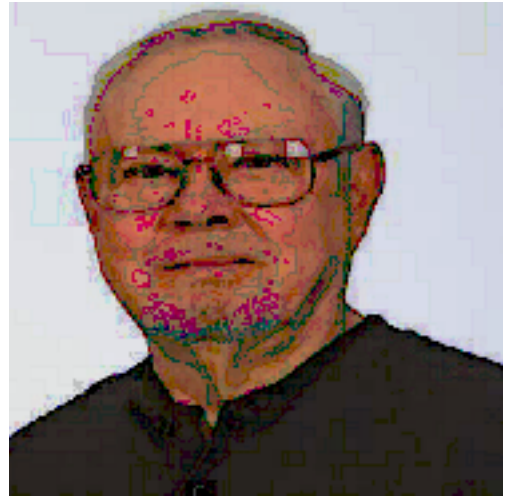

FINISHING INSTRUCTIONS

CUSTOM FLY TYING BOBBIN

Prepared by

Steven L. Jensen

INTRODUCTION

IMPORTANT: Please read this entire manual prior to beginning construction of your custom fly tying bobbin.

In April, 1982, I was afforded the opportunity to visit the home of Wayne E. Moore in Mountain Home, Arkansas. Mr. Moore had a well deserved reputation of being an outstanding fly tier and fly fisherman, and I was anxious to meet him. Upon entering his home, I was immediately impressed by a variety of wood carvings and subsequently learned that he was also a master woodcarver. But what impressed me most, and was to ultimately have a profound influence on my personal interests, were his exquisitely crafted wood fly tying bobbins.

During the next two years, I was fortunate to spend many hours with Wayne, watching him work and learning his techniques. He helped me make my first bobbins and shared in my excitement when I ultimately had the tools necessary for me to work on my own.

Wayne Moore passed away unexpectedly on April 17, 1984, at the age of 70. During the thirty plus years that Wayne built his bobbins, his designs evolved through a series of modifications. Likewise, my own designs, which were initially based upon his, have changed over the years and my bobbins are now considerably different than the last ones he was to make. But, although the design has been changed, the techniques that he taught me haven't, and I hope that I will always carry with me his respect for fine woods and his insistance for detail and accuracy. I owe him considerable gratitude for the techniques he developed and for providing me with the basic concepts.

DESIGN PHILOSOPHY

Prior to beginning work on the bobbin, an understanding of the design rationale will prove helpful. Developing an appreciation of what is desired in the finished product will help guide you through the various construction steps.

The design goals, in order of perceived significance, are:

1. To provide an infinintly precise thread tension control devise. This has been accomplished through the design of a custom machined brass spool assembly. The brass spool rotates on a collared stud. The collar on the stud is precisely perpendicular to the shaft so that there is no binding as the spool turns. Two teflon washers assure that the spool turns smoothly, and the special siliconized rubber washer and knurled nut provide precise tension control.

2. To provide a structural shape that is light yet comfortable to hold by conforming to the shape of the hand. The offset position of the spool dictates an asymmetrical shape which is accomplished through a series of gradual curvatures. The overall length is convenient to hold without the addition of excessive weight.

3. To provide a minimum angle of entry of the thread from the spool into the bobbin tube. Although the bobbin tube is made from high quality stainless steel tubing, it must be recognized that nylon is abrasive and the continued passage of thread over the same spot on the lip of the tube will ultimately wear a groove in the tube. By precision drilling of the tube hole, and the offsetting of the spool, the angle of thread entry is reduced to a minimum.

4. To provide not only a highly functional tool but one that is atheistically pleasing as well. The combination of brass and stainless steel components coupled with fine hardwoods results in an attractive yet durable tool. The beauty and durability may be further enhanced by a fine finish.

