

Reed Making for the Bagpipe



Gordon K. Speirs

Text typed and images scanned by Stephen T. Pegler
(1994)

Images cleaned up, text laid out and PDF document created by Andrew T. Lenz, Jr.
(2002, revised 2009)

FORWARD

A few words of caution!

It is not the intention of the author to pretend all-seeing knowledge in the art of bagpipe reed making. Many reed makers have a variety of systems of arriving at similar results. Some bad, some good. Some will differ in dimensions and tools to be used. It can only be said that what works the best is the way to go for anybody.

For the purpose of these notes, all diagrams and sketches have been drawn by the author and, by way of an apology, no formal training in this art has been his lot, as will be seen!

At one time or another, each of us have had a bad experience with reeds. This prepared paper is not the cure-all to that problem. However, it is the hope to reduce the incidence of these problems.

The main purpose is to explain in general terms what goes into the making of reeds and to give some insight and guidance to those who feel that they would like to make an attempt at it. You are urged to try! Even if only one person does try and is successful in producing consistently good reeds, then we are 100% ahead of our present position and the efforts gone into compiling these notes will have been worthwhile.

As a last word, it only remains to be said that the main ingredient for success in reed making is *patience*.

Gordon K. Speirs
Kansas City, Mo.
9th February, 1979

Note from Document Preparer, Andrew T. Lenz, Jr., Summer 2002, Fall 2009

It was the belief of Stephen Pegler that the information provided herein to be in the public domain. As such, he scanned materials from Gordon Speirs' reed making paper and provided it to be posted on the internet. (See Appendix.) In October 2009, I successfully contacted Ross Speirs, Gordon's son, who gave his Speirs Family blessing to this project: "Dad loved teaching and I'm sure he'd love to know that his lessons are carrying on." Since Gordon Speirs passed away in 1994, I am happy to know that he would be pleased at what we are doing in his memory.

I reversed the order of diagrams 8/9, 10/11 and 12/13 so they appear in same order as in the text. Aside from removing spots, etc. from the scanned images, for some I've moved labels or separate parts closer together to make the images more compact. In a few instances, I've taken the liberty in the text of modifying references to images for sake of clarity, such as changing "below" to "right" and such as adding "Diagram 8."

Document laid out in Adobe Pagemaker/InDesign on a Macintosh. The font family is Stone.

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WHAT YOU WILL NEED

For Chanter Reeds:

1. **Cane.**
 - 22 - 25mm for Pipe Chanter reeds.
 - 25 - 30mm for Practice Chanter reeds.
2. **Special tools as indicated on the attached sheets.** All special dimensions will be disclosed during the course of the clinic.
3. **Copper Strip.**
 - 1" wide x 26 gauge for Pipe Chanter.
 - 1¼" wide x 26 gauge for Practice Chanter.
4. **One 3" Nail.** This is required to make your staple former.
5. **Parallel Jaw Pliers.** Reed blade forms will have to be made for these and then fixed in place with an epoxy resin. See page 8.
6. **Small Fine Blade Saw.** Available at most hobby stores and will be required for drone reeds too.
7. **Gouging Machine.** This is a specially manufactured tool and many reed makers use these today with varying success. The cost is in the region of \$700.00 and so, for our purposes, we will contain ourselves to the use of hand tools!
8. **Hand Gouge.** These can take various forms but the main essentials are that the dimensions shown in the appropriate diagrams are religiously followed. See page 6 and page 7.
9. **Clean Hands!** Making chanter reeds with dirty hands will result in a product that gives the appearance of having been handled by all members of every band on the East Coast! Clean hands throughout the entire construction will ensure good reeds and a satisfying product.
10. **PATIENCE!** This is most important with chanter reeds. To rush this process will only waste cane.

SHAPING THE CHANTER REED

1. A raw cane billet comes in its natural cut state and can be in a variety of lengths. This is determined by the growth pattern of the individual cane and the placement of the growth knuckles. Generally the lengths are between 6 - 12 inches long and vary in diameter between 22 - 25 millimeters.

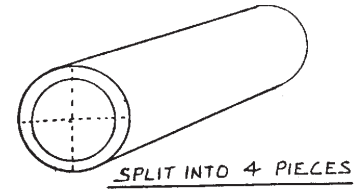
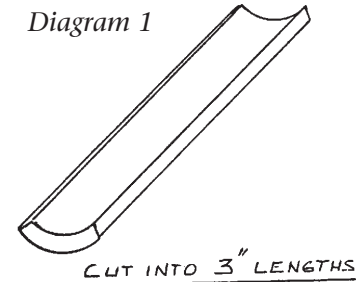


Diagram 1

2. Carefully select your cane and inspect for flaws, disease, and splits caused in cutting or transit. If acceptable, the cane can then be sectioned into four.



3. To section a piece of cane, all that is required is a sturdy sharp knife to be placed on one end of an upright piece of cane and a rapid blow with the heel of the hand to the dull side of the knife blade. This action will result in the cane splitting down the full length and following the natural grain of the wood. A twist of the knife blade completes the maneuver and causes the cane to fall in two halves. Repeat this method on the two halves to arrive at four pieces. See *Diagram 1*.

To attempt to saw down the length of the cane will result in bad reeds with a great tendency to warp.

REMOVE SURPLUS MATERIAL

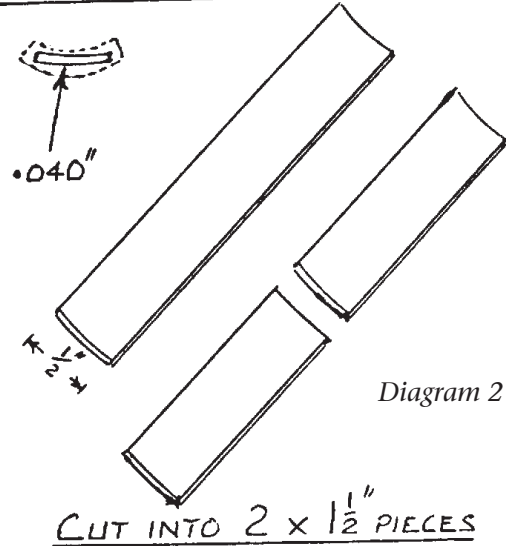


Diagram 2

4. Cut the sectioned lengths into 3" pieces and remove the surplus material from the back and edges as described in *Diagram 2*. It is important at this stage to remove as little material as possible from the outer side of the reed blade. You will see that the outer side has a natural hard shiny skin and it is desirable to retain as much of this hardness as is feasible.

5. Having arrived at the desired thickness of .040" along the full length of the blade, cut across the middle with a hand saw to result in two pieces 1 1/2" long as indicated in *Diagram 3*.

SHAPE REED BLADES



ALWAYS KEEP PAIRS TOGETHER!

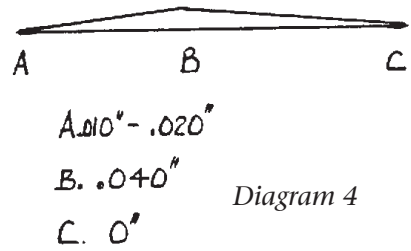
Diagram 3

6. It is imperative that those pairs remain as pairs throughout the entire process of construction.

7. After final shaping as shown in *Diagram 4*, select three pairs of blades and wrap a cou-

ple of turns of hemp around each pair separately. The cane now has to be soaked for a few minutes and the hemp will prevent the separation of the pairs. Place all three reed blade pairs into a shallow dish of water. While these are soaking, it is a good idea to make more blades or a few staples just to allow the cane an honest few minutes to soak. Cane will form around the staple when thoroughly soaked whereas a dry can will split.

FINISH BLADES

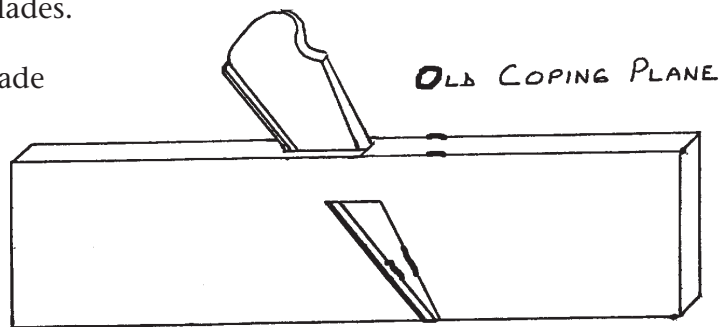


- When ready to wrap the cane onto the staple select another pair for soaking whilst the wrapping is being done.

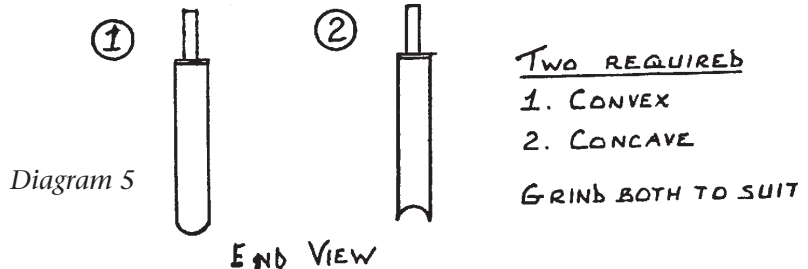
CANE GOUGE

Purpose: For shaping reed blades.

- The gouges shown are made out of old metal files (See Diagram 5 & 6). The metal is very hard and reduces the necessity for frequent sharpening.



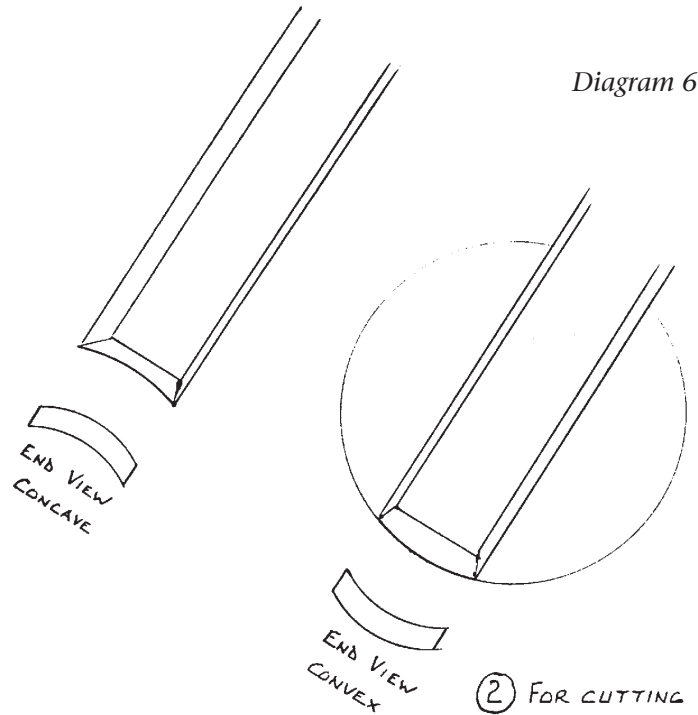
- Whatever method of gouging is used, it is essential that the cane is properly secured. Any deviation in the angle of cut will produce an improper reed blade. The surplus material should be



removed in a series of strokes along the entire length of the prepared cane. Attempting to take too much at one time may split the cane or leave tool chatter marks.

- An alternate to the gouge is to use old coping planes. A sketch (Diagram 5) is shown for the benefit of those unfamiliar with this type of plane often found in antique stores.
- A number of reed makers advocate the use of a grinding wheel held along the direction of the cane and grinding the required radius. Of course, the wheel would have to be shaped and dressed in the proper manner to do a good job. Also, there should be some form of dust collection apparatus. The dust created by this method is horrendous and may be harmful to your health unless precautions are taken.

① FOR CUTTING OUTSIDE OF CANE.



② FOR CUTTING INSIDE OF CANE

NOTE: THESE BLADES CAN BE GROUND FROM EXISTING LARGER CHISELS OR OLD FILES.

THE FINISHED BLADE SHOULD ^{NOT} BE LESS THAN 1" WIDE AND THE CUTTING EDGE GROUND TO 3" DIAMETER.

DISCARDED COPING PLANES ARE VERY SUITABLE TO MAKE THESE TOOLS.

REED BLADE FORMER

Purpose: Final forming of reed blades.

1. The parallel jaw pliers shown in *Diagram 7.1* are the type required to do the job in the proper manner. The jaws open to the extent of $\frac{3}{8}$ " and should permit the shaping of three pairs of blades at one time (i.e., 3 reeds). It is very important that the reed blades are centered in the jaws of the pliers so that equal amounts of surplus cane is exposed on each edge of the forms.
2. The forms shown are made out of tool steel and should be ground convex and concave respectively to follow the contours of the previously gouged cane. These ground surfaces are probably not essential but it does lessen the risk of the cane blades splitting if too much pressure is applied to the pliers.

3. Taking a sharp chisel or knife, the surplus cane should be shaved a little at a time from one side of reed blades until the cutting implement reaches the metal blade forms. Keeping a firm grip on the pliers, a twist of the wrist will expose the surplus material on the opposite side and remove that surplus cane in the same manner.

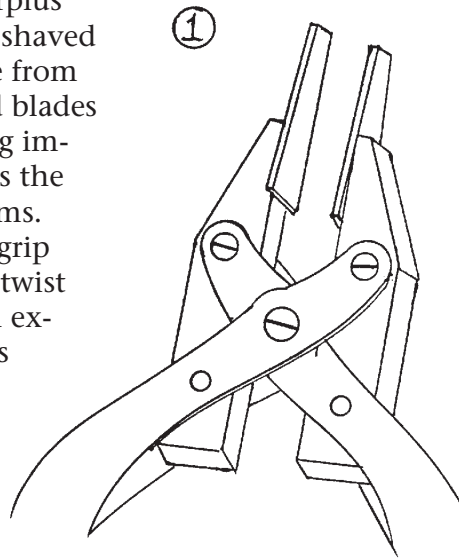


Diagram 7.1

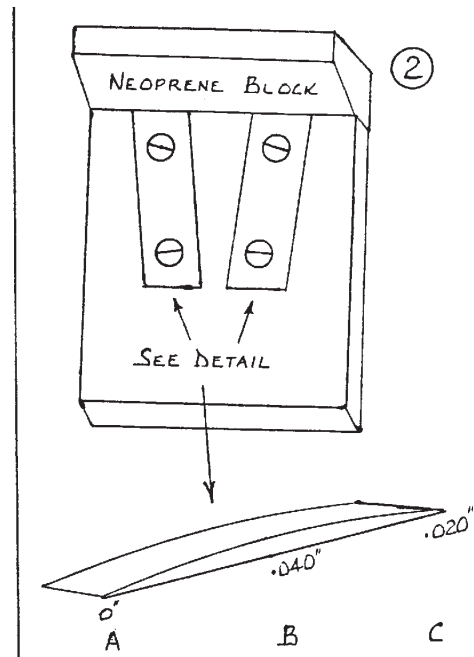


Diagram 7.2

4. The block in *Diagram 7.2* shows two shaped strips of metal that have been ground to the final dimensions of the finished reed blade. Remembering to keep reed blades in their respective pairs, place a blade into the shaving block and gently remove all the surplus material with a sharp chisel until the tool slips easily along the faces of the metal strips.
5. Having accomplished all of the above, you should now have a pair of reed blades ready for soaking and wrapping to the staple.

REED STAPLE CUTTER

Purpose: To provide blanks of copper for staples.

1. The copper cutter (*Diagram 8*) is one that is home made. It has been found that commercial paper cutters are too fragile in construction and require frequent sharpening.
2. It should be noted that the angle of cut is off-set at a variance of $\frac{1}{16}$ " from a true plane. The reason for this is so that the copper strip can be turned over after each cut and thereby save material.

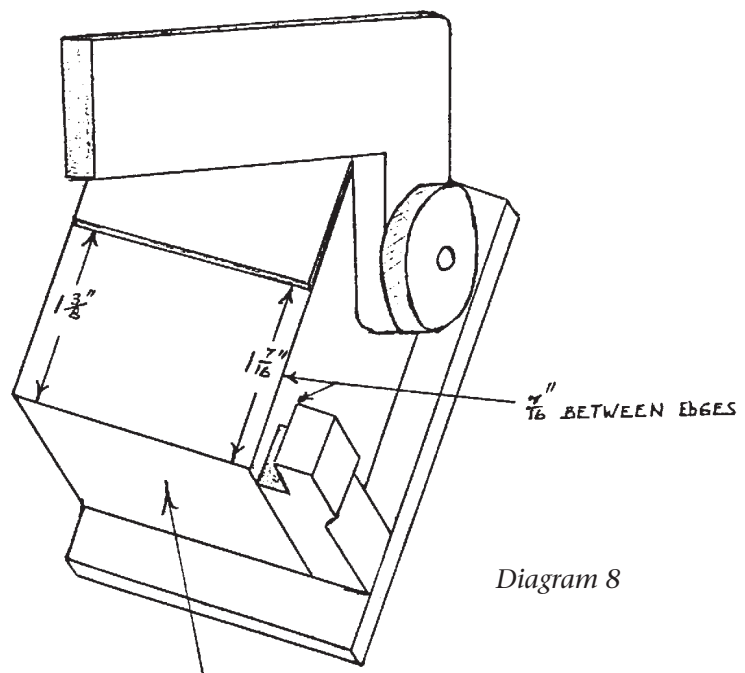


Diagram 8

THIS VARIANCE OF $\frac{1}{16}$ " ON THE ANGLE OF CUT IS ESSENTIAL

3. Right is a diagram of the strip and a finished blank as it should result.

4. After sufficient blanks for your needs are cut, it is important that the edges to be folded are lightly rubbed once or twice with a fine file to remove any residual metal from the sides that may prevent a proper seal. A low speed grinding wheel may be used for clean-up but there is less control of how much should be removed.

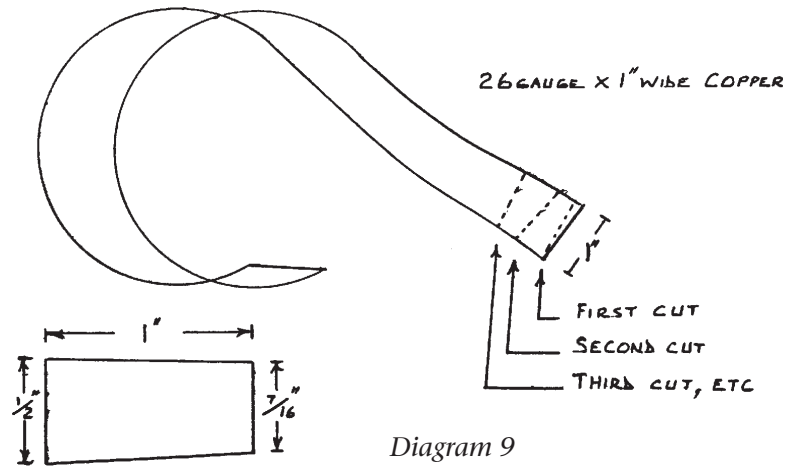


Diagram 9

CHANTER REED STAPLE ROLLER

Purpose: To convert copper blanks to cylinder form.

1. Another hand tool that will require special manufacture. There are some reed makers who use parallel jaw pliers with forms fixed to them. They then roll the copper around in a series of pinching motions over a nail former. The problem here is that the staples go "out of round" and no two are alike.

2. This tool shown (Diagram 10) operates by placing the copper blank into the aperture and standing the $\frac{1}{8}$ " former "nail" into the same slot. A simple closing action of the handles then forces the copper around the circumference of the former and results in the required cylinder. There is also the added advantage of having each staple to exactly the same dimensions.

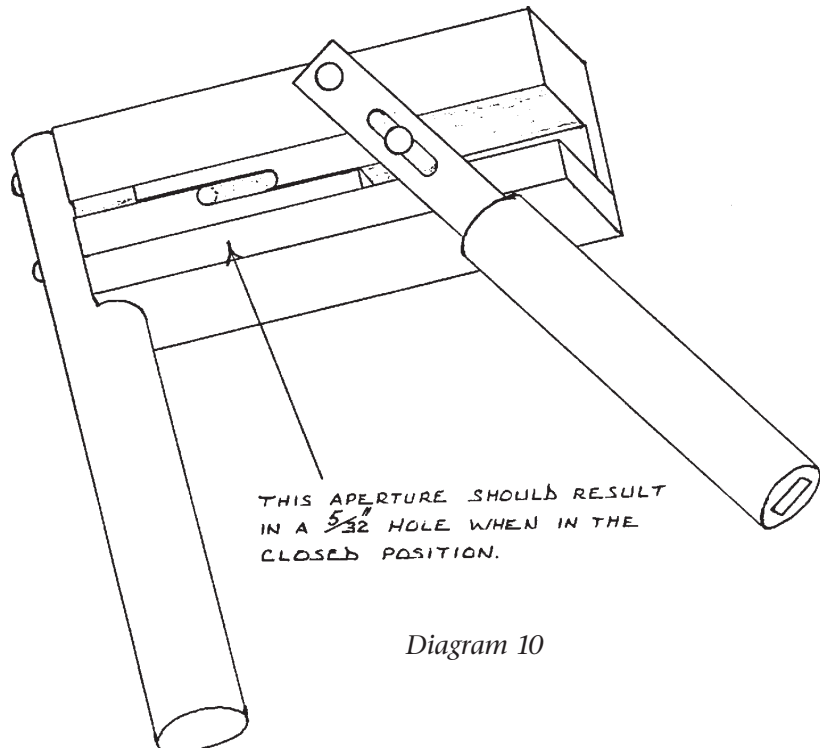
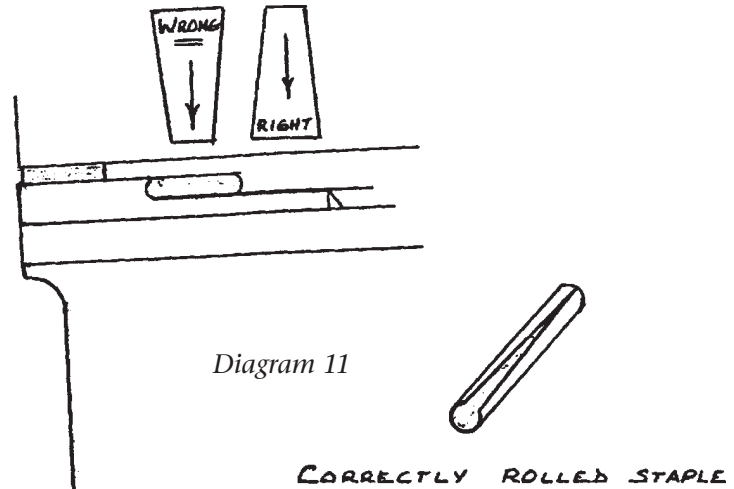


Diagram 10

3. A reminder!! Be sure that the meeting edges of the blank are prop-

erly cleaned prior to forming the copper cylinder.

- It is essential that the larger end (i.e., 1/2") of the staple blank be placed in the bottom of the former aperture. See *Diagram 11*.



CHANTER REED STAPLE FORMER

Purpose: To complete final forming of staple.

- The jig shown (*Diagram 12*) is merely an adaptation of a regular letter heading paper press. The small forms indicated were made by hand and fixed in position with an epoxy resin. It has been found that the best way to make these forms is to file them roughly to the dimensions required and use a pattern staple to fine file the forms to a snug fit.

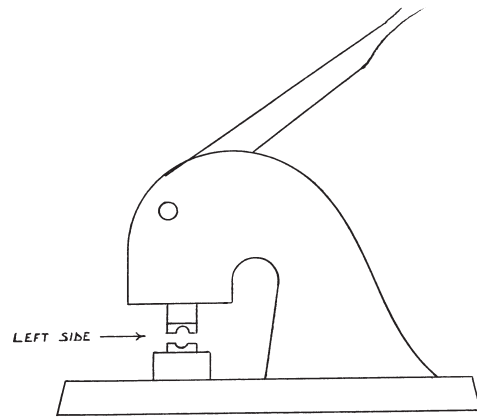
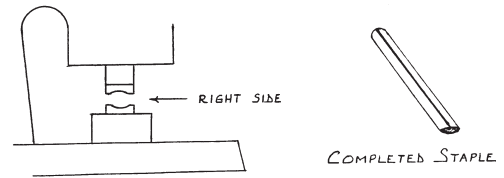


Diagram 12

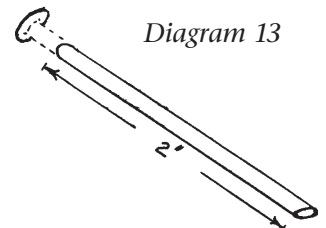
- Below is a sketch of a three inch 1/8" thick nail that has been converted into a form. The dimension of the flat end was arrived at in the same manner as those in paragraph 1 above.



Taking an existing staple as a pattern, file the shape until it is a snug fit internally.

Take care that it is not too large as the finished staple will have a break in the seal and therefore have an improper seal. The same applies to a former made too small except that the sides of the blank will overlap and not seal correctly.

- Whilst making your staple former as in paragraph 2 above, it is an idea to use the other end as the form for the rolling of the staple blank as described in the previous operation on the previous page.



CHANTER REED ASSEMBLY JIG

Purpose: To enable ease of wrapping the reed blades to the staple.

1. This jig (*Diagram 14*) is available from a number of large music stores and will be readily recognized as that used for making most wind instrument reeds.
2. The main advantage of this tool is that the internal gears continue to turn the shaft mandrel after the operator lets go and allows both hands free to complete the last few turns of wrapping the reed.
3. It is necessary that the cane be held to the staple in the required position by wrapping a short length of hemp or thread around the blades of the reed at the widest point. There should be just enough pressure on the blades to pinch the staple to allow wrapping on the assembly jig. Obviously, this temporary thread will be removed subsequent to the final wrapping.
4. The wrapping should be started with a double strand about an $\frac{1}{8}$ " from the open end of the staple and progressively cover the cane with tight and close turn until the required distance is reached. It is this process that permits the soaked cane to form around the staple as you progress and, when dry, retains this shape. Having reached the last turn of the wrapping, the double thread is then brought down to the open end of the staple in a series of long turns to give the appearance of a large screw thread. The ends are then tied off at the same spot that the wrapping was started.
5. The wrapped reed should be allowed to dry at room temperature. The best way to achieve this is to have a block of wood with a number of panel nails embedded and place the staple end of the reed over the nail as they are completed.
6. When the reeds are dry, thoroughly wet the entire wrapped area of the reed with a heavy lacquer. It is best to use the old fashioned cabinet makers type but this is not always available. **Do not use** the spray can type as this has a tendency to over-spray and thereby have an affect on the performance of the reed.
After the lacquer application, replace the reed back on the nail to dry as in paragraph 5 above. Finally wrap a few turns of white or yellow hemp to the end of the staple to ensure an air tight fit into the chanter.

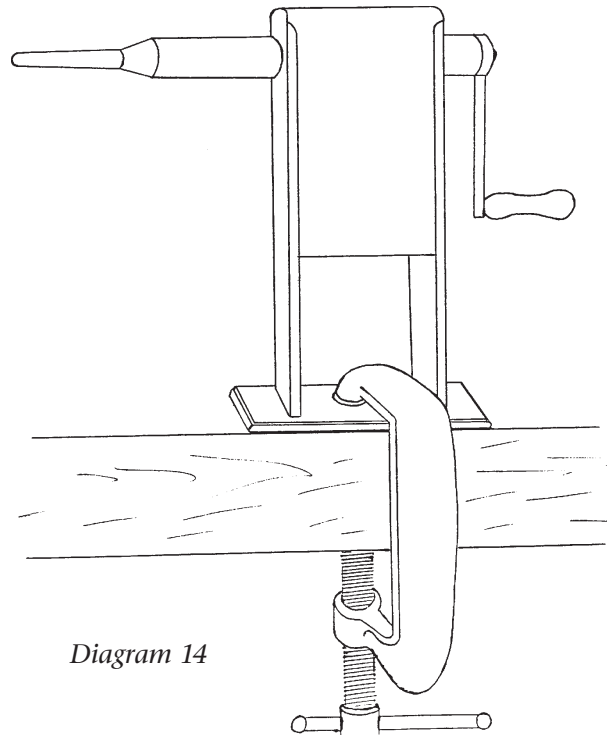


Diagram 14

GOOD LUCK!

WHAT YOU WILL NEED FOR DRONE REEDS

1. **Cane:** 9mm for tenor reeds
11mm for bass reeds.
2. **Hobby Tools:** Small fine blade saw.
Small bladed pencil type knife.
Extra blades for above
6" long X 1/8" round file (Swedish fine)
3. **Rule:** 6" or longer, preferably flexible steel.
4. **Fine felt tipped pen, preferably black.** Lead pencil work but usually the marks get rubbed off in the course of handling.
5. **Carpet Thread.** Yellow or white hemp can be used as a substitute but it looks clumsy.
6. **Cobblers black/brown resin.** Some heavy lacquers can be used as a substitute.
7. **Sealing Wax.** Commercial Brands are best but the wax available in stores will work. The latter type is inclined to become brittle and reeds completed with this will require watching for wax loss.
8. **Pencil Sharpener.** The old school type is best. Do not use the crank type (or electric) as this strains the fibre of the cane.
9. **Clean Hands!** This cannot be stressed too heavily. Dirt allowed to get into the tongue bed will detract from. the quality of sound.
10. **Lots of PATIENCE!**

MAKING THE DRONE REED

1. Unlike the chanter reed, the making of the drone reed is relatively simple and with few tools involved.
2. Taking the raw cane as it comes, the first step is to inspect and discard any split, diseased and/or distorted cane. The best cane is straight and light in color with a hard outer skin. If you are able to heavily indent the outer shell of the cane with your fingernail, then the cane is too soft and unlikely to make a good reed. Similarly, if the cane is bent, this should also be discarded as the tongue will be "sprung."
3. Most of the cane will come oversize in length and have a small "coronet" just beyond the knuckle line. The knuckle line is usually a shade or two darker than the remainder of the cane. This "coronet" should be removed to within about 1/16" above the knuckle line. Do this before cutting the reed to the required length.
4. Cut the reed to a specified length of 3 3/4" for tenor reeds and 4 1/2" for bass reeds.

Clean the inside of the cane with a 6" long x 1/8" round fine cut file. You will find a quantity of loose fluff and fibers inside that may serve to stop the reed from operating.

5. Using a hand held pencil sharpener, lightly remove some of the sharp edge left by the saw in operation 3.
6. The next step is to affix the bridle. This can be achieved in a number of ways but it has been found that to use 4 turns of heavily resined hemp in a series of loops is best. The hemp should be kept taut at all times. Measuring from the open end of the reed, place the bridle firmly in the prescribed manner at a point 1 1/4" for tenor reeds and 1 1/2" for bass reeds.
7. It should be noted that there is a small "pip" just below the knuckle line on the reed. Placing the reed in the groove on the prepared 30 degree block, gently pull the handle of the drone reed jig down to a position 1/4" below the "pip." Applying a steady pressure, the cutting blade should be permitted to enter the cane approximately 3/32".
Having cut to the proper depth, the handle should be gently released. This action, if done properly, should take the cane out of the groove and remain stuck on the cutting blade.
Grasping the reed by the open end and snapping the wrist downward smartly should cause the cane to split down each side as far as the bridle. If the bridle is good the splitting should finish at that point. Discard the reed if this is to the contrary.
Do not attempt to cut or make the tongue by any other means.
8. If all has gone well so far, it is time to nick a small notch at the same place but not as wide as the cut made in operation 7 above. The purpose of this nick is to permit the tongue to vibrate and not get caught up on the opposing face of the cut.
9. The cleaning of the inside of the reed is achieved by holding the reed by both ends between the thumb and little finger with the palm of the hand open. Placing the nail of your index finger under the edge of the tongue will bend the tongue open sufficiently to give access for the small knife.
10. Using the small file again, remove the debris from the inside of the reed.
11. A good tip at this point is not to take too much wood off! Try to blow the reed at various stages of cleaning to see if it works. If so, don't mess further than you have to!
12. With great care not to split, cut, or otherwise disturb the outer edges of the tongue bed, gently remove the pappy like inside of the tongue to create a knife edge. Do likewise to the main body of the reed tongue bed. The same applies to the inside front of the tongue where the original cut was made.
It will be impossible to clean all the way back to the bridle and you should not attempt to do so. The least strain applied to the tongue during the cleaning process the better.

13. Your reed should now sound! If not, then (a) the knuckle end leaks, (b) the reed tongue or bed has been damaged, or (c) you didn't do a good job of cleaning. Check all three.
14. Assuming that we now have a good sounding reed the time has come to finish off.
15. During the course of making the reed, the knuckle end may have gotten a little grubby. Before proceeding further, use the pencil sharpener to clean the closed end of the reed just enough to make it attractive.
Melting a small piece of sealing wax into a heated foil dish, dip the end of the reed into the molten wax and immediately turn the reed up on end for the wax to harden as a round cap. The wax should not be allowed to flow beyond the edges cleaned by the pencil sharpener.
This method does a much more efficient and attractive job than trying to apply with a dripping wax stick.
16. After the wax is hardened, use a small piece of fine sandpaper to roughen the last ½" of cane on the outside of the open end. This is in preparation for wrapping the hemp around the bottom of the reed to ensure a proper seal in the bowl of the drone seat.
17. It is always a good idea to use the cobblers wax on the first few inches of the hemp to allow a good start to the wrapping.
18. There are a variety of ways to apply the hemp and more success will be met by applying a light coating of resin along the entire length of the hemp. The main benefits of this practice is that it will lessen the chances of the hemp becoming loose and will prevent the reed from falling into the bag. Starting with a short length laid along the reed, make the first turn about ½" from the open end and cover the short laid length progressively until you come within an ⅛" from the end. Securely tie off the end by double looping the hemp. The resin previously applied will prove sufficient to hold this and obviate unsightly knots.
19. The foregoing has given an insight in the making of a single reed. Obviously, it would be better to make a number of reeds at each stage to speed things up.
20. The following sketches and notes will give a better understanding of the subject but there is no substitute for experience.

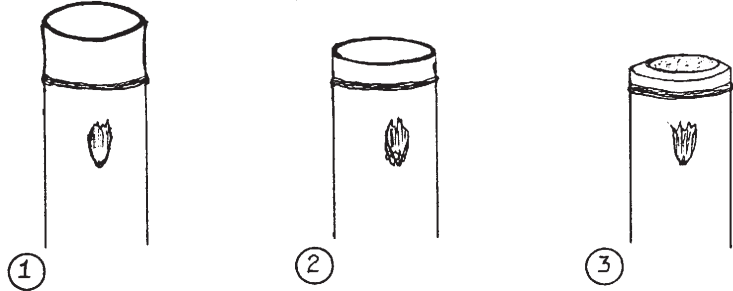
DRONE REED EXPLANATORY NOTES

Diagram 15 Index.

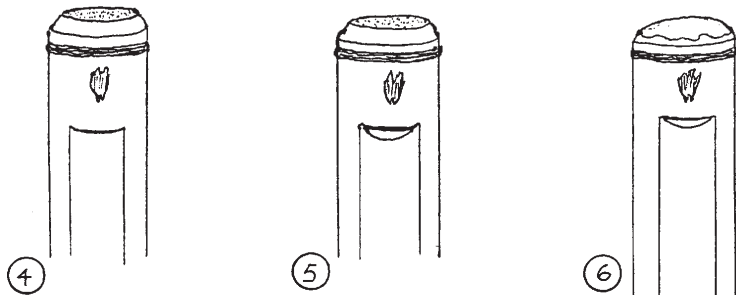
1. The raw cane selected should be straight and inspected for disease, splits, and other flaws.
2. The cane will have a "coronet" near the knuckle end and this should be removed

to within $\frac{1}{16}$ " of the dark brown line.

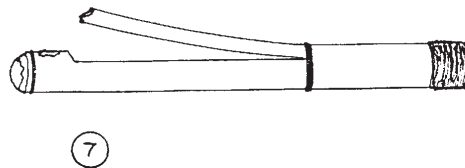
- Using a hand held pencil sharpener, remove the sharp edge above the knuckle end only enough to produce a slight chamfer.



- The bridle should now be placed on and the tongue split starting at a point $\frac{1}{4}$ " below the cane "pip." The depth of the cut will vary dependent on the diameter of the cane used but generally this is about $\frac{3}{32}$ ". A good tip is to look directly down on the cut made so far and ascertain if 25% of cane is showing on each side of the cut. If so, this is far enough.



- Using a sharp knife or chisel, make a small nick at 45 degrees angle toward the cut. This nick should be about $\frac{1}{16}$ " wide and about half the depth of the cut.



The nick should not be allowed to intrude beyond the edges of the tongue.

- Clean out the internal areas of the tongue as previously described. Take extreme care that the edges of the tongue and the tongue bed are not disturbed Or broken in any way. If the cleaning has been properly carried out, the line of the tongue should be barely visible when held closed. Any break in the line indicates damage and possible leaking of the reed.
- The final steps to the completion of the reed is application of the wax to the closed end and the wrapping of hemp on the open end. These are fully described elsewhere.
- As is the case with all reeds, they require special and delicate handling. When the reeds are completed and to be stored for a while, they should be placed in a box or jar and away from any drying elements.

DRONE REED JIG

Purpose: Cutting of drone reed tongue.

1. The drone reed jig as shown (*Diagram 17*) is fairly self explanatory. Any electrical drill stand from one of the larger hardware stores will suffice. The cutting blade support shaft will have to be "tailor made" to meet the requirements of your specific brand of drill stand.
2. The cutting blade in this apparatus is a single edged dispenser type razor blade as made by Schick, and others. With experience, you will find that such blades will only cut about 3 to 4 reeds before showing signs of cutting edge distortion. The life of your blades can be extended by resetting the blade in your tool to utilize both ends of the cutting edge as well as the middle section.
3. Below is a diagram (*18*) of a block of wood cut at 30 degrees angle to promote accurate cutting each time of the reed tongue. Any piece of hard wood will do.
A groove must be made along the length of the block to prevent the cane from slipping off the sides. Generally, finger pressure applied on the cane will hold it firmly enough to obviate slipping down the groove. Some reed makers have a block for each bass and tenor reeds. This is optional as the 30 degrees remains the same.
4. It will take a good deal of practice to make the proper depth of cut but this will come in time.

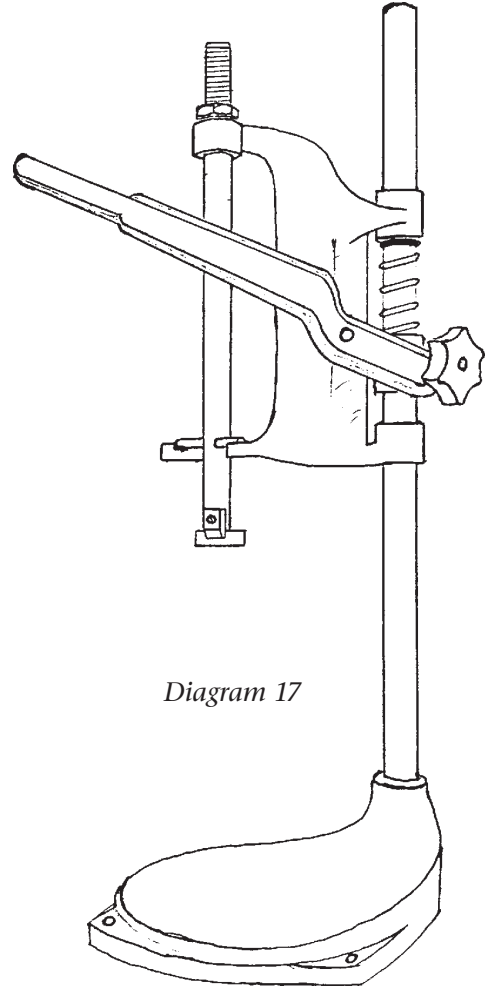


Diagram 17

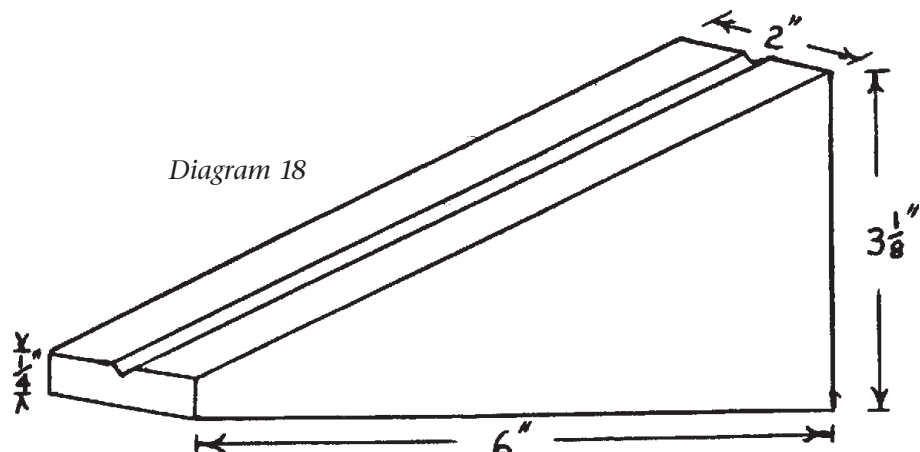


Diagram 18

Appendix A

Andrew Lenz's Comments on the Diagrams and Text.

Some of the diagrams can be confusing, so here are some of my thoughts on these images and what they represent.

Diagram 4 (Page 6). The viewing angle is from the side, with "A" being the tip of the reed blade and "C" being toward the staple. The mouth of chanter reed has some thickness and end tied to the staple does taper down to nothing, so this orientation of the diagram is logical.

In *Diagram 10* (Page 9), everything is fixed, except for the handle on the right and the piece that slides back and forth in the center of the tool. When the handle is moved to the left (handles closer together) a cylindrical shaped hole is formed.

Diagram 11 (Page 10) shows that the copper piece is to be inserted with the slightly larger end away from you. As far as I can figure, this is important because the ends of the copper could slide past each other (rather than meeting precisely) if they were not flush against a surface. If the piece of copper was placed with the wide end out, the edges would be more likely to slip by each other.

As for *Diagram 12* (Page 10), this is a printer supply tool for companies to imprint paper with their logo and address. You have to remember that this paper was written in 1979 before the laserprinter was invented, and some printing products are in less demand—if they used at all anymore. Functionally, the item he refers to, when you pull down on the handle (to the upper right in the diagram) it forces the cylinder down to meet the base. The key thing to remember is that when the staple is completed it is round at one end and flattened at the other. The diagrams make more sense when you keep this in mind.

One thing thing that I read elsewhere is the precise point at which the hemp holding the blades in place should stop is at the top of the staple, i.e., you don't want it to squeeze the blades where there is no support. Mr. Speirs was a little vague on this.

It will be educational for the budding reed maker to disassemble an existing reed and I highly recommend it. You can also reuse a existing staples provided you don't plan on go into the reed making business!

At the time of this writing, I have not done any reed making nor do I intend to do so any time in the near future. I am quite happy purchasing my reeds from reputable makers, although it is helpful to understand the process. In other words, please don't contact me with technical questions regarding reed making!

Appendix B

Some history of this document.

Letter as posted at:

<http://www.mines.uidaho.edu/ftp/pub/pipes/reeds/gordonsp.txt>

Stephen Pegler
[Obsolete mailing address removed.]
December 27, 1994
[Obsolete e-mail address removed.]

Dear Gordon:

Thanks for your input on other subjects. I have encoded all of the drawings from the Gordon Speirs reed making paper. They are all PCX for IBM, encoded uue. Once decoded they should yield pcx files again. I tried one and it worked.

I'm sending this to you via snail mail because I don't want to use up all of my AOL time uploading files to you. I am hoping that you can upload these on your ftp site, which incidently I was able to get into with no problem.

The text itself is on the disk, zipped and unzipped. I have also included a copy of a zipped file which contains all of the pictures. I unzipped it, and it all seems to be in order. To use it, unzip it, and then decode it. And then print the pictures separately, or place them at the proper places in the document. I have indicated this in the paper itself. One file name problem I had was to zip speirs1.uue. I changed the name to speirs1a.uue, but it is the same file.

Let those on the Bagpipe list know when you get it up. Thanks loads.

Stephen Pegler

Note: As of August 2002, Stephen Pegler's e-mail address is: SPegler919@aol.com. Also, the addressee was not Gordon Speirs, but an individual with the same first name.

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September 10, 2002, revised October 15, 2009