the rotary motion to the rod which he is holding, the molten metal winds round the rod like thread on a reel : its hardness and malleability are consequently increased. But, since in addition the metal is in the shape of very fine threads during the winding process, the inclusions fall out and collect at the bottom of the furnace. This is what provides the extraordinary degree of purity of the final product. [Plate 6 shows such a rod with its lump of Oseborniron.]

§ 922 :"When the lump of iron wound around the rod has reached a

size good enough to provide a bar, it is taken to the hammer. Appropriate forging permits the making of small bars of iron which when drawn, will give harpsichord strings and numerous items of iron-ware".

Plate 6

This is, to say the least, a surprising process and an ancient one ! Old commercial archives frequently show Oseborniron as quite a common commodity at a time when harpsichords were still unknown.

We are now in possession of the three raw materials that we need to make our harpsichord strings, namely red and yellow copper, in plates and iron (preferably oseborniron) in bars of more or less circular cross section. Let us now reduce these three materials to wires in diameters convenient for our requirements. There is only one technical solution : wire-drawing.

There are numerous stages ; we shall describe them. To begin with, let us start with plates to finish up with wire.

WIRE-MAKING

The plates of either red or yellow copper are first lengthened under the hammer. During the hammering, the metal acquire still more hardness which, if taken too far will result in the plate shattering. To avoid such a dead end the hammered plates must be regularly annealed (a similar treatment is to be applied to wire). Plate 7 shows these operations in Vaudry's time for example. The copper and brass plates eventually take on the shape of long sheets of four or five millimetres in thickness.

Plate 7

It is somewhat different with iron. We know it is delivered in bars, whose diameter is nevertheless too great to be drawn so soon. Plate 8 depicts the task of a workman busy reducing the diametre of such a bar which will be ready for drawing.

This is also the case for the copper but only when the sheet has been cut into strips by the use of shears similar to those we see in Plate 9. These

Plate 8

Plate 9

copper or brass strips can be drawn after having been roughly rounded under the hammer.

The wire-drawing itself takes place in two stages : reducing of "thick wire" and finishing of "fine wire". Let us recall the principle. A strip of more or less circular section is drawn through a conical hole bored in metal harder than the one we wish to draw. The malleability of the metal to be drawn allows the progressive reduction of the diametre of the draw-plate hole. In this way, a progressively finer and longer wire is obtained. Each drawing through the plate increases the hardness of the drawn metal. At a certain point it will be necessary to anneal it, as indicated above. In the old days, this operation was carried out on a sort of grill placed above a small furnace. The heat was regulated by the use of different kinds of wood according to the temperature desired.

Plate 10

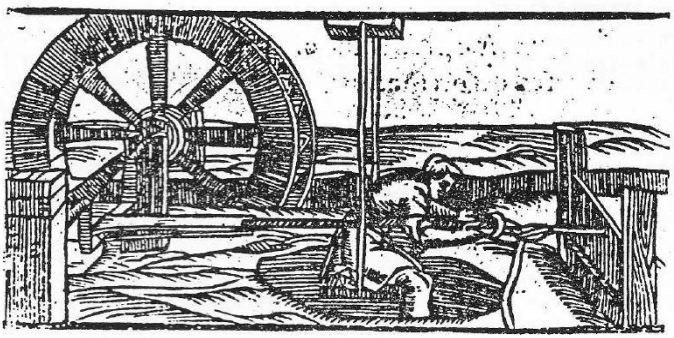

Plate 11

Plates 10 and 11 show in one case two workshops for "thick wire" in th 14th and 15th centuries, and in the other case an apparatus performing the same work but with the help of hydraulic power, this in the time of Baffo. After processing in the "thick wire" workshop, a diametre of 1.5 to 2 mms is reached. It is therefore possible to finish by hand and this is done in the "fine wire" workshops.

Plate 12

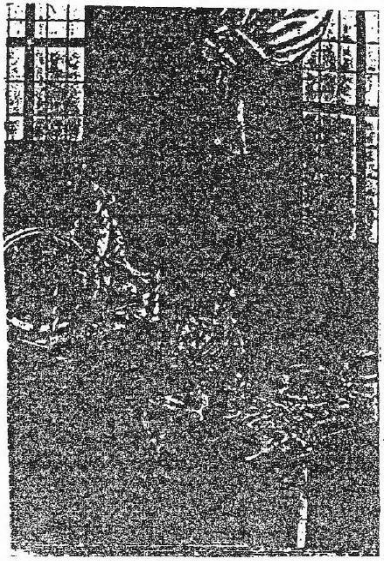

Plate 13

Plate 12 depicts the workshop of a Nüremberg wire maker in the time of Hans Rückers. Plate 13 shows an 18th century workshop.

The finished wire was dispatched on wooden bobbins to the various outlets where instruments makers could purchase them. Wires of highly varied diametres were available and according to Lejisugo (1744) one could find both iron and brass in diametre much finer than

those used on harpsichords.

WIRE MANUFACTURE BY TRADITIONAL METHODS

For technical reasons, it is not possible to publish in FOMRHI photographs taken during a cycle of our own manufacture of traditional-type wire. Please refer to "Musique Ancienne"nr 15 of January 1983.

The following recapitulatory list will also provides the captions for the various slides :

A : preparation of the old style alloy from which are made the :
B : plates of red copper or brass. These are lengthened under the :
C : forge hammer.
D : After several hours they become a sheet which in turn is cut into :
E : metal strips which are roughly rounded
F : under the hammer
G : thick wire drawing
H : fine wire for harpsichord stringing.

With regard to this list, we must briefly raise the question of 20th century string manufacture. We already know that the raw materials used are different : the copper is extremely pure, as in the brass, while the iron comes exclusively from modern blast furnaces quite different from the ancient osebormiron.

To these differences must be added processing techniques, some of which did not exist formerly such as hot rolling : thus there are none of the effects of hammering.

When we know how sensitive metals are to the methods of development and processing applied to them, we can be in no doubt that these differences will have repercussions on the sound of the strings.

LABORATORY ANALYSES

The third stage represents the theoretical approach to this last question. The practical approach is less complicated : it consists in comparing strings manufactured by the traditional methods, on a given instrument, with those produced by modern industry.

Modern methods of metallurgical analysis provide us with precise information which old texts do not contain. I shall not go into them in detail.

The hardness test first of all. Analyses of the old samples give degrees of hardness ranging from

- 250 to 350 units for iron
- 160 to 290 units for brass
- around 80 units for red copper.

By way of comparison, hard high carbon steel goes up to 700 units; the various low carbon steels at present available are in the region

of 350 units, while most modern brass is in the region of 300 units. On the other hand, our well-known phosphor bronze manages to go beyond 500 units of hardness ! In short, modern low carbon steel and brass strings are the closest to old wire as far as hardness is concerned.