TERMINOLOGY

The following terms are used to describe specific areas of the blank or components used in association with the blank. The terms are referred to throughout the instructions and familiarization of the terms is necessary during shaping, sanding, finishing, and assembly processes.

apex the apical portion of the blank (see Fig. 1).

back the back profile of the blank (opposite the face) through which the stud hole is drilled (see Fig. 1).

blank the entire wood portion of the fly tying bobbin.

butt the rounded end of the blank (as viewed from the face or back) having a slightly greater diameter than the spool (see Fig. 1).

face the face profile of the blank (opposite the back) (see Fig. 1).

knurled nut a portion of the spool assembly consisting of a round knurled nut threaded 10-32; used to provide spool tension control (see Fig. 2).

spool a custom or commercially-available spool which holds the tying thread (see Fig. 2).

spool assembly the entire functional assembly consisting of the stud, spool, knurled nut, and various washers (see Fig. 2).

spool base the flattened portion of the spool cutout area of the blank where the spool will be located (see Fig. 1).

spool cutout area that portion of the face that includes the flattened spool base and the concave curvature; the tube hole is drilled through the apex into the spool cutout area (see Fig. 1).

stud a portion of the spool assembly. The stud consists of four components: (1) an unthreaded end which fits into the stud hole; (2) a raised thin collar which, when installed, is flush against the spool base of the blank; (3) an unthreaded portion where the spool rotates; and (4) a 10-32 threaded end which accepts the knurled nut (see Fig. 2).

stud hole the hole drilled through the back into the spool base area for the purpose of mounting the spool assembly. Initially this hole is threaded with a 10-24 tap (to hold the blank during cutting and disk sanding operations), but is later slightly reamed to accept the stud (see Fig. 1).

tube the stainless steel hypodermic tubing through which the thread passes.

tube hole a hole drilled through the apex of the blank into the spool cutout area; accepts the tube (see Fig. 1).

washer set a portion of the spool assembly consisting of one siliconized rubber and two teflon washers. The washers are used in the tension control of the spool (see Fig. 2).

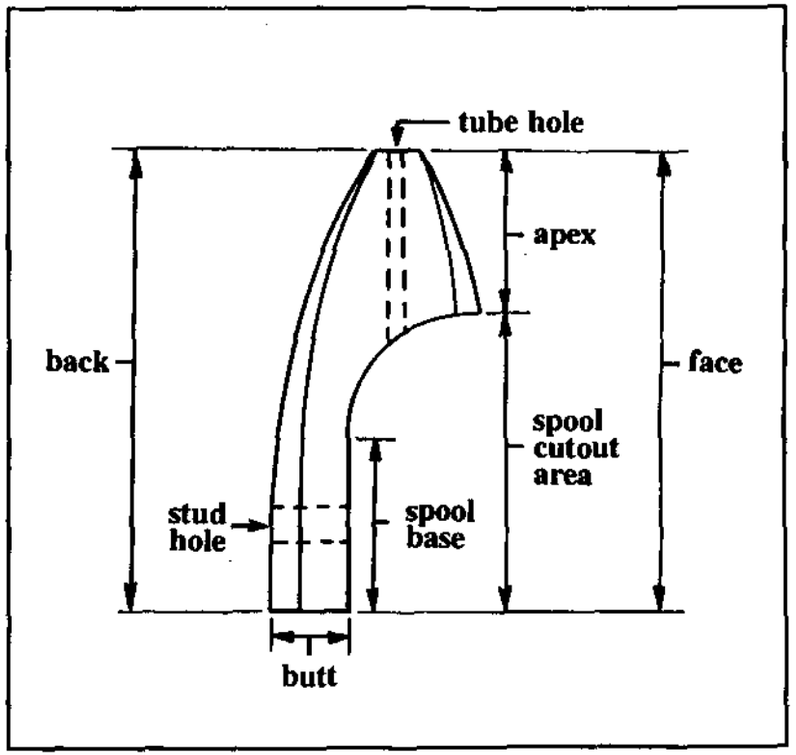

Figure 1. Diagram of the blank (right side) showing regions discussed in the instructions.

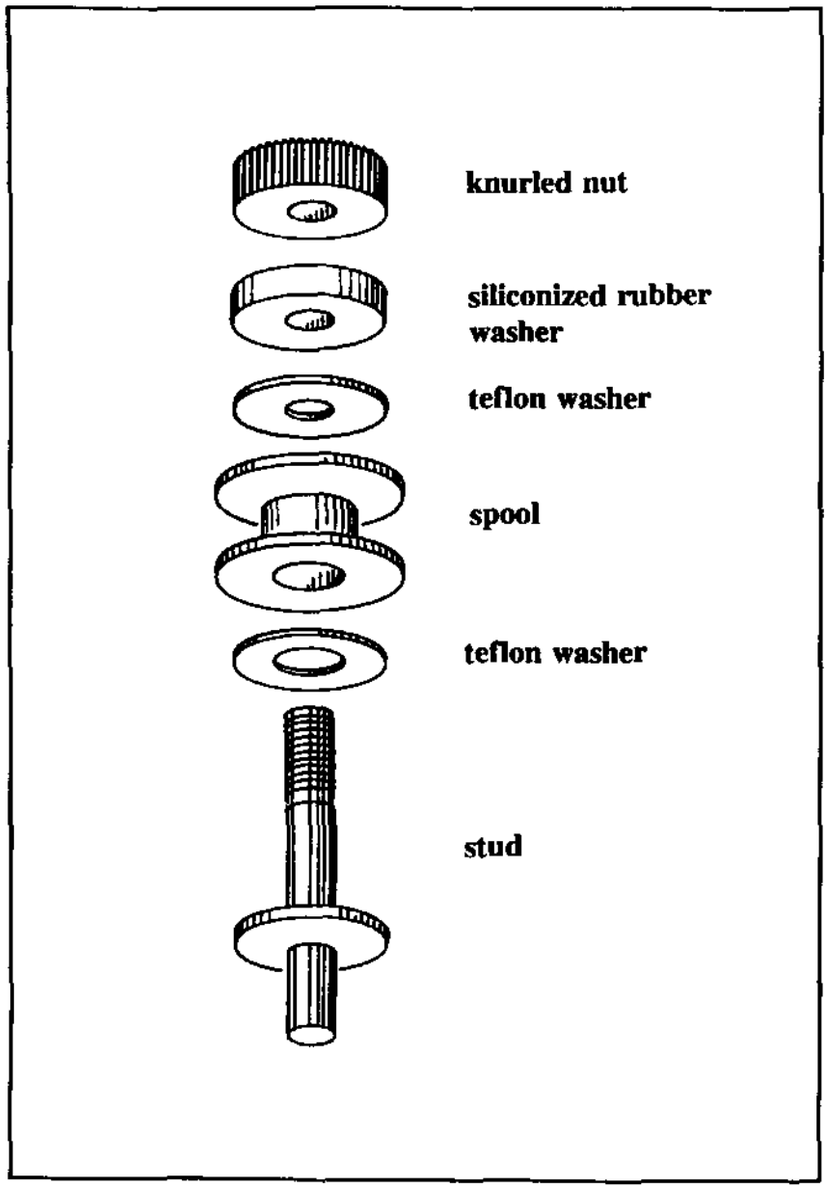

Figure 2. Components of the spool assembly.

TOOLS AND SUPPLIES

The following list of tools and supplies are needed for various construction and finishing steps. Some may be considered optional; that is, it is possible to complete the bobbin without them depending upon the desired results.

wood rasp or half-round mill bastard file (optional)
half-round smooth or second cut file (8 inch)
120 grit garnet or aluminum oxide sandpaper
150 grit garnet or aluminum oxide sandpaper
180 grit garnet or aluminum oxide sandpaper
220 grit garnet or aluminum oxide sandpaper
320 grit garnet or aluminum oxide sandpaper
400 grit silicon carbide sandpaper
600 grit silicon carbide sandpaper
39 drill bit + tap wrench or pin vise (to hold the bit)
22 drill bit + tap wrench or pin vise (to hold the bit)
small cone-shaped rotary stone + pin vise (to hold the stone)
filler/sealer (optional, depending upon finish used)
finish
steel wool (grade 0000)
1/8 inch wooden dowel
small board (for drying stand)
lint-free wipers or cloth
rottenstone or fine pumice (optional, depending upon finish)
parafin oil (optional, depending upon finish)
felt pads (optional, depending upon finish)
high quality paste wax
epoxy (24 hour)

BOBBIN CONSTRUCTION: AN OVERVIEW

As you receive it, the blank has already received considerable attention: it has been precision drilled to accept the tube and spool assembly; it has been bandsaw cut to the proper profile; and has been disc-sanded to an eight-sided configuration. From this point to the finished product, the

blank goes through three distinct stages: shaping, sanding, and finishing.

SHAPING This phase of the construction is intended to refine the shape and to remove the marks left by the bandsaw and disc sander. Whereas most of the other phases of construction are essentially mechanical, this phase requires particular attention. ***Work slowly and carefully. Remember, you can always remove additional wood but, once removed, it can't be replaced.***

SANDING Using progressively finer grits of sandpaper, the blank is sanded in preparation for the final finish. Some of the sanding steps are dependent upon early determination of the type of finish that will be used. Be certain that you carefully read the section on finishing before the blank is sanded.

FINISHING The distinction between good and great is the final finish and the final finish is directly dependent upon the shaping and sanding. It will be necessary for you to decide early what type of finish you plan to use so that the appropriate schedule can be followed.

SHAPING THE BLANK

A person experienced in shaping wood may wish to use a wood rasp, heavy mill bastard file, or even a rotary tool (such as Dremel) for some of the steps listed below. If you have little or no previous experience, I suggest you that you use a smooth or second cut half- round file. Wood removal is much slower but there is less chance of error.

STEP 1 Using a smooth or second cut half-round file, file the spool cutout area until all bandsaw marks are removed. Once the spool cutout area is smooth (only file marks remain), place the unthreaded end of the stud into the stud hole. The stud hole has been threaded to hold the blank during cutting and sanding operations, and it may be necessary to remove a portion of the threads. If the stud doesn't fit into the stud hole, carefully ream the hole with a #22 drill bit held in a pin vise or tap wrench. DON'T use a power drill to ream the hole; the drill bit should be hand turned. With the stud in position, make certain that the collar of the stud is flush with the spool base of the blank. It it isn't, remove the stud and file the high spots on the spool base. Repeat as many times as necessary until the flange is flush with the spool base. (Note: This step is for aesthetic purposes only; if the flange isn't flush, the performance of the bobbin isn't adversely affected).

STEP 2 Temporarily mount the stud and spool on the spool base. Using a soft pencil, trace around the spool. The butt of the blank should be slightly greater in diameter than the spool and this difference must be maintained.

Remove the stud and spool from the blank. Using the smooth or second cut half-round file, carefully file away the disc sander marks from the butt of the blank. As viewed from the face of the blank, the butt should be rounded so that it is parallel to but slightly greater in diameter than the pencil line traced around the spool. Removal of too much wood will result in the rim of the spool extending over the edge of the blank.

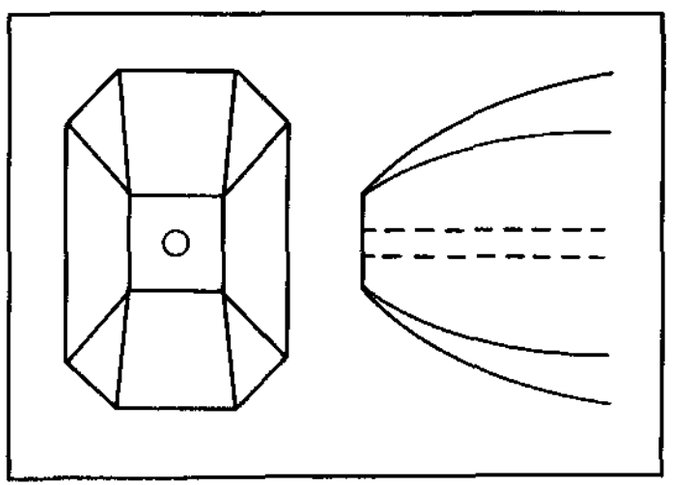

Figure 3. Apex of blank as received in the kit (before shaping).

STEP 3 The apex of the blank as you received it will be similar in appearance to that shown in Figure 3. Carefully remove wood from the face, back, and two sides of the blank until all four surfaces are gradually and uniformily tapered to within 1/16th inch of the tube hole as shown in Figure 4. There are three critical areas:

(1) Don't remove too much wood from around the tube hole. There should be a rim of wood which will be bluntly rounded later.

(2) Make the taper to the tube hole gradual so that there is an even curvature from the face, back, and sides.

(3) As much as possible, keep the curvature of the sides, and the curvature of the face and back similar so that the apex of the blank is symmetrical in appearance.

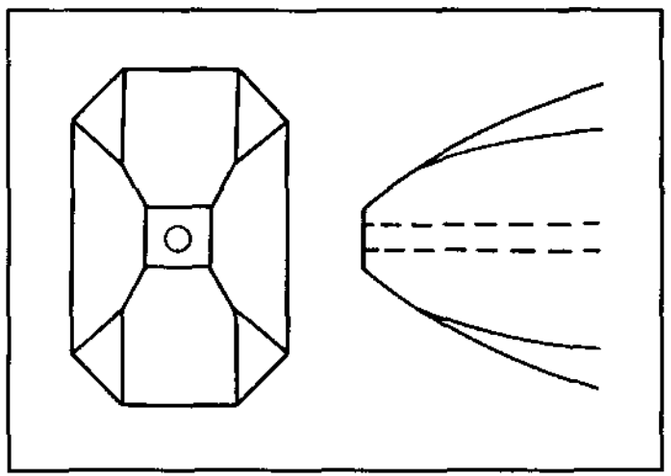

Figure 4. Apex of blank after completing step 3.

STEP 4 The surfaces between the face and sides, and the back and sides were made with a disc sander. Beginning with the apex of the blank, carefully remove wood with the file until the blank is eight- sided around the tube hole as in Figure 5. Again, don't remove too much wood; retain the rim of wood around the tube hole.

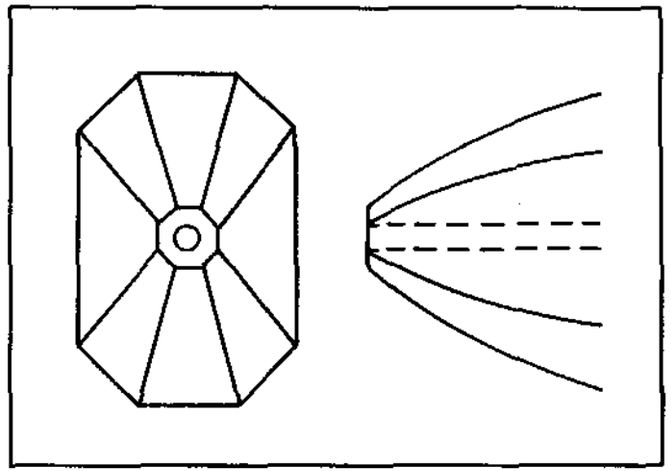

Figure 5. Apex of blank after completing step 4.

STEP 5 Working with the apical half of the blank, carefully file away the edges between the eight surfaces until there is a smooth transition between one surface into the next. At times inspect the blank from a number of angles to make certain that the curvature from the left side to the face and back is about the same as the curvature from the right side to the face and back. When you have completed this step, the apical half of the blank should be oval in cross section and essentially symmetrical from left to right. Figure 6 shows representative pre-shaping and post-shaping section profiles from several points along the blank. These are only suggested profiles; you should contour the blank as you desire.

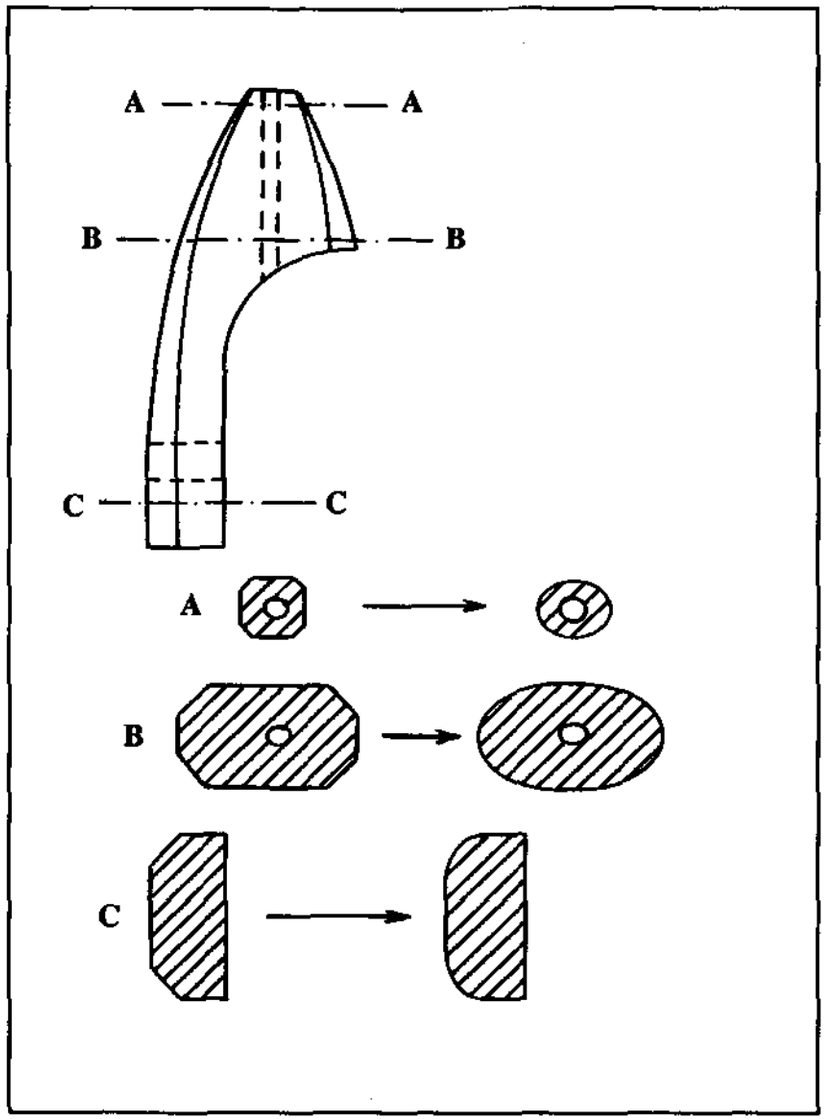

Figure 6. Schematic of blank showing pre-shaping and post-shaping profiles at selected points.

STEP 6 The basal half of the blank may be contoured in several ways depending upon your personal preference:

(1) The left and right sides as well as the butt of the blank are left acute and only the surfaces between the sides and the back are contoured so that they blend smoothly into the back. Be especially careful not to remove too much wood from the back of the blank near the stud hole or the stud may extend above the back surface.

(2) The left and right sides as well as the butt of the blank may be rounded so that they curve smoothly into the back surface. As above, the edge between the sides and the spool cutout area should remain acute. Again, be careful not to remove too much wood from the back near the stud hole, or the stud will extend above the surface of the back.

STEP 7 At this point the blank should be shaped in its final form. Examine the blank from several angles under bright light to determine that all deep scratches from the band saw or disc sander have been removed. The file will leave marks but these are rather easily sanded out in the next section of the instructions.

SANDING

The distinction between nice and exceptional with regards to any woodworking project is realized in the way that it is finished. Exceptional work requires considerable time and effort. Your attention in this section will be reflected in the final product.

STEP 1 Sand the entire blank using 120 grit aluminum oxide or garnet sandpaper. Always sand in the direction of the grain of the wood. Continue sanding until all of the file marks made during the contouring of the blank are removed. In addition:

(1) Re-insert the stud into the stud hole and make certain

that the collar is still flush with the spool base. If it is no longer flush, sand the spool base in the high spots until it is flush.

(2) Bluntly round the tip of the apex around the tube hole.

STEP 2 Sand the entire blank using 150 grit aluminum oxide or garnet sandpaper as in step 1.

STEP 3 Using a small, cone-shaped rotary stone (such as those sold in conjunction with Dremel of Foredom tools), dress the inside of the stud hole on the back of the blank to remove any rough edges or irregularities produced by drilling the stud hole. The stud hole in the spool cutout area need not be dressed.

STEP 4 Sand the entire blank using 180 grit aluminum oxide or garnet sandpaper. Any sharp edges on the blank such as around the spool cutout area should be slightly rounded at this time.

STEP 5 (Optional, depending upon the finish to be applied). If you plan to finish your bobbin using a surface finish (see the section below on finishes), you should complete one or more the following as appropriate:

(1) If the blank has a crack or one or more fissures (which are common in burled woods), these should be filled with epoxy and allowed to dry. Once dry, the repaired area may be sanded using 180 grit aluminum oxide or garnet sandpaper until it is flush with the surface of the blank.

(2) If the blank is of a porous wood (such as walnut, oak, padauk, zebrawood, and others), the pores should be filled using a commercial wood filler (Behlen's Pore-O-Pac is recommended).

Follow the manufacturer's instructions on applying the filler. After it has completely dried, sand the entire blank using 180 grit aluminum oxide or garnet sandpaper.

(3) A relatively heavy coat of sealer should be applied to the entire blank. NOTE: the sealer coat should be applied after the epoxy has dried and been sanded (step 5a) and/or after the filler coat has dried and been sanded (step 5b).

STEP 6 Sand the entire blank using 220 grit aluminum oxide or garnet sandpaper. You should also:

(1) Reinsert the stud to make certain that the collar is still flush with the spool base.

(2) Inspect the blank carefully from all angles in strong light to make certain that there are no scratches or rough areas.

STEP 7 Sand the entire blank using 320 grit aluminum oxide or garnet sandpaper. At this point the blank should be very smooth and free of scratches.

FINISHING

The finish used is primarily a personal preference and the information contained herein is intended to provide a few hints and suggestions.

Before progressing further, you must select the category of finish to be used and it is advisable that you select a specific brand in advance so that you can follow the manufacturer's recomendations. Essentially all finishes can be placed in one of two general categories: penetrating finishes and surface finishes. Both have their advocates and both offer advantages and disadvantages.

PENETRATING FINISHES

As the name implies, these finishes penetrate the wood where they seal and protect it. Included in this category is tung oil, Danish oil, boiled linseed oil, and others.

Advantages:

1. Ease in application (they are essentially foolproof)
2. Durable
3. Provides a natural feel to the wood

Disadvantage: On small items such as the bobbin, this finish tends to look dull and lacks the luster of a surface finish. They yield a much less spectacular finish.

SURFACE FINISHES

As the name also implies, these finishes are applied to the surface of the wood so that there is a film of finish over the entire surface. Included in this category is lacquer, varnish, various polyeurythanes, polymerized tung oil, various tung oil or linseed oil + varnish combinations (commonly sold as gun stock finishes), epoxies, and waxes.

Advantage: When properly applied, these finishes provide a glass smooth surface that maximizes the beauty of the wood. They can yield a spectacular finish.

Disadvantages:

1. They are relatively difficult to apply in comparison to surface finishes
2. Porous woods require extensive filling of pores
3. They usually require a dust-fee environment during drying

My personal preference, in spite of all the drawbacks, is a surface finish which can be hand rubbed (I use Birchwood-Casey TruOil gun stock finish). The high gloss of this type of finish can be reduced using rubbing compound or a similar substance.

MAKING A DRYING STAND

Regardless of the type of finish that you use, it is necessary to support the blank while the finish dries. Since the entire surface of the blank is covered with finish, the best way to hold the blank while the finish is applied, and to support the blank while the finish dries, is with a tapered wooden dowel inserted into the tube hole.

Obtain a 1/8th inch wooden dowel and cut a length about 1 1/2 inches long. Taper one end of the cut length so that the dowel can be inserted at least 1/2 inch into the tube hole at the apex of the blank. It is usually possible to twist the blank onto the dowel so that it is firmly seated.

The drying stand consists of a small board in which a hole has been drilled to accept the butt of wooden dowel. Once the finish has been applied to the blank, the dowel is placed in the hole in the board and the blank is supported while it dries. For slow drying surface finishes, it is suggested that the drying stand be covered, providing a lint/dust-free area.

APPLYING PENETRATING FINISHES

STEP 1 Apply an ample amount of finish to the blank and sand the entire blank using 400 grit silicon carbide (wet/dry) sandpaper. Keep the blank saturated with finish throughout the sanding process. Upon completion of the sanding, wipe off all excess finish, insert the tapered end of the round wooden dowel into the tube hole, and place the blank on the drying stand. Allow the blank to dry overnight in a relatively dust-free area.

STEP 2 Repeat step 1 except using 600 grit silicon carbