

Bassoon reed making according to historical methods

as found in sources and interpreted for practical use

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I. Practical description

I came to the following method of building reeds through three main routes:

- reed making instructions and images from primary sources.
- articles covering historical reed making methods (secondary sources).
- through practical experience and attempting to follow historical instructions as closely as possible.

The examination of original reeds was also helpful, whereas they served mostly to confirm which techniques were used. Until now I have not examined that many reeds, as I find it more important to develop the possible technique which they may have used and to integrate this in my professional work, rather than examine the structure of cane grown with different climatic conditions than our modern cane, as this most likely would have an impact on the construction and techniques used. The change during the last century in how cane is harvested has most likely a considerable impact on its structure.

This method is not the kind that should not be questioned, on the contrary, critical thinking is obligatory and even called for. Debate and cooperation shall hopefully bring us all useful results.

1. Split the tube (which is around an inch thick, or 23-26mm) into four equal parts, shorten to the required length, soak.
2. Begin with the gouging after at least 2 hours in warm water. Firstly, gouge until a thickness of 1.3mm (it is recommendable to stay within 1.2-1.4mm), it is possible to feel what consistency the cane has and how it may develop. Make sure the cane stays soaked, it makes for easier work. The easiest way to gouge is to start at the sides, and then to remove the ridge you have created in the middle. This creates a slight profile, where the middle is thicker than the sides. If you light it up from behind you can see the result (always take the quality of the bark/epidermis into account, it can make the cane seem darker or lighter).
Take care not to slice into the cane with the side of the gouge.
3. Having reached 1.3mm cut the sides to the required width, for instance 17.5mm (for baroque). As the curvature will be somewhat flattened out later it is not too bad if it ends up being a bit narrower.
4. With a triangular file (or the side of a diamond file) make small notches in the middle on the sides of the cane as well as where the first wire will be placed. This is to keep these positions clearly visible during the following gouging.
5. Now for the profile. Start gouging (relatively deeply) with the middle of the gouge 3-4mm from the side of the cane. Start from the end closest to your body and gouge straight to the other end. Repeat the process on the other side. This gouge should have enough width as it will later become part of the profile. Its thickness should be approx. 0.5mm, as measured around 1mm from the edge. It helps to have the final shape of the reed in mind, including the profile you want. The rest of the profile is a gradual decline from between the first and second wires towards the tip: start in the area of the first wire and gouge evenly towards the tip, then repeat this but start closer to the tip, which should in the

end be 0.8mm (or between 0.7-0.9mm) thick. Keep turning the piece, so the middle of it has an even thickness. The gradient should in any case be as smooth and even as possible, but that is a case of personal preference, e.g. whether the gradient slopes more steeply from the wire or not. If you know from modern reed making how your reed is constructed, with the different thicknesses in different places, then you can base the profile on this. It should be possible to see it when shining a light from behind the cane, as well as looking closely at how the shadows fall when the light comes from above, as well as whether fibres are continuous or are cut off.

If the cane is difficult and brittle, you can polish it in between with scouring rush so that the gouge does not get stuck on anywhere too uneven.

6. Let the piece of cane dry completely when finished. Using the scraper remove anything uneven, it is worth being very meticulous at this stage. There will most likely be a small ledge in the area of the first wire due to starting the central profile here – it is very important to remove it with the scraper or even gouge, as there might be a hole at that place when the two halves are put together. That is one thing you really cannot correct afterwards. Any unevenness on the sides that meet will have a negative effect, whether it be that the sides do not close properly, or that the sound of the reed suffers.

Depending on how much pressure you use with the scraper, it can result in a smoother or rougher effect. The scraper can be used in a diagonal direction when removing faults, be careful as this sometimes pulls at the fibres. It is worth also polishing with the scraper. To do this, use very little pressure and swipe very quickly over the area. It is also a good idea to do this as the last step.

7. Soak the cane, thoroughly, so that it regains its flexibility. Polish the gouged area with scouring rush. Before continuing, you can check if enough flexibility has been worked into the cane through bending and applying pressure. Place the side of the thumb directly behind the middle of the piece and with gentle pressure on the area of the first wire check its flexibility. Ideally, you should feel a stronger centre and two equally flexible (getting more flexible towards the middle) sides on the thumb. If this is not the case check where it is missing.

a) If you use a folding shaper cut first one side to it before scoring across the middle of the bark in preparation for the fold. This will not be necessary if you use enough pressure from the thumb pressing the cane onto the knife acting as a guide for the fold. The fold itself will not be a problem, as long as the cane is not too elastic. The first option (scoring into the bark) is the safer one, but if the cane is too elastic the finished reed will not be the best anyway, and it can serve as a further test of the reed's quality before you get to the playing stage. After folding cut the second side to the first. Make sure to keep the sides aligned while doing this.

b) Fold the cane first if you do not have a shaper (as described above) and draw the measurements onto its surface: at the top mark its width; draw a line across where the first wire will come; and at that point also how wide you want it. Join the marks at the tip with those at the first wire, whereas they can be somewhat rounded rather than just straight. That ultimately depends on the player or the instrument. They do not have to be perfect, they are there to serve as a guide, and it is better they are drawn wider than the finished shape. Constantly check your progress by measuring in the appropriate areas and using your sense of proportion until you get the finished shape. Take care at the very end of the reed, it should not be less than 10.5mm wide otherwise it will not fit onto the crook (for a crook diameter of approx. 4.5mm). If the edges do not lie flush with each other you could end up continuously trying to correct this and cut away too much, so make sure they stay in the same position at all times.

Important: as the width later becomes the circumference of the inside of the tube, you have to keep an eye on how thick you have made it. As soon as it has its rounded shape there are two factors that decide this: the width and the thickness, the circumference can be widened or narrowed this way.

The shape of the reed can also influence the sound and playing experience: a “spade” shape on the sides can make it feel slow and sound dark; a reed with almost parallel sides can work well, as long as there is enough profile inside and the tube is round enough, otherwise it will sound hard; a reed with a V shape and straight sides is good for dulcians and romantic; a “fishtail” shape as found on some dulcian reeds will be bright and precise. Which version you use depends on the preference of the player as well as the type of instrument. The cane is also a deciding factor.

8. One optional step concerns the back end of the reed, a change in the angle of the sides of the shaped cane that meet when it is made into a tube (beveling – but note the angle!). The reason for this is the following: left untreated the two shaped halves will meet at an acute angle while being rounded on the mandrel and may later slip over one another. Cutting away the superfluous cane will slightly change the angle and will avoid this. Start under where the binding later comes. Some reed makers build in

- this manner, others leaves the sides untreated (there is no mention of this step in the primary sources).
9. Bind the first and second wires as closely as possible to the reed, in the planned positions (both turns of the wire should end up on the same side), then score 5 or 6 times gently into the bark below the second wire, down the remaining length of reed (the cane shouldn't be split through, just the bark scored and the other layers left intact). The bark will split evenly when later rounded. You can also score two or three crosses, they will distribute any superfluous tension. At the very base, file (using a triangular file or the side of a diamond file) a groove going across what will become the tube, approx. 3-5mm from the end. This will prevent the wrapping slipping from its place in the future.
 10. Wrap one layer of not too thin thread (e.g. cotton) around the reed, from the end up until the second wire (and if you wish a bit further). Make a slipknot at the end. Soak the reed again for about 5 minutes.
 11. *Push* the reed onto the mandrel – it is very helpful to hold the reed at the sides of the tube using pliers, and while pushing it on the mandrel apply some pressure on the pliers to open the two halves. You can also support the shaping by massaging the sides a bit further up (that helps when the reed does not go far enough up onto the mandrel). Take your time here, work too fast and the cane may split past the first wire, although that can also be caused by too hard or too thick cane.
 12. Loosen the slipknot and unwind the thread a bit. Place the thread for the binding (linen yarn waxed with beeswax) below the second wire so that it crosses over itself, and bind towards the end of the reed with plenty of pull. Do not pull too tightly at first as there is no knot holding it, but after 4 or 5 turns it will be possible to pull with full power. It is worth experimenting how much pull happens where, and how quickly it builds up. In any case, avoid having too much pull in the thread at the second wire, as this has a negative influence and makes the reed sound muted. Wrap until 2-3mm before the very end (the thread may expand a bit; if you forgot earlier to make the groove at the end of the tube you can do that now), then bind upwards with slightly less pressure, otherwise the first layer of thread will be pushed away by the new one. When you have reached the second wire you can either stop and make a simple knot (beeswax is very sticky, the thread will not slip), or you can wind down and up again, for example in a wider spiral with lots of pull, in order to bring all the thread together more compactly. Every new layer of thread adds to the pressure applied to the reed. As the reed gets older it will not swell as much as it used to and becomes more inflexible. As this thread is linen yarn and not elastic polyester the pressure from when it was built will become less. These two factors complement each other.
Cane swings differently with polyester or linen, and depending on what kind of reed you prefer you may choose to stay with the thread you are used to. I find however linen to be more predictable, but that is a personal preference.
 13. If the reed does not want to come off the mandrel press first on the one, then on the other side of the reed (just above the first wire). It will slowly move up the mandrel until it comes off easily.
 14. Hold the reed upside-down at the binding with thumb and index finger, with the front end resting either on the thumb or at its base. With a small, very sharp knife cut away the bark. The area to be cut away depends on how thin you have gouged the cane, perhaps half a centimetre with thin cane, when thicker around two thirds, keeping to a U or V shape (for a dulcian reed take only the front quarter to a third away, in a shallow U. This will only be changed when utmost necessary). Take care at the edges, it is very easy to cut away too much. Cane is made up of several layers with different consistencies. All layers except the white one have a high density. The softness of the white one is more difficult to slice through, so you do not need to worry about cutting too far into the reed.
 15. Then wet the reed for a short while at the tip, place it on a hard piece of wood and with a good hammer and a straight and very sharp knife (like an old-fashioned razor, or an Opinel) cut the tip off at about 1mm in to open the reed (guillotined; however using a guillotine may cause the reed to split). It works best with plenty of courage and one blow. A second one can split the reed. If you need to get find out how your hammer reacts swing it past the table edge a few times to get the feel of its weight. Holding the hammer closer to its head helps precision. If the reed is soaked completely through with water then all its cells are as fully filled as they can possibly get. When opening the reed this can lead to it splitting. Let dry until all the darker spots of water are gone. Setting the knife blade at the right angle is also a deciding factor for a clean cut: you'd automatically place it at 90°, but you will need approx. 30° in addition to compensate for the angle of the blade's construction (the knife will therefore be set at an angle of approx. 120° onto the reed, as measured from the side where the reed lies). Round or cut off the sides at the tip. Round reeds do not have an edge where they can break!
 16. The following steps make the reed playable. Firstly, to bring out the low register (it should become less muffled) take away some more of the bark – and due to the dense cane you do not need to worry about the high notes. It is a good idea to keep Ozi's idea of cutting a wedge into the cane in mind: not

to take too much bark away from the back than necessary, and to take away more in the width towards the front of the reed (resulting in a U or V). If the inside has been made well the sides will shut flexibly. However do not forget: there was never "the" reed, everything was possible. If the cane does not react as you had hoped, or if the profile on the inside was not properly executed, then you can/have to react differently on the outside. There are reeds where the whole area is scraped through all layers, from the first wire to the tip – no U or V form, more like a = , with the most extreme example having a small spine of bark at the base: ^ . The U or V were however seen as the ideal to be reached, as only this shape is described in reed making instructions. (A dulcian reed needs only to be scraped at the exposed area, this method brings the reed to vibrate differently than the below described one. The lower register comes more clearly if the scrape is thin enough; it should also be kept as flat as possible unlike for baroque (Ozi's wedge) without losing too much of the high register. If the reed is really too thick towards the first wire to let the front scraping bring out the low notes, then the shallow U can be moved down a touch. That should be regarded as a last resort. An old reed which has got harder over time and where the low notes are harder to play can be modified in the following manner: using a sharp knife press into the bark to make a short cut, then scrape firmly and fairly deeply shortly below it into the bark. The knife will stop at the cut. Start just above the first wire and go on to make three or four rows of evenly spaced nicks. The deeper, now exposed layers will help to make the low notes vibrate again.)

17. Scraping.

i) The reed's ideal vibrating conditions are brought about when the relation of the various vibrating parts of the cane have been exposed to the correct extent (see 18. vi). When the reed is played in you can keep this balance by scraping evenly over the area free of bark. In some cases the low register has to be freed again (scrape the lower third part, as measured from the end of the U/V closest to the first wire; remove some of the bark at the back; lengthen the U or V), but make sure not to unbalance the reed when doing this.

ii) Don't expect the perfect reed straight after opening! – the reed will need a few days to settle into its new form. It is not hard to get the reed into a playable state, but optimising it may be too early unless the cane is unusually flexible. In the beginning, young reeds do not need to be saturated to work well, but this will change with time, and the older they get the longer they need to soak. Before soaking always take care that everything is positioned correctly (wires and maybe the wrapping). These reeds lose water slower than their modern counterparts (and can even hold too much water in the beginning and therefore sound hard). The areas scraped free of bark have to be kept wet through saliva or water as the difference of water content in the various parts of the reed can cause the tip to lose its form. The various layers of cane have differing qualities regarding how they contain water: the outermost are flexible and shrink more when they dry. The innermost however stay almost in the same form. That is why the reed malforms when dry and returns to a playable shape when wet.

18. Some practical rules for scraping:

These reeds are often too bright for the current (German) taste. That is why the following paragraphs are concerned with this topic.

i) The reed can start to buzz if too much has been removed from the front. (See 18. vi for the reason for this). This can be corrected by scraping from the back (of the U/V). This can feel a bit like a balancing act, both areas have to work well because:

ii) The low notes will not speak well and the reed will be too bright when there is too much cane at the back, the mass stops the reed from vibrating correctly.

iii) Taking too much from the sides at the front (the corners) makes the reed brighter and it will react worse. The corners lie together uselessly and have lost their supporting function, which now lies further back. You can observe this by pressing the reed together while lighting it up from behind. You can see an area of water at the corners that moves as you press. If this is too large then too much of the corners lie on each other. There are two solutions to correct this: round off the sides more than they already are – here you remove the buzzing part of reed, hopefully that does the trick... Or you shorten the reed a touch to change its balance.

iv) The thickness at the tip is not too important, you should take away as much cane as necessary. It has to be kept in balance with the rest of the vibrating area, however.

v) If the sound is still too bright and you are unsure where this comes from, it is worth cleaning the inside with scouring rush. Fröhlich, a famous bassoonist at the beginning of the 19th century even used a file to make the inside of the reed rougher for a more velvety sound. I would use a diamond file in the central area of the tip. Also useful is to insert scouring rush along its ridges carefully down the side of the reed. This removes anything that might cause the buzzing and evens down the sides, in case unevenness was the cause of the noise.

vi) If the sound is too bright and the high notes don't want to come then the reed is either too thinly gouged (the reed articulates very well, but almost only buzzes – you can in any case here leave enough bark at the back of the reed), or the inner profile was gouged too shallow, so that the sides don't transfer any flexibility to the tip and the reed therefore shuts too flat and has no support down its centre (the reed doesn't speak well). You can observe this by pressing the reed on its spine and looking over one of the blades. (The tip is pointing to your face and at almost 90 degrees to your body, so that you can look over the upper area like over a landscape.) If you press at the back you can see if there is enough flexibility from the first wire to the front. The further forward you press the less influence the back of the reed has on the how the tip shuts. Pressing on the tip shows you its profile. The flatter the reed shuts the brighter it is, and it is more difficult to get high notes. To counteract this scrape in those areas that do not move flexibly enough, you can even remove some of the bark if necessary. Be aware however not to take away too much of the outermost sides, that won't necessarily help and may even make the reed sluggish as the support from the sides is missing (the sides may start to collapse and lie too flat onto each other, that stops the reed from vibrating freely). It is better to scrape a groove with a narrowly rounded knife blade to weaken the cane in the relevant area. Remember Ozi's wedge: if the front of the reed is thin enough it will allow the profile from the inside to have more effect. If you want the profile even stronger you can scrape the first few millimetres along the tip, but not in the middle (and not the corners, see 18. iii), to create a small spine.

Summary: a reed will always have a round sound and better articulation if a) there is more movement at the sides of the blades in comparison to down the middle, b) this movement is more pronounced towards the tip, c) if the middle towards the tip has not been too thinly scraped. The reed should move in the following way: the direction should start from the corners (also, but less, from the sides which are already resting on each other), continues at the tip where the sides start to shut towards the middle and finishes with the remaining motion being contained almost only at the tip. (The opposite of the kind of reed that shuts too flat would be one that shuts "too well" and has too much tension down the middle. This reed will sound very round but will have a difficult articulation and need far too much air. You can see why when you press the reed together: the centre of the two blades hardly touch. To remove this weaken the middle area.)

19. A further possibility to influence how the reed works is by slightly rounding the edges at the sides of the reed where there is still bark on. Cut off thin slices down until the second wire. It can make the reed a touch easier to play, as it changes the pressure exerted by the first wire touching the corners of the reed.
20. The most important thing is to use all your senses to test the reed (mostly with sight, but also tactile information and playing the reed regularly between the many steps): checking from when you start the profile on the inside, the shaping of the reed all the way to how it shuts – if and where there is enough flexibility.
21. Blades shifting sideways: It can have several reasons if the blades shift from one another after opening or over the course of time. 1. a) Not enough care was taken that both sides were lying flush on top of each another during the fold and while putting the wires and thread on. The edges don't lie on but next to each other, and the forces which are exerted from the tube having been made round make it all the more likely that the shifting continues along the inside of the blade. b) If, during pushing the reed on the mandrel, the sides are not next to but over each other on the tube, this will also cause the blades to shift. Use a small knife to lever the lower part until it lies plane with the other one, like levering an inner tyre into the outer one on a bicycle. Do this carefully, to minimise damage to the cane. 2. The wires are too loose, and the reed has been bound with too much pull. The lateral pull of the thread pulls the blades apart even more. If the wires were tighter (particularly the second wire) they would prevent too much influence from that pull reaching the blades. Nonetheless, take care not to tighten the wires so much that the reed is strangled. Again, experiment with how much pull is used while binding. 3. The reed has been *turned* onto the mandrel, not *pushed*. If the blades have been ignored during this process they may move into a different position than intended.

There are only two solutions to this problem (if using exclusively historical techniques): 1. The projecting parts of the sides have to be cut back as far as possible. The areas closest to the first wire will be more in danger: if you try to cut off everything which is projecting out wrongly it is possible that you may cut a hole into the side (as the gouged areas on the inside are lying on each other and not the outer edges!). So work carefully, after all the reed should work well and does not need to look pretty. The reed will become narrower of course, and this changes the sound and tuning accordingly. It might be necessary to re-work the front, as both blades at the tip will not be lying flush. The blades may continue to shift a bit more, but if you have taken away enough and reduced the lateral forces they

should come to a standstill. 2. Avoid doing the above-mentioned mistakes again the next time you build a reed.

22. If an old reed has become too soft you can cut off up to 2.25mm (one *ligne*) at the tip. This can bring back some life to the reed for some (sometimes not that much) time. The reed cannot take a second cut as the vibrating areas will be gone completely, the reed will be too open and will not have a good sound.

If for any hygienic reason you use an alcohol spray, the alcohol will harden the cane very quickly. It will do this over a long period of time and may make the reed seem brighter in sound. The effect of this will be all the more apparent if the reed has been resting for a while. You can only try to compensate by scraping in the relevant areas. As soon as you use alcohol it will always have a noticeable effect, regardless of how old the reed is.

23. You can cover the binding on the finished reed with (nail) varnish, but our modern-day varnish did not exist then. There are three possibilities:

a) Leaving the well-waxed thread uncovered. However, when the reed is older the thread may loosen and in the worst case even come off the reed. Every different position of the thread changes the behaviour of the reed, as the pressure it exerts changes.

b) Using a small paintbrush apply heated beeswax, reheat this part of the reed by putting it on the mandrel and holding it to a heat source. Be careful when using a candle, it is safer to use a halogen lamp. Protect your eyes – use sunglasses! Reheating the wax lets it soak into the thread.

c) Make a historical recipe yourself (see e.g. *Willent (J.) et Bordogni (J.B.) Méthode Complète pour le Basson, Paris 1844*, Fuzeau „Le Basson“, 2nd volume p.137). It is useful to compare recipes from different sources to expand your own background knowledge. Look under sealing varnish, sealing wax, violinmakers' recipes...

Willent et Bordogni's recipe translated (with modern measurements):

113.4g shellac (stick lac)

28.35g vermilion (cinnabar, quicksilver sulphide)

1/8 l spirits of wine (ethyl alcohol, alcohol with 99%)

Fill everything into a small bottle and wait until everything is mixed, stir, then seal the bottle so nothing can escape. If the fluid gets too thick, add more spirits of wine.

Warning: vermilion is poisonous! It is used only for colouring and not as an active ingredient. I would advise leaving it out or replacing it with a harmless equivalent. If you do use vermilion use the appropriate protective clothing (mask, disposable gloves). Vermilion is a fine dust and should not be used where there is a draft. Later it is bound with shellac, but I would nonetheless always take care that what flakes off does not get swallowed. Do not use on reeds you want to sell. Always clean away rests with kitchen towel, clean the brush with ethyl alcohol and wipe it dry. Treat all waste as hazardous and keep it in a separate bin. Keep the vermilion properly shut and store the alcohol in a dark and airy place.

You can find all the ingredients at e.g. Kremer Pigmente, or other specialist paint suppliers.

b) is of course the easiest to make.

So that the varnish doesn't start to flake as well as the wax come off so quickly it is worth soaking the reed only from the front, letting a few drops drip through the tube so that the inside of it also gets wet. The binding stays dry this way. The alcohol from the spray should also not touch the varnish, otherwise it will dissolve.

A note on tools: it is really worth using good tools. They let you build with more precision, lessen faults and are more fun to use. Paying a bit more money for a good tool, be it only pliers, is worth it in the long run.

II. Almenräder

Detailed reed making descriptions exist only from the end of the 18th century on. Thanks to extant reeds and iconographical evidence it is noticeable that the technique of building reeds had not much changed over the centuries. Shape, types of gouging as well as how much bark was left was dependent on instruments and tone colour ideals.

Added here is Almenräders description from 1842. This source is particularly relevant as its depth of detailed description is quite unusual for the time. Nonetheless, you have to read it critically – it was written in a time

where bassoon and reed making were following the romantic tendencies, and is here in an early transition to the modern reed. Almenräder also experimented with bassoonmaking and developed a new type of instrument. The reed is meant for this instrument. Old-fashioned instruments and reed models co-existed with the modern ones until approx. 1900. Climate change (it was warming, but less pronounced as nowadays) led to the consistency of the cane to change (and perhaps why more of the soft part was used). As a contrast: the early baroque went through a small ice age (ca. 1550-1850, during the baroque it was slightly warmer for a short period), and the reeds seem to be gouged thinner and have more bark.

We have to therefore conclude that, even if the above description is in agreement with the sources, this method (with the work on the profile and other built-in factors which lead to a flexible reed) cannot be seen as the only one to use in building, as we can only build reeds with cane from our own present climate.

A note on the translation: I have tried to convey Almenräder's very descriptive and sometimes complicated style, as well as trying to be as exact about the content. Some vocabulary was difficult, as I have not yet been able to find modern English equivalents, or the German word was more precise in its meaning. One illustration is incorrectly labelled, Fig. 7 (Tab. IV) bears the number 1.

Hohlkehle (in modern German also called a *Mulde*): gouging bed, trough; I do not know whether there is a different modern English word. I use the word used to describe a part of the gouging machine.

Rohrholz: strictly speaking the word "cane" would suffice; I have used reedcane to distinguish Almenräder's usage between *Holz* and *Rohrholz*.

Ring: I have used the word "ring" instead of "wire", as it was also common practice to build reeds using a soldered metal ring pushed onto the shaped cane instead of wires bound around it. The modern German word for "wire" would be *Zwinge*.

Schachtelhalm: equisetum hyemale. In German more specifically known as *japanischer* or *Winter-Schachtelhalm*, in English "scouring rush" or "rough horsetail".

Schlichtfeile: "smooth file", was a single-cut file.

Unschlitt: is the older German word for "tallow". The modern word is *Talg*.

Ziehklinge: in modern German denotes a piece of punched steel with a strong burr that is used to smooth wood. It is pulled in only one direction over the surface, the English word here is "cabinet scraper". For reed making the tool used today looks similar but can be pulled in both directions as it has only a sharp edge, no burr. In modern German the word for this is *Schaber*, "scraper", which I have used in the translation. Almenräder's illustration may show a type used for woodwork.



Carl Almenräder
The Art of Playing the Bassoon, Schott 1842

CHAPTER XIX Concerning the Making of Bassoon Reeds.

§.1.

Having brought himself through thorough and diligent study to a meaningful artistic level the bassoonist is nonetheless sometimes very dependent on his bassoon reed. He may possess the most delightful instrument as well as the best, most artificial humour, however when

he plays a bad reed he must be its slave and cannot move freely. It is therefore unavoidably necessary for the bassoonist, if he himself does not want to make his own reeds, to gain precise knowledge of the building of the same; that he may inform whomsoever who makes his reeds how he wishes to have them, namely: broad or narrow, short or long, here gouged thin, there left thick in cane, etc., as there are, after all, many different calibres and shapes of reeds. One type of reed used on this instrument is perfectly in tune, and is on that one completely false. It is therefore necessary that the bassoonist always keeps to that species of reed with which his instrument has been attuned.

If I now part here with my opinion in general

concerning the manufacturing of bassoon reeds: so may it be especially applied to my species.

§.2.

For the manufacturing of bassoon reeds one uses cane which has been grown in Spain, or also in Italy. Of the former, I have until now used the most for this, of the second much less, not because it could be worse than the former but because I have had until now little or no opportunity to procure this. I do not know the cane that grows in southern France. Spanish reedcane in Germany is most easily to be had in the manufacturing quarters, where it is often processed into a tool necessary for clothmakers. The cane which one chooses here to manufacture bassoon reeds must have grown straight, and the cylindrically formed pieces (see illustration [III Illustrations, i. Almenräder, a), below]) must have a diameter of at least one rhinelandic inch [26.15-26.99mm] and has to be as long as the length of the bassoon reed; so that when the cylinder piece is split into four equal parts, each part will have the sufficient width and length of a reed.

The good and suitable properties of cane for a bassoon reed are most surely perceived during the working of the reeds. It must neither be too hard nor too soft, nor have been stored for years in one place where no clean air could pass through it and where it must therefore have gone mouldy; the meat on the inside during gouging must seem strong and fresh, be of an even white and possess a certain toughness, the last being noticeable due to gouging smoothly. Some would even differentiate suitable from unsuitable cane through many other characteristics, e.g. through the outer colour, whether this is a pale or bright yellow, whether its colour is dappled; also by cutting into the cane and then wetting the cut they would recognise whether it sucks up water and has pores which are too rough. As much effort as I have put in to precisely follow these characteristics when choosing reedcane, I have found that they are based on unstable reasons and are not always reliable. The only test which has served me until now is (apart from my indicators mentioned above) running the nail of the thumb along the round tube on the outer part of the reedcane, through which one recognises its elasticity most surely. If, having used medium nail pressure there is no mark of it left on the cane, then one can be sure it is too hard. Even if some have the following objection against it: "The hardest and toughest reedcane is the one which is the most suitable to make the fittest reeds", so I must counter that one then, to conclude according to this, could make bassoon reeds out of much harder and tougher objects which would all have to be better than those made out of reedcane; although I trust myself to

bring about a fit reed out of pinewood than out of such tough cane.

As for the assumption that some make that reedcane is only allowed to be cut at a time when it is ripe: I haven't found enough evidence as yet, although I suspect that if, during a time of year where it still contains its juice it is cut and then laid in a place where no air can pass through and therefore cannot dry quickly enough, that this in any case must be harmful for the cane. I could not discover in spite of all the effort I undertook, whether this cane [is ripe] early every year and then cut, or if it is only ripe after two or three years,^{*)} and is only then cut. It would in any case be good for reed-wind instrumentalists to know more.

§2 [sic!]

To make bassoon reeds one needs (apart from an ordinary wire pliers to secure the wire rings, a small vice one can secure to a table, a coarse file, and a good English smooth file, both of which have to be flat, and a triangular file) the following tools illustrated in Tab. III in original size: Fig. 1. A gouging bed made out of fairly hard wood that can be attached with a wooden screw tightly to a table. Fig. 2. A gouge out of good steel. Fig. 3. A steel scraper. Fig. 4. A mandrel out of brass that is as wide as the reed is when bound to it [sic?], and must be round and finely polished. Fig. 5. Pliers, where the inside surfaces have been smoothed down.

§3

From the cylinder piece which had been split into four equal parts, take one which has the length and width as indicated in Tab. IV at Fig. 1, place it for one hour in cold water, and after this gouge it on the gouging bed with the gouger evenly along its entire length until it is as thin as shown in Fig. 2.; this having been done, divide the entire length of the piece exactly into two equal halves (see Fig. 1 from *a-b*), then with the triangular file on the outside of the piece notch just the bark of the cane and cut in a small triangle on both sides at *a-b*, so that when it is now put again on the gouging bed the eye always has the middle of the piece in view. Gouge now from *c* with the gouger, as well as from *d* gradually thinner to the middle of the two halves *a-b* indicated in Fig. 2, so that it has become thinner by somewhat more than half. This last gouge must be done very carefully, namely in the place it should be, evenly; this is granted if one holds the worked piece up to the daylight where then, through the shadows caused, one easily notices the uneven areas. Now with the

^{*)}A trustworthy man assures me, however, that it is cut in the third year.

scraper, and after the worked piece of reedcane is dry, even out the uneven areas in the gouging bed, and then into water for 10 minutes. After this, completely scour the gouged side with scouring rush. As in Tab. IV. Fig. 1 cut the shape of the reed only on one half (after a shape on thin metal plate which one has made oneself for this), just as according to the measurements of the points shown here. After it has lain for further 5-6 minutes in water test through cautious pressing in the area of *a-b* Fig. 1 if it is flexible enough that the other, as yet unformed half, can be put together with the formed half without it getting too round at the notches, as in Fig. [3] Tab. IV, or even that the two halves separate from each other.

Both cases may occur when 1) if the reed towards the front, where the reed is taken in the mouth, is not yet thinly gouged, and 2) when the cane is too elastic. In the first case one can be helped in that one (but before beginning to fold together both halves) gouges the cane from *c* until *a.b* and from *d* until *a-b* thinner, so that both halves let themselves fold together flat as in Fig. 4, which in the second case, if the cane is too firm and elastic and thus has to be gouged too thinly, it must fold flat in an other manner. But the sound from a reed made in such a way can only rattle and not be made nice. If one notices following the aforementioned that the fold will be successful, one places the reed that has been completed thus far onto the gouging bed and, with a knife blade where the tip is broken and is therefore at a right angle, split the cane equidistantly at the lower part at *e* and fold together. The flatter the two halves come to rest against each other, there where the reed is notched at *a-b* and where it is taken into the mouth, the more hope there is in gaining a good reed. (See Fig. 4 and 7 in Tab. IV.) One lays now both halves completely flat on each other as at Fig. 7 and cuts the as yet unformed half *m* to the already formed half *n*, having done this bind both halves flat and firmly together. See Fig. 5. After it has lain in water yet again for 5 minutes one takes the brass mandrel, Tab. III. Fig. 4, and coats the same with tallow and presses it between both folded halves, though not so quite so far as it [the reed] has been bound with the binding thread, following which both halves having (unless otherwise) been so far evenly and equally worked out in the appropriate places will also bulge evenly and flat. Following this one takes well annealed wire and fastens the same to the middle of the reed where the binding thread stops, bending it with the wire pliers on to the cane; after this one removes the binding thread and pushes the wire to its appropriate place (see Tab. IV. Fig. 1 at *h-i*) and tighten it here once again; then notch $\frac{1}{4}$ inch [6.54-6.75mm would be a $\frac{1}{4}$ rhinelandic inch] under this first wire ring with the triangular file all around the reed somewhat so that the second wire

ring which, once fastened here, cannot move any more from its place. Approximately four lines [ca 9mm] from the lower end, at the place where the reed will go on to the bocal yet another notch in the cane must be made all around the reed, so that the subsequent binding thread which will continue to stay on the reed cannot push itself from its place. After this the mandrel (which yet again is coated with tallow) is tightened fast at its key shape [handle] in the vice and, starting at the second ring using so-called driving cord which one gets at the ropemakers*) (which however has to be coated with wax beforehand), bind the reed until the very bottom as tightly as possible; on one's right hand making use of a thick leather glove so that the string can be pulled tight with force, which keeps both blades from becoming loose because of it (being able to push apart from one another) which is a great disadvantage to the reed, and is nonetheless on some often the case. Should the reed be stuck very tightly on to the mandrel use the pliers as shown in Tab. III marked Fig. 4, and applying the concave sides above the string press this way and that, until it thereby comes off the mandrel. One takes the reed which is thus far completed between the left thumb and left index finger at the string at the lower end, similar to when one wants to cut a quill feather, whereas the flat part of the reed rests on the lower soft part of the base of the thumb (on the inside of the hand), and cuts with a narrow but sharp quill knife the bark very thinly from that place onwards, marked *f-g* in Fig. 1; the hereby leftover unevennesses are removed with the coarse file. One now places the reed, after it has been made a little wet at the tip, on a smooth but firmly load-bearing piece of wood, places an old sharp razor on the very front part of the reed and separates both halves with a brisk and bold hammer blow. The opening at the front of the reed will now have the form as in Tab. IV. Fig. 4; should the two halves however stand further apart, approximately as in Fig. 3, press the first ring from both sides together somewhat with the wire pliers, through which both halves will lie closer to one another. The first ring is not supposed to become too oval, because in this case the inside of the reed will not be open enough. If both blades of the reeds are too close to one another press the reed apart somewhat from both sides with the pliers (see Fig. 1 at *h-i*). One carefully scrapes out the inside of the reed from the front, as far one can reach, using scouring rush which has been made a bit wet and then pressed flat together. One takes the reed again between the left thumb and the tip of the left index finger. One tries the reed subsequently on the bassoon and examines whether the low or high register responds the best on it. When the response in

*)It is out of three or four strands, twisted out of hemp or flax and is therefore very strong.

the low register is difficult the fault usually lies in the reed being too strong with cane beyond the first ring; one therefore files with the smooth file more in these areas on both blades, and gradually less towards the front where the reed is taken in the mouth. If the high register speaks with difficulty, then also file towards the front on both blades. Above all the reed must be worked as thin as ordinary writing paper at the front where it is taken in the mouth, and then left gradually a bit stronger towards the ring. On both sides (see Fig. 6. at *k-l*) one scrapes the reed a bit thinner than in the middle, though one must always note the strength of the cane during this and act accordingly, that the stronger and harder the cane is the thinner it too must be worked. By the way, it is best when the reed is left the same thickness on both sides where the blades lie upon each other, as specified in Fig. 8. At the same time I cannot recommend enough that one leaves but plenty of cane in the area of both rings (see Fig. 8. at *o-p*), which gives the sound of the reed a certain power. An easy articulation is guaranteed from the reed through sanding very carefully this way and that through the inside of the reed with scouring rush pressed flat. (See Fig. 6.) I must remark here that the reed during this and similar procedures must always be kept wet. Having followed the previous instructions precisely one will soon be able to find the reed fit for use.

The first 4, 5 to 6 days the reed changes the most, both blades sometimes press themselves too much together during this time or also too far from one another; one

knows from the above what one has to observe in order to get the correct opening of the reed, which is specified in Fig. 6. The reed will usually become somewhat stronger, also when using it in the first days. One scrapes it in this case with scouring rush, but always towards the front, and on both sides somewhat gentler where both blades lie on each other, and repeats this in a few days again when it has become necessary. The dirt which develops on the inside of the reed must be carefully cleaned out of the same using a chicken feather, and after much usage it must be put in a place where air can pass through it. (See *Cäcilia* Vol. 11, page 58.) If the reed during gouging should accidentally have been left too thick in cane in the area of the first ring, and therefore the vibrations of the same (particularly of the lower notes) are not large enough, and these then do not speak easily enough, then one pushes the first ring somewhat more towards the second. If it has been gouged too much at the above mentioned place that therefore the vibrations of the reed are too large and through this the higher notes do not speak easily enough, one must proceed in the opposite manner and the first ring must in this case be pushed more towards the front, where the reed is taken in the mouth. This moving of the rings should nevertheless only happen a little as even main errors that one was liable for during gouging cannot be improved, and it is in any case always preferable if the ring keeps to its place as in Fig. 1 at *h-i*.

The finished reed must have the form as in Fig. 9.

III. Illustrations

i. Almenräder

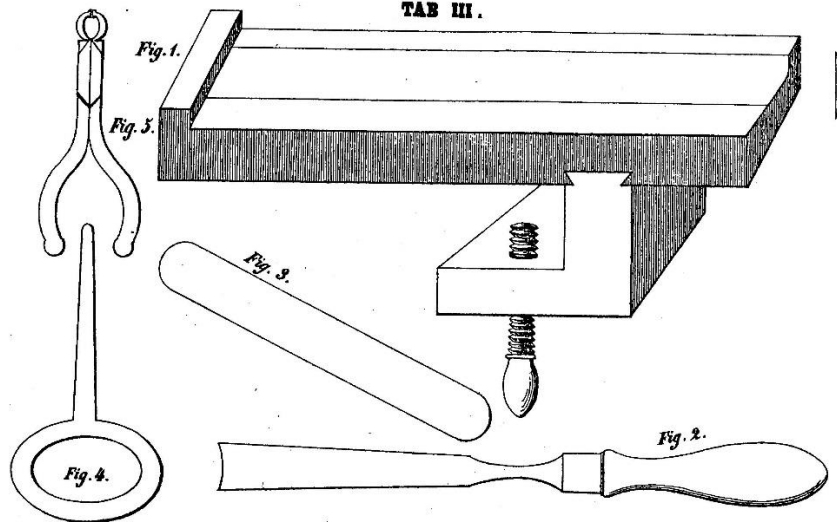
a)

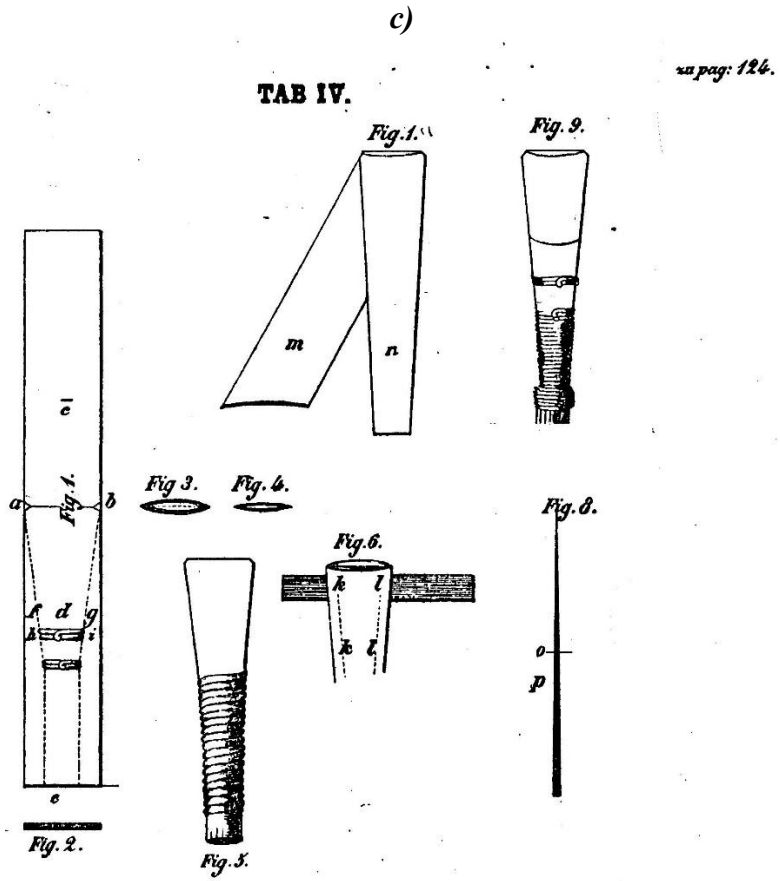


b)

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TAB III.



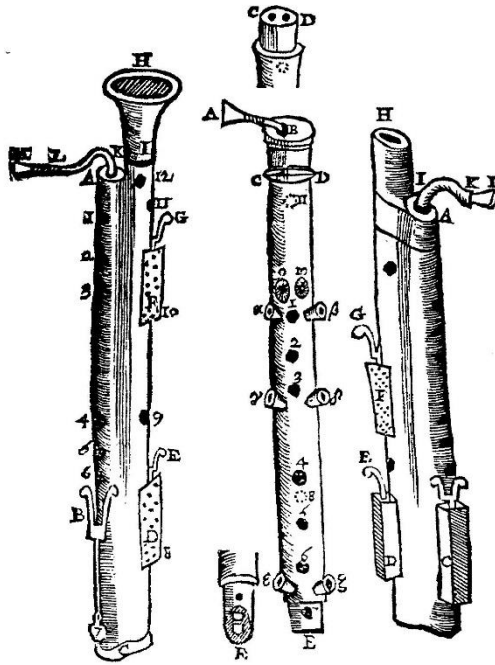


Illustrations from Almenraders *Die Kunst des Fagottblasens*, Schott 1842.

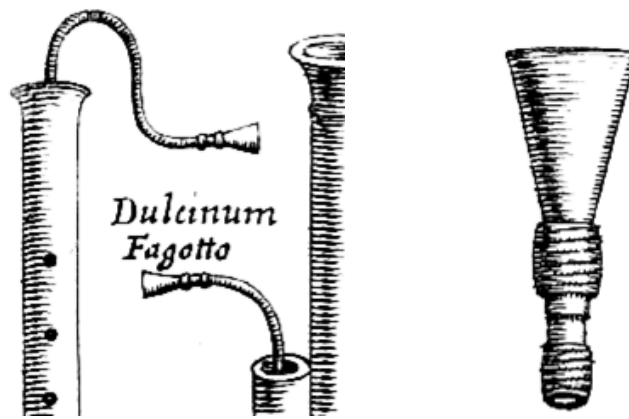


Almenraders reed as it appears in the article in *Cäcilia* April 1826.

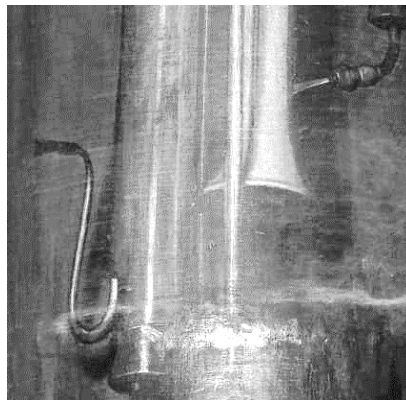
ii. Other Illustrations



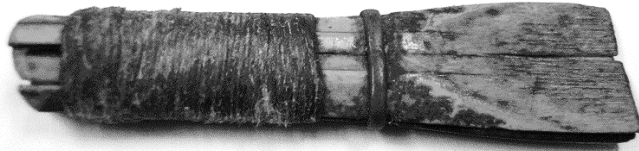
From Mersenne, Harmonie Universelle, Paris 1636.



Kircher, Musurgia Universalis, Rome 1650.



Cornelis Brizé, Oude Kerk, Amsterdam, Netherlands, 1658.

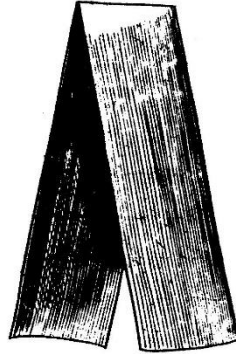


Reed from the Edinburgh University Collection, second half of the 18th, beginning of the 19th century?

Morceau de Roseau évidé dans les proportions prescrites pour établir une Anche.



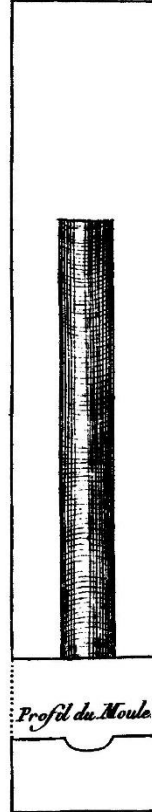
Le même ployé avant d'être Taillé



L'Anche formée les brides étant placées et disposées à recevoir la Ligature.



Plan du Moule pour évider le roseau.



N° Ce Moule est tracé sur une échelle de Moitié de la grandeur qu'il doit avoir.

From Étienne Ozi Nouvelle Méthode de Basson, Paris 1803



Reed from Willent (J.) et Bordogni J.B.) Méthode Complète pour le Basson, Paris 1844