The tensile strength test enables us to determine a number of parameters the most important of which, for a harpsichord maker is the breaking stress. The forty old samples tested give the following results :

- for iron : 85 to 120 kg/mm2
- for brass : 65 to 85 kg/mm2
- for copper : 45 to 55 kg/mm2

The same tests on modern wire show :

- steel piano wire : 300 kg/mm2
- modern brass : 85 kg/mm2
- phosphor bronze : 102 kg/mm2
- low carbon steel : 120 to 150 according to origin.

Here also we notice that only modern brass and low carbon steel are comparable with their "ancestors" as far as breaking stress is concerned.

The limit of elasticity also brought to the fore by the tensile strength test is another significant parameter which is important for the quality of the sound produced; it is "situated" differently on historical strings in comparison with our modern strings.

The metallurgical analysis continues by a study under the metallographical microscope. This is the field of the anatomy of strings. Plate 14 shows a transverse section of an old string. We notice first the irregularity of the cross-section; modern strings are perfectly circular, which was out of the question for old strings since drawplates were made by a technique which has long been abandoned.

Plate 14

Plate 15 enables us to compare the structure of an old harpsichord string in longitudinal section with that of plate 16, a modern string. We note that the first string is composed of long fibres set lengthways. The second string is more of an agglomerate of shorter cristals. Here we touch on one of the major differences between old and modern strings : fibrous structure or "forge structure", for the former which no longer exists in the latter and which stems solely from the method of manufacture.

Plate 15

Plate 16

The dark trace on the upper part of the old string is another vestige of its method of manufacture. It is in fact a fold resulting from the forging of a square section strip to prepare it for passing through the draw plate. It is striking to see how a defect in the original bar will remain intact right through to the smallest drawn diametre.

To sum up the data supplied by the metallographic microscope, one could say that the difference between old and modern strings is similar to that between a fibrous resinous wood and a homogeneous hardwood.

Now, for the series of chemical analyses. To avoid swamping the reader under an avalanche of figures, a selection has been made.

The five elements to be taken into consideration for iron are :

Carbon	Silicon	Manganese	Sulphur	Phosphorus	
0.038	0.040	0.005	0.009	0.130	authentic old string
0.030	0.001	0.050	0.020	0.030	modern pure iron string

Without going into a long discussion over those figures, let us merely underline the point already raised concerning the low sulphur content of old strings.

Now a glance at the composition of old brass. By way of illustration here is the analysis of a string on a French 17th century instrument which does not necessarily mean that the string dates from that period. Nor, by extrapolation, that French 17th century harpsichords were string with brass whose composition was identical to this example. In old-style metallurgy, exact copying is impossible -even for the same caster with too consecutive runs in the same workshop. Also I think it wise to admit that most of the old strings that have come down to us are post-1750.

Cu	Sn	Pb	As	Sb	Ag	Ni	Bi	Fe	Zn	Mn	Al
72.7	0.001	0.02	0.01	0.015	0.005	0.10	-	0.10	(27)	-	-

Mg	Ca	Si
0.005	0.05	0.02

Widening our scope, the fifty samples whose composition has been analysed (wire and sheets) can be classified in 3 groups :

1.- Brass wire which almost always possesses 26 to 32 % of zinc.
2.- Sheet brass whose zinc content exceeds 32 % in certain cases reaching 38 %.

3.- Brass with 15 to 18 % of zinc used according to my observations in place of red copper, in some late English harpsichords and some French harpsichords which have been "ravalés".
As regards copper, analysis figures have already been given in the chapter covering its preparation.

CONCLUSION

How do old strings sound?. Where does the difference lie between their sound and that of modern strings?

Describing a sound is a hazardous enterprise. Consequently three sonagrams are provided in plate 17; they were produced by Mademoiselle Michèle Castellengo of the G.A.M. in Paris. They show successively the sound of a low A string of phosphor bronze, modern red copper (not hammered) and lastly traditionally processed copper. Prudence dictates that many sonagrams should be provided for an objective inventory of the existing differences for, in the field of tastes and colours, where illusion is very often the only truth, definitive judgments cannot be made. The writer can do no more than transmit the impressions derived from his experiments. The change from metal which had not been hammered to that which had been was quite distinctly perceived (obviously in the area of tonal color but also in the duration of the sound). It would seem that the internal damping of metals with forge structure is considerably less than that of non "fibrous" metals. Traditionally made strings sustain sound longer.

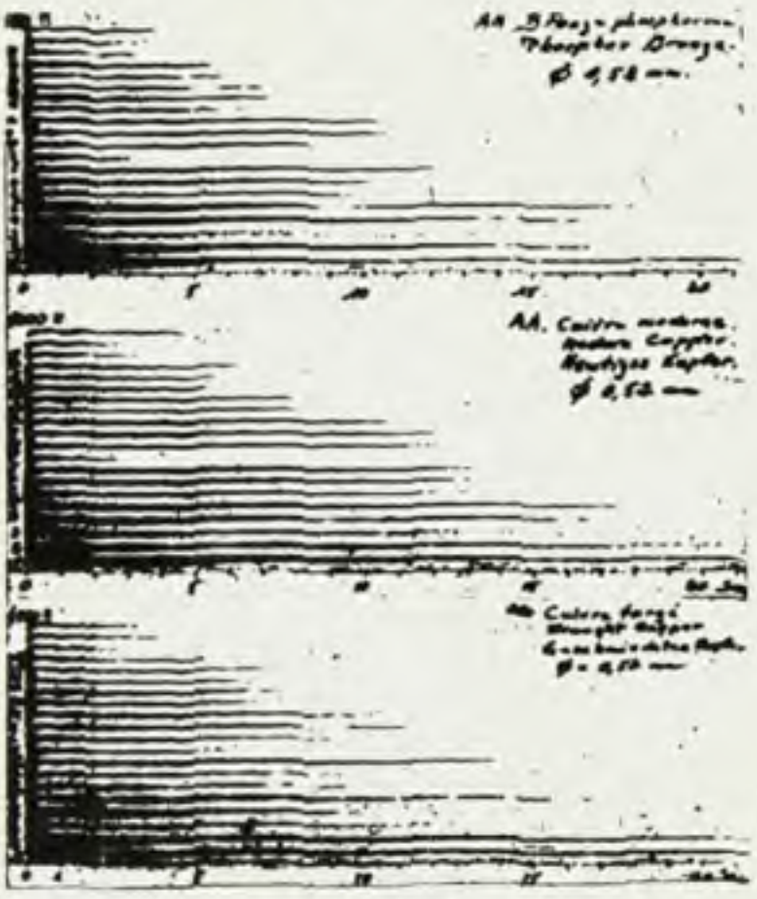

Plate 17

Many other differences exist : they will vary according to the instruments on which the strings are mounted, according to the sensitivity of the ear which judges them and to the psychological and intellectual receptivity of the listener. One must form one's own opinion in the silence of the workshop. From a personal point of view, the writer undertook this project as a craftsman with the sole aim of satisfying personal curiosity guided by an "aspiration to beauty" through sound.

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FoMRHI Comm. 453 A Double Recorder

The double recorder of Oxford was not unique. There's a similar instrument in a fresco at the Salamanca Cathedral, 14th c. according to La Musique (Larousse, vol. 1, p. 178). The Salamanca flute (at least its Larousse reproduction) is reversed, that is, with the shorter pipe for the right hand, but otherwise the form and dimensions (scaled from human proportions) are almost identical.

Back to Oxford, the two pipes seem to be a fifth apart, their lowest notes being cc to gg, perhaps up to a semitone above a 440. Its poor physical condition prevents accurate measurement of pitches or dimensions. The bores appear to be inverted conical, minimum to maximum bore ratio about .85-.90 (18th century baroque ratios are about .75 to .80). Each has five fingerholes, the highest for the thumb.

The longer pipe's fingerholes are about where the lowest would be on a "normal" flute a neuf trous of comparable bore. Hence, it seems likely to have had a range of a sixth, cc, dd, ee♭, ee, ff, ff♯, gg, gg♯, aa.

But the shorter pipe's holes are higher and more spread out, the lowest only a bit above the "normal" place, but the highest about where the left-hand middle fingerhole would be chez neuf trous. So a yield of a 7th seems likely, with the possibility of overblowing an 8ve (or more).

The following millimeter measurements are thanks to Bruce Dicky, with a few modifications by me.

	Long Pipe	Short Pipe
Total Length	299	205
Windway Length	27	24
Hole (Center) Distance From Top and Diameter	176, 4.8	103, 4.8
	259, 5.5	172, 5.1
	237, 6.1	152, 4.9
	212, 5.0	131, 5.0
	189, 5.1	112, 4.4
Bore		
Bottom	10.3	9.3 x 8.5
Top	12.3	10.3 x 10.1
Window Width	7.8 - 9.3	6.3 - 7.7
Cut-Up	4.0 - 4.2	3.5 - 3.8

I've done some experiments roughly based on this instrument, but in sizes a 5th lower, lowest notes being f and cc. Applying my experiences to a higher instrument involves some vaulting faith, but in my judgement, not so broad a leap as to invalidate the comparison.

By blowing more directly in one pipe than the other, it can be blown at greater pressure than the other. But unless this was a standard virtuoso technique for adjusting almost all intervals, equal breath pressure for all notes on both pipes seems logical.

Is the pressure requirement of the longer pipe's lowest notes compatible with the shorter's upper notes? With conical bores, just barely, if the shorter one stays in its first 8ve. Overblowing the shorter pipe seems out of the question, needing more pressure to sound than the longer pipe's lowest notes will tolerate without overblowing themselves. What's more, even a cylindrical bore barely overblows an 8ve at the same pressure. A conical bore's overblown 8ve is hopelessly sharp.

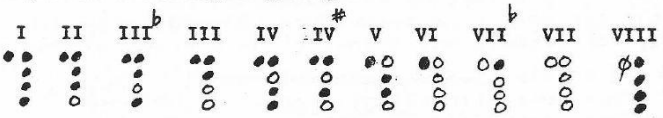
Imitating the shorter pipe's hole placement and size gave an all-open note only a small 7th above the lowest note. To get it up to a big 7th involves a notably different hole size or placement.

My conclusion is that the Oxford's shorter pipe gave only a range of gg-fff, its highest note an 11th above the longer pipe's lowest note.

To get beyone these limitations, I've tried the following modifications (which I wonder would be necessary if a really close copy of the original were tried. I've enough confidence in my conclusions not to tool up for a copy, but nagging doubts lurk):

The longer pipe has a 16th c. "choke" bore, which tolerates quite strong breath pressures for its lowest notes.

The shorter pipe is cylindrical, with holes a little higher to give a good major 7th (top hole, .41 of sounding length.) By adjusting the hole positions I get the following fingerings:



Some higher notes can be had with fancy finger leaking and shading.

Acknowledging the hubris in making such "improvements", I wouldn't mind finding out they are unnecessary or undesirable. But at present I've no idea of the original's musical use, and the addition of a couple more notes to the range seems an irresistable contrapuntal temptation. The sound should still be no shock to 15th-16th c. ears.

Bob Marvin

FoMRHI Comm. 454

WORKSHOP GIMMICKS. Len Stanners.

Some useful workshop gimmicks I have not encountered elsewhere, either in practice or in print, are -

SANDING BOARDS.

Sandpaper glued (or secured by double-sided sellotape) to a piece of chipboard of reasonable size, say 12" x 20", can be useful for a number of otherwise awkward workshop tasks. For a flat sanding board, a rigid piece of chipboard is needed. It is useful for sanding small items which may be easier to hold than to secure in a vise, items which may need to be sanded absolutely flat, e.g. the base of a viol neck, sanding the rib edges of stringed instrument bodies, especially to true up the gluing edge after fitting linings, and it is particularly valuable in final sanding of the ribs of the bent upper section of viols where the angles are otherwise difficult to judge if one is to get a perfect gluing surface for the upper back.

A curved sanding board can be made from say, 5mm chipboard secured along a centre line to a rigid piece of board, with the desired curve (in one direction only of course) achieved by means of appropriate spacers secured between the outer edges of the two boards. This is useful for putting a camber on the ribs of instruments where a flat soundboard is bent, barrel fashion, over shaped ribs.

While the flat sanding board can be used either by moving it on top of the secured workpiece, or secured on the workbench with the workpiece being moved over the board, the curved one is probably better used on top of the workpiece. A clearly marked "centre line" on the back of the sanding board helps to keep it on line with the centreline of the workpiece, but frequent checking is needed to ensure that it is removing wood evenly on both sides of the centreline.

DOWEL DIE.

Very small dowels or pins are sometimes needed, for example for the tangents of a hurdy gurdy (3mm dowel), or round sections, for example the shanks of harp brays.

For making dowels of any reasonably small diameter, first reduce the stock to a size slightly greater than the finished size required, either in a lathe or by whittling, planing or sanding. Take a piece of 1/16" steel say 1" x ½" and bore a hole of the required size at right angles to the surface. Secure one end of the roughly finished stock in a drill, and at slow speed, feed the free end into the hole in the steel "die" and feed the die by hand along the revolving wood stock. A little experimenting will soon establish how much waste wood can be left on the stock and how fast to feed the die along the stock. With care, quite accurate dowels up to 6" or 8" long can be made quickly and easily. The experimenting will also show how rapidly the steel die heats up!

For turning round shanks, the procedure is reversed. Into a piece of pipe which will fit the drill chuck, braze a small piece of 1/16" steel with the appropriate size hole through it. If the hole is effectively centred, and if the internal diameter of the pipe is slightly greater than the hole in the die, the tool will round the roughed out shanks accurately and quickly.

BENDING IRONS.

If you are fighting a losing battle with scorch-marks, put a piece of thin cardboard between the wood and the bending iron.

Referring to Brian Lamin's query (bull 30 p 8)

Many years ago, before I started making musical instruments I was a lettering artist, and later an art college teacher on the subject, so I may be able to help.

Writing on any pre-early nineteenth century instrument would be with a quill pen and chinese ink, or if poor in soot and water. Brian does not say what wood he wants to write on... which is important.

Buy a stick of chinese ink from a good art shop and rub it down with water to form a thick ink. Some people add a few drops of gum arabic. This is good dense ink which does not spread like Indian Ink (which is watery and spreads on spruce like blotting paper apart from being a poor grey/brown-ish black). It is possible to use Polymer Poster Colours thinned to the right consistency. This is of course waterproof.

A seasoned turkey or goose quill can also be bought from an art shop. It will then need cutting into a good nib shaped point, with a deep-ish cleft up the centre - this improves the ink flow.

I know of no satisfactory metal nib currently on the market. The best is perhaps the not very good Perry's Script Pen, which is a pseudo-quill. If I remember correctly Joseph Gilliott exhibited the first metal nibs at the Great Exhibition of 1851.

I prefer a brush which means paint can be used. This gives a much better finish, is denser and there is no problem with spreading. I usually use Pelican Plaka which is waterproof casein colour; there's a good range of colours and they are safe to mix.

Use a No 4 Artists' Sable Hair brush, the lettering variety if you can get it. First wet the bristles, put the brush in your mouth and twist it as you withdraw it from between your pursed lips (like a kiss!)....which will give a good point. Nip off the almost invisible end of the tip with a razor blade or scalpel on white paper. The 3 or 4 hairs on the tip make the brush unmanageable.

Fill the brush with ink or paint and draw it backwards on a piece of paper

This should be only just visible when it's cut off.

to get a good point. It can then be used like a pen for down strokes and gives a excellent finish and a good range of thicks and thin strokes. The up strokes can then be done the "wrong way" and much lighter(thinner).

Bye the way, when buying a brush insist on a pot of water to test it with. Dip the brush in the water, then tap the ferrel sharply on the rim of the water pot. If the brush goes to a single point, buy it. If it breaks into two or more points let some other mut waste his money on it - it is useless. Quite a proportion of brushes are dud.

I hate to be discouraging but it IS difficult. Scribes and lettering artists take a year or more to train. If it proves too difficult why not use transfer lettering that can be bought from art shops. There are several hundred styles, including scripts. Type faces like Caslon O.F. and Bodoni are of 15/16 century origins. They have the authentic character but slightly modernised/cleaned up. The manufacturers produce a protective lacquer. Most brands have a bar under each letter which is its optical width.. Remember the letters should NOT be equally spaced by horizontal measurement. Each letter is a different shape and width. The "white" between each letter should be of equal area; e.g. LATIN right LATIN wrong

FoMRHI Comm. 456

On the Sizes of Italian Theorboes and Archlutes before 1650

E. Segerman

Piccinini (1623) wrote that lutes (by which he most probably meant archlutes) came in three sizes: liuto picciolo (treble lute), liuto mezano (mean lute) and liuto grande (bass lute). The intervals between these are a tone and a fourth respectively. Banchieri in 1609 mentioned an ordinary liuto in G and a liuto grosso in D. These were most probably not archlutes (Banchieri also included a 13-course tuning without reentrant treble as a possibility for a chittarrone, and we would call that an archlute). Nevertheless, traditions of nominal tunings for different sizes would most probably have continued through the transition from old lute to archlute. It is therefore likely that Piccinini's instruments were in A, G and D. If we then bring to bear Doni's (1640) comparisons of pitch standards in different areas and our usual criteria relating highest pitch and length (with Lombardy pitch equaling Praetorius's Cammerthon at 1/3 semitone below modern), and apply them to all Italian pitch standards, we have a continuous distribution of archlute string stops from 46 cm (an A lute in Venice) to 87 cm (a D lute in Naples).

The 46 cm figure is very close to the surviving instruments which we expect to have played the octave-higher tiorbino part in Castaldi's duets. It seems likely that Castaldi did not have a special instrument made for his duets but just used a readily available instrument in perhaps a novel way.

Theorboes usually had about a two-octave open-string range while that range on archlutes was usually about three octaves. For equivalent string properties to single-nut instruments, if the ratio of unfingered to fingered string stops is two, subtract an octave. If the stop ratio is one and a half, subtract half an octave. On single-nut instruments, the open-string range is 1 1/2 octaves with plain gut, two octaves with high-twist gut basses, and 2 1/2 octaves with catline basses. The equivalent single-nut range for various relevant instruments is shown in Table 1:

TABLE 1: OPEN-STRING RANGES (in octaves)

Instrument	Number of Reentrant Courses	True Range	Equivalent Single-nut Range: Stop ratio 2	Stop ratio 1 1/2
Usual theorbo	2	2	1	(1 1/2)
Praetorius*	2	2 1/2	(1 1/2)	2
Banchieri+	1	2 1/2	1 1/2	2
Usual archlute	0	3	2	2 1/2

*: Paduan theorbo
+: the chittarrone that is not an archlute

The usual archlute with a stop ratio of 1 1/2 just filled the range using catlines, and so the relationship between length and pitch was fixed. This relationship is calculated and shown in Table 2. For theorboes we can estimate how far from highest-string breaking point was common practice then by considering Buechenberg's instruments which we assume were made for use in Rome. His instruments with stopped strings of about 98 1/2 cm and 89 cm are for tuning about a tone apart and it is likely that these were for G and A at Roman standard. Other theorbo nominal tunings are unlikely. This

represents about two fret-distances shorter than maximum length. Using this two-fret criterion, we can calculate that the fingered string stop for either of these tunings at the different pitch standards would range from 73 cm (an A theorbo in Venice) to 104 cm (a G theorbo in Naples). These are also shown in Table 2. The optimum fingered string stops at modern pitch (a'=440 Hz) and pseudo-early pitch (a'=415 Hz) are also calculated and included for reference.

TABLE 2: FINGERED STRING STOPS (in cm)

Area	Archlute in			Theorbo in	
	A	G	D	A	G
Venice	46	52	69	73	83
Lombardy	49	55	73	77	87
Florence	52	58	77	83	93
Rome	55	62	83	87	98
Naples	58	65	87	93	104
a'=440Hz	48	54	72	76	86
a'=415Hz	51	57	76	81	91

Some archlutes seem to have had a stop ratio of 2. This would provide a half-octave downward latitude in tuning (or equivalently shorter string stop with the same tuning) with a 3-octave open-string range. This seems often to have been the case with the liuto grande (bass archlute). The downward tuning latitude would be helped by having only six fingered courses. For these instruments the fingered string stops given in Table 2 are upper limits. These stops could be as small as archlutes in G at the relevant pitch standards, but this is unlikely often to have been the case. A single first course with the other fingered courses being double is a good indicator that an instrument was an archlute rather than a theorbo. A doubled first course does not necessarily indicate the reverse, and only a fingered string stop of 90 cm or over leads to a reasonably unambiguous theorbo identification.

When the lowest fingered or unfingered strings approach the lower limit of the range for the type of bass string used, octave stringing is usually needed to restore the richness and projection that the bass string alone cannot offer. When a bass archlute with a stop ratio of two (as discussed above) is long for its tuning (near the figures in Table 2), single unfingered strings would probably be adequate, but if the size is small for its pitch, doubled unfingered strings would be more appropriate.

In conclusion, the expected sizes or size limits of archlutes and theorboes are calculated for the various Italian pitch standards used in the first half of the 17th century. Attention is focussed on bass archlutes which could easily be confused with theorboes, and perhaps need to be considered more seriously than they have been in recent times.

FoMRHI Comm. 457

Effects associated with tuning instruments having a conical bore and rules of thumb concerning the intonation of historical wind instruments.

Geert Jan van der Heide, Boubrief 26

translated by Roy Chiverton

Factors affecting toneheights are:
1. The conicity of the bore in relation to the total length; the end-correction and bore width are also related.
2. The position of a fingerhole, giving a new length.
3. The size of a fingerhole, linked with the new length.

Further to 1.
The overall conicity affects the timbre and the loudness of which an instrument is capable (compare the bassoon and the shawm). Small alterations in the conicity, eg chambering, have the above-named function, but (only in parts?). They are needed to make it clearly playable both for fundamental and over-tones. For a particular instrument, overall conicity is an almost fixed datum; timbre and tone lie so to speak approximately fixed at any time.

Further to 2.
The position of the fingerhole is tied to the capabilities of the human body, ie arm length, finger separation, etc. The way in which an instrument is made is also involved. In a three-key oboe, for example, a fingerhole cannot take the place of a hole covered by a key.

Further to 3.
The hole size is tied (in almost all cases, except where keys are used) to finger size and "feelability", so must be neither too large nor too small. The size has also much to do with the sound of the instrument. Compare the traverso, with holes of about 6mm, with the Boehm flute, with holes of about 15mm. This means fork-fingering, with its implication for the sound of the note, and a minimum size of fingerhole.

If, now, in making a copy or, perhaps, in designing a conical wind instrument, clarity is sought late in the day, the following situations are possible

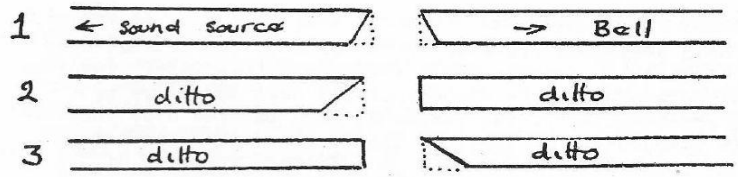
I. Possible ways of dealing with an existing instrument.
a. Enlarging a fingerhole
b. Undercutting a fingerhole
c. Widening (reaming) the bore

Further to a.
Has the effect of raising the pitch of the note. The effect on the octave note is greater than on the fundamental, that is to say, the pitch of the octave note rises faster than that of the fundamental.

Further to b.
Undercutting is a particular way of enlarging a hole, and also a way of enlarging the bore. Besides easier speech (away with sharp edges!) effects are as under, a) in the case of a small hole, it suits the timbre better.

Undercutting in a particular direction is a combination of:

Hole enlarging. Making the bore wider. Moving the hole.



1. raises the fundamental somewhat and the octave more. 2. raises the fundamental normally, and the octave too, but the ratio is altered in favour of the fundamental. But the octave always gets higher faster. 3. raises the fundamental hardly at all. The overblown tone, the octave therefore, becomes quite a bit higher. Undercutting is mostly used as a tuning facility.

Further to c.
Widening the bore. If this is just in front of the hole (on the side of the sound-source, reed or labium), the fundamental will rise in pitch, but not the octave. If the bore is made wider immediately behind and around the hole, there is the opposite effect; the fundamental changes very little but the octave becomes higher.

II. Possible alterations of a subsequent instrument.
a. Relocation of fingerholes.
b. Narrowing the bore, by altering the reamer. Where you think it useful to make narrower, you can explore the effect by introducing something artificial into the bore.

Further to a.
Putting the hole higher (nearer the sound source). The fundamental is made higher in pitch by this means, but the octave much less so. Moving the hole further down has the opposite effect. The fundamental becomes somewhat lower, but the overblown tone a lot lower.

Further to b.
Narrowing the bore immediately in front of a hole scarcely alters the fundamental, but the octave rises. At and immediately behind a fingerhole raises the fundamental, but the octave almost not at all. All these remarks are valid only when the alterations are made independently of each other. Thus, for example, moving a hole has the effect stated only when the hypothetical hole size remains the same.

For this mass of data to become "(a regular feature???)", so as to do service in the workshop, it looks like this.
To make the fundamental higher but not the octave:
Solution: put the fingerhole higher; widen before the hole.
To make both fundamental and octave higher:
Solution: enlarge the hole; undercut it; increase the total conicity somewhat.
Fundamental lower but not the octave.
Solution: hole smaller; overall conicity smaller (narrower)
Fundamental the same, octave lower.
Solution: narrowing at and behind the fingerhole; making it smaller but putting it higher.

Fundamental the same, octave higher.
Solution: undercutting in the direction of the sound source; widening the bore at and behind the fingerhole.

Warning.
All the effects described above are quite direct. The consequences for timbre, twelfths and other notes than those immediately involved are outside the scope of this discussion and must therefore be established experimentally. For instance, in a baroque oboe, narrowing the bore immediately in front of the double hole C/Fis has an effect on the response of the low C; in addition, the size of the tuning holes can affect the clarity of the high B quite markedly. The data which I give here should therefore not be taken to be sufficient to deal with an instrument in all respects. They can, however, help to even out the inequalities which occur in some instruments, in my opinion.

FoMRHI Comm. 458

Early 18th Century Bows and Screws

E. Segerman

I admire Bigio's youthful enthusiasm in pursuing his point (Bull 30 p.5,6). I have been well aware of the considerable age of the tap and die (they were clearly understood by Heron of Alexandria in pre-Christian times). I am glad to hear of the chaser before 1750, but as discussed below, doubt its relevance to our problem.

Taps and dies, the chaser and the mandrel lathe were all in the repertoire of the advanced early 18th century metal worker, and if a bow maker wanted a screw made, any of these tools could have been used. My guess is that if cheapness was an issue at all, the mandrel lathe would be the method of choice. The reason is that the long thin screw needs to be of stiff strong metal. Cutting a thread on hard iron or steel dulls tools quickly and increases the probability of the cutting-tool chipping. On account of replacement cost the use of the die would be avoided. It would be reserved for softer materials. The chaser can be more easily sharpened but it still is costly (this is probably why it was mostly used for dressing threads on large screws on hard metal rather than for cutting them from scratch). Because of ease in sharpening and cheapness of tool replacement, the mandrel lathe would seem to be the tool of choice.

Before 1750 it is quite possible, perhaps probable that bow makers would have experimented with using screws. If they did, it would most probably have been for a particularly expensive bow with novelty value (e.g. the famous bow supposedly by Stradivari with an ivory carving of a Milanese mandolin serving as a frog). It is not clear from surviving bows made then that now have a screw mechanism (and exhibit no apparent evidence of alteration) as to whether the original mechanism involved a screw or just a pin. The main advantage of a screw over a pin would be to make rehairing slightly easier, reducing the accuracy required in setting the hair length. This would be truly of marginal benefit to an experienced bow hairer and would hardly have justified the expense. Shifting the wedge from the stick to the frog and fixing the frog by an eye and either a screw or a pin makes the probability of the wedge at the frog end pulling out as low as at the tip end. But again to an experienced bow hairer, the benefit over fixed-frog bows is marginal. An exception here is the double-bass bow where the large amount of hair and high hair tension makes this wedge particularly difficult to fit securely on a fixed-frog bow. Having encountered this problem practically, we can appreciate the cremallier-like type of frog fixing (but with only one notch) that we've recently heard of on some early double-bass bows.

It is hard to think of any good reason why early 18th century players would be interested in having a screw mechanism on their bows. Their playing technique clearly would not have required any fine adjustment of hair tension. If they worried about the stick taking a set when not in use, slipping the frog out is quicker than giving the end a few twists. It takes more skill to slip out the frog without damaging the bow, but they would have already acquired that skill in their training. Putting the frog back in properly takes a bit more time (perhaps three seconds) and care. The best reason I can think of is avoiding losing the frog when taken out.

As a result of the benefits of having a screw in the bow being marginal, and mainly for the inexperienced bow hairer (i.e. an apprentice with less training could then do it) and the inexperienced player, only remarkable cheapness would justify its widespread adoption. The use of screws in bows offerred no disadvantage that I can imagine. The weight of the metal is not excessive. An important function of the frog on a bow is ballast to achieve required balance, and the weight of the metal could easily be compensated for by less frog wood if a very light bow was required.

Innovations that reduce the amount of skill needed to do a job are of little use to those already possessing those skills. But these innovations are readily adopted by the next generation which is usually not interested in putting in the time to develop unnecessary skills. With the evidence that in the late 1760's, fixed frog bows were still the standard and bows with screws were still considered as the alternative, the hypothesis that screws in bows were generally introduced during the late 1740's seems to be reasonable relative timing.

The case for screws to help in the tuning of wire-strung fingerboard instruments is considerably stronger. For the same string tension, stop, closeness to breaking pitch and peg diameter, a peg turns about a quarter as far with an iron treble string than with a gut treble string for the same change in pitch. The most popular instrument of this type in the middle of the 18th century was the English guitar. I am impressed by the coincidence of the first evidence of screws on these instruments and the first unambiguous evidence of the use of screws on bows, both occurring in the same decade, the 1750's. And that was just the time when the first practical lathe with the cutting tool guided by a lead screw was developed by the watchmakers. The great advantage of this lathe over the mandrel lathe could well have been that it would be used for production using relatively semi-skilled cheap non-guild labour.

In conclusion, I have never had any argument with Bigio on what technology was available in the first half of the 18th century. The basis of my discussion of screws in bows in Comm 409 was the economics of technological developments. My speculations in this area are only efforts to try to make sense out of the apparent chronology of what happened. Other speculations that also take seriously the available historical information would be most welcome. New information bearing on the problem would be particularly useful.

FoMRHI Comm. 459

A Note On Meantone Temperaments

E. Segerman

A musician can choose a temperament because he is concerned with minor thirds and sixths as well as major thirds and fifths. I thought this was common knowledge because I've heard it from various people, but it seemed to be news to some musically educated friends. So I thought it might be worth a bit of space here.

If you remember, a proper meantone temperament is made up of two sizes of semitones (involving a particular frequency ratio for each), diatonic ones where the names of the notes have different letters, such as between C♯ and D or D and Eb, and chromatic semitones where the names have the same letters, such as C and C♯ and Db and D. The octave, which involves a frequency ratio of 2, includes 7 diatonic and 5 chromatic semitones. If the frequency ratio of a diatonic semitone is given as d and of a chromatic semitone as c, then $2=d^7c^5$. The values of d and c can vary considerably, and so there are all kinds of meantone tunings. Once either d or c is specified the other can be calculated from the above equation.

A fifth has 4 diatonic and 3 chromatic semitones, so this interval ratio is d^4c^3. For the fifth to be pure, this ratio is 3/2, so the mistuning ratio or ratio of the meantone fifth ratio to the pure fifth ratio is $f=(2/3)d^4c^3$. It is traditional to measure the type of meantone temperament by the amount of mistuning of the fifth, f. For a perfect fifth, (i.e. in Pythagorean tuning) this mistuning ratio f=1, and by solving these equations one gets $d=2^8/3^5$ and $c=3^7/2^{11}$. We shall not be concerned here with the values of d and c, but rather with comparing the mistuning of the fifth f with the mistuning of other intervals important in harmony for several types of meantone temperament.

The major third has two chromatic and two diatonic semitones, so the interval ratio is d^2c^2. To be a pure third the ratio should be 5/4. The mistuning ratio then is $(4/5)d^2c^2$. With a bit of algebra involving the previous equations this ratio becomes $(1/5)(3/2)^4f^4$ or $(81/80)f^4$. With Pythagorean tuning f=1, so the major third is sharp by the ratio 81/80, which is called the syntonic comma or comma of Didymus. The ratio 81/80 is a comma sharp and 80/81 is a comma flat. If we consider the type of meantone tuning which has the major third pure, then the major third mistuning ratio is set to 1 and $f^4=80/81$, so $f=(80/81)^{1/4}$ or the fourth root of 80/81. The fourth root of a comma is called a quarter comma since a quarter comma applied 4 times means the ratio is multiplied by itself 4 times, which is that it is taken to the fourth power, and that equals the comma.

Let us now consider the type of meantone tuning in which the third is equally as sharp as the fifth is flat. Then $(81/80)f^4=1/f$, so $f^5=80/81$ and $f=(80/81)^{1/5}$. This is a fifth-comma meantone tuning.

The minor third includes two diatonic semitones and one chromatic semitone. The interval ratio then is d^2c. To be pure the minor third ratio should be 6/5. The mistuning ratio is then $(5/6)d^2c$. With a bit of manipulation this ratio becomes $(1/f^3)5(2/3)^4$ or $(80/81)/f^3$. With Pythagorean tuning f=1 and so the minor third is a comma flat. At 1/5th comma meantone, the minor third mistuning ratio would be $(80/81)^{-3/5}(80/81)$ or $(80/81)^{2/5}$, which is 2/5 comma flat.

At 1/4 comma meantone, the minor third mistuning ratio would be $(80/81)^{-3/4+1}$ or $(80/81)^{1/4}$, which is 1/4 comma flat. When the minor third is pure, $(80/81)/f^3=1$ or $f=(80/81)^{1/3}$, so the fifth is 1/3 comma flat. And the major third mistuning ratio is $(81/80)(80/81)^{4/3}$ or $(80/81)^{1/3}$, which is a 1/3 comma flat.

The above calculations can be generalized by considering 1/n th comma meantone. Then $f=(80/81)^{1/n}=(81/80)^{-1/n}$ and the major third mistuning is $(81/80)f^4=(81/80)^{1-4/n}$, which is 1-4/n or (n-4)/n comma sharp. Similarly the minor third mistuning is $(80/81)f^{-3}=(80/81)^{1-3/n}$, which is 1-3/n or (n-3)/n comma flat.

For tuning of chords, the intervals we are interested in are the minor third, major third, fourth, fifth and sixth. The fourth is the same interval flat as the fifth is sharp and the sixth is the same interval sharp as the minor third is flat. This is because each of the above pairs when combined, make an octave.

We can summarize the above in the following table:

TABLE: NUMBER OF COMMAS OUT OF TUNE
(+ is sharp and - is flat)

Type of meantone temperament	fifth	fourth	major third	minor third	sixth
Pythagorean	0	0	+1	-1	+1
1/6	-1/6	+1/6	+1/3	-1/2	+1/2
1/5	-1/5	+1/5	+1/5	-2/5	+2/5
1/4	-1/4	+1/4	0	-1/4	+1/4
1/3	-1/3	+1/3	-1/3	0	0
1/n	-1/n	+1/n	+(n-4)/n	-(n-3)/n	+(n-3)/n

In conclusion, in music (e.g.medieval) for which only intervals of fifths and octaves are important, Pythagorean tuning would be appropriate. For music (e.g. Renaissance) where the major third approaches the fifth in importance, and the minor third is less

important, 1/5 comma meantone would be appropriate. For music (e.g. much of baroque) which either has the minor third as important as the fifth or has the major third more important than either the fifth or minor third, 1/4 comma meantone would be appropriate. For music (e.g. some of baroque) which has the minor third more important than either the major third or the fifth, 1/3 comma meantone would be appropriate.

A proper meantone termperament is a compromise allowing the mistuning of some important intervals to get other important intervals better in tune. It is uniform over the diatonic scales based on 6 adjacent notes in the circle of fifths. If the music (or required transpositions) lead to the use of intervals outside of these diatonic scales, these intervals would sound considerably more out of tune. This mistuning tension can be a legitimate musical intention of the composer, perhaps later to be resolved with more in-tune chords. But if this is not the intention and intervals in more diatonic scales than 6 need to be compromised over, a temperament closer to equal (equivalent approximately to 1/11th comma meantone) would be required and worse major and minor thirds would just have to be tolerated. Special tunings other than a meantone type allowing more than two different sizes of semitones may be an advantage in these circumstances.

Similarly, when the music does not use intervals in all 6 diatonic scales, better intonation can often be achieved by using a specialized non-meantone temperament. Fretted instruments using a more restricted set of scales need to make compromises because the same frets govern intonation on several strings at different pitches (see Comm 88) and this can lead to compromises very similar to those in meantone temperaments.

FoMRHI Comm. 460

Wood Contraction and Instrument Bores

E Segerman

I would like to discuss a point in Morgan's article on recorder making (Early Music 10/1 p17). He rightfully states that the oval shape of the inside bore of a surviving original instrument is most probably due to uneven shrinkage of the wood with time, and that the maximum diameter is closer to the original bore than the minimum. He then uses the maximum bore diameter as his best estimate of the original round diameter.

I would like to point out that the maximum diameter has also been subject to shrinkage and that the original diameter was most probably larger. The main interest in this issue as that an assumption of too small a bore leads to a pitch higher than it should be.

That original diameter can be estimated by noticing that relative shrinkage in

different directions with time is closely related to the relative amount of movement in different directions resulting from variations in moisture content. That is, along the grain (i.e. the tree growth direction) there is almost no movement with moisture content and very little shrinkage with age. Compared to the effect in this direction, both movement with moisture and contraction with age are much greater in both the radial direction (perpendicular to the rings) and the tangential direction (along the rings). Comparing the latter two, radial movement with moisture is roughly half that in the tangential direction for most types of woods. We also observe that the maximum diameter in the oval bores of old instruments is in the tangential direction. It is almost as if the ovalness of the bore is purely the result of our measuring the instrument at a lower humidity that that at which it is made.

This relationship between shrinkage with moisture variation and shrinkage with age is further exemplified by the observation that very old wood that has always been in a constant moisture environment (be it in a dry tomb or a wet bog) shows little signs of shrinkage in spite of loss of weight. Also, wood that has been constrained from moving in response to moisture variations in its environment shrinks less with age than wood that has been free to respond. An example of this is that we can often locate the cross bars under old lute soundboards by noticing that cracks due to age contraction tend to end where the soundboard has been constrained from contraction or expansion by being glued to the bars.

While on a short time scale expansion and contraction with changing moisture content is reversible, on a long time scale the equilibrium dimension at a particular moisture content decreases according to the amount of moisture movement the wood has been subjected to. It is believed that this age contraction results from strain gradients in the wood during change of moisture content. To prevent this contraction the preservation of wooden objects requires a constant humidity environment.

And now back to woodwind bore diameters. I am not aware of any good measurements of the relative contraction of wood in different directions with age (such measurements could easily exist and it would be a service to the readers if these were brought to our attention). Without this information, the observations above could lead to a reasonable estimate of the original bore diameter by assuming that the ratio of tangential to radial contraction with age is quantitively equal to that ratio when seasoned wood loses moisture. In the rough approximation stated previously that ratio equals 2. The original bore diameter would then be as much larger than the maximum diameter of the oval as the minimum diameter is smaller. If one wants an estimate which directly uses the ratio of tangential to radial dimensional change with moisture variation for the particular type of wood involved (which is readily available from published tables), the original bore diameter would be as much larger than the maximum diameter of the oval as the difference between maximum and minimum diameters divided by the difference between 1 and that ratio.

This conclusion is no different from that come to by Carp(GSJ XXI (1978) p13). Morgan cannot be excused for ignoring Carp's paper just because the formula in it was unnecessarily complex and Carp did not distinguish clearly enough between contraction with age and contraction with decreased moisture content.

The derivation of the stated relationship is as follows. Let DM = maximum diameter of oval, Dm = minimum diameter, D = original diameter, a = contraction in radial direction, b = contraction in tangential direction, and s = ratio b/a. Then DM = D - a and Dm = D - b. Subtracting, DM - Dm = b-a =a(s-1). Then D = DM + a = DM + (DM -Dm)/(s-1).

Following is a demonstration that Carp's equations are equivalent to the above. His variables are: $r = 1/s$, $\theta = \arctan r$, and $R = \sin\theta/(\cos\theta - \sin\theta)$. If we divide numerator and denominator of R by $\cos\theta$, we get $R = \tan\theta/(1-\tan\theta) = r/(1-r) = 1/(s-1)$. Substituting this into Carps's final equation: D = DM + R(DM - Dm) gives the same equation as above, D = DM + (DM - Dm)/(s-1).

FoMRHI Comm 461 P and A Mactaggart

Transferring soundboard designs. I am somewhat concerned at the suggestion made by Brian Lemin in Bull. 30 p9 that designs can be transferred by ironing a xerox pattern onto a soundboard with a domestic iron. Certainly xerox pigment will respond to heat – the black is made up with a synthetic resin so that it can be heat set onto the paper – but there are much easier and safer ways of transferring designs.

Apart from local drying out of the soundboard wood and the risk one runs of inducing splits, there is a considerable possibility that the timber would become casehardened in the areas which had been heated. This could have an effect on the way the soundboard responded locally to variations in humidity and cause distortions. The temperature at which case hardening can occur is quite low, certainly lower than the figures I got when checking the heat of the sole plate of my iron. The rayon setting gave 100°C, silk around 175°C and wool (the medium setting suggested in Brian Lemin's note) 220°C. While the temperature which the wood achieved might not be as high as the base of the iron, even if the pattern were gone over several times, because wood conducts heat badly, the the temperature of the extreme surface would be likely to rise quickly and hardening could result.

Some people use carbon paper to transfer designs. This takes well on the bare wood but it can be difficult to get it to work if the soundboard has been varnished. If the painting does not follow the outlines perfectly, the carbon marks will show and cannot be removed. Carbon lines also tend to show through thin layers of paint. Chalked paper, although less clean to handle than carbon, produces a far more flexible working method. Take a typing 'flimsy' or other very thin sheet of paper and rub it all over thoroughly with the side of a brown conté crayon (I find the dark brown is better than the red-brown). Rub the crayon well into the paper with the fingers or a wad of tissue and then shake off the dust. Put the paper beneath the design on the soundboard and trace with a very hard pencil or smooth stylus. You will find that the chalk will take on both varnished and unvarnished surfaces and less pressure will be needed than is required with carbon so that there is less likelihood of indenting the wood. The brown marks are obliterated by the paint and if, when you have finished, there are some lines which have not been covered, the chalk can be picked off by dabbing the surface with 'blu-tack' or by patting gently with a strip of low-tack drafting tape stretched over the fingers. If, when using freshly chalked paper, the deposit of colour is too heavy, the lines can be lightened in the same way.

I am not clear what Brian Lemin wants in his request for a pen with a nib which glides over timber instead of catching in the grain and his further queries about a book of designs and varnishing pen work (Bull. 30 p8). Assuming that these queries also apply to soundboard decoration, I can only say that apart from signatures and note names, I have not seen any evidence of a pen being used, though we have seen some pen work on case decoration. A good brush will make a perfectly controllable line if used with the correct consistency of paint. Such lines can be finer than those made by most pens and a brush certainly glides and does not catch when used on well-finished bare timber. Kits which include patterns for both French and Flemish harpsichords are marketed by Zuckermann's. We are producing booklets on gilding and case painting which should be available shortly and the one on case decoration will include details of a varnish for use over soundboard decoration. If a varnish is to be used under decoration (and this is dubious painting practice), it should be of a type which will become insoluble. The point is that if the decoration ever needs to be cleaned, it must be possible to remove the varnish which is over the decoration without also taking off the lower layer of varnish and the decoration with it.

FoMRHI Comm. 462 Arnold Myers

Review of: G.B. Lane, The Trombone in the Middle Ages and the Renaissance, Indiana University Press, 1982, no price stated.

The author's stated purpose has been to consolidate information on the history of the trombone appearing in dissertations, publications that are out of print and inaccessible material in various languages, and arrange it in a readable format. The nineteen-page bibliography is indeed quite impressive. Regrettably, the text is laboured and muddled, and one cannot recommend it as a popular account of the sackbut. Moreover, the material seems little altered from Mr Lane's treatise written in partial fulfillment for the D.M.A. in Trombone Performance at the University of Texas at Austin: certainly all research of the last ten years is ignored. Some sections have already been published in the International Trombone Association Journal in 1975 and 1976. Undoubtedly FoMRHI members will turn to contemporary sources and the writings of Galpin, Philip Bate and Anthony Baines rather than a book of third-hand information and misinformation. After treating the history of the instrument, the author expands on the use of the sackbut in town bands, the royal courts and the Church - the latter chapter including an interesting section on renaissance church bands in Mexico. Apart from the muddy illustrations, the book is well printed and pleasantly bound.

To this review should be added the following letter from the publishers:

Dear Editor:

Last fall, we sent you a review copy of THE TROMBONE IN THE MIDDLE AGES AND THE RENAISSANCE by G. B. Lane.

In light of certain circumstances surrounding this work, we have taken the step of withdrawing it from our list. This book is not currently available from the Press.

Because you may have assigned this book for review or have a review in process, you understandably may wish to delay the appearance of such a review until further notice.

Should circumstances change, we will reannounce the book and advise you of its availability.

We regret any inconvenience this may cause.

FoMRHI Comm. 463 John Cousen

Review of; Musical Instruments in the Dayton C. Miller Collection at the Library of Congress-Vol.I 1982 Recorders,Fifes and Simple System Transverse Flutes of one key-compiled by Michael Seyfrit

This is a check-list of part of the huge collection amassed by Dayton C. Miller and left to the Library of Congress in 1941. 273 instruments are listed,representing the sublime to the ridiculous(e.g. No.18,a Hotteterre alto recorder to No.3,a pre-war Adler descant recorder with one key)Of particular interest are No.35,a renaissance tenor recorder,and No.38, a renaissance basset recorder of splendid appearance.

The book is divided into two parts-the first gives a brief description of each instrument,and in some cases,a close-up photograph of a key or a maker's mark. Instrument makers will be disappointed to find only the most basic of measurements given,and certainly there is insufficient information to attept any reconstruction

The second part of the book consists of one overall photograph of each instrument (not to scale). This could be a joy to any flute player or collector,but the quality of the photographs is so uniformly bad as to make the production of the book almost valueless.Coming from the nation which brought us breathtaking pictures of the rings of Saturn,this can only be a sad disappointment.
Mr. Seyfrit has supplied a sensible and well-written,but brief introduction in which he discusses definitions,bore profiles and makes some interesting points on the subject of making copies. This book will be hardly a best seller,I imagine,on this side of the Atlantic,but to those with access to the collection,I suppose it could be a great time saver.

Excerpt from JAHMIM, see p. 16

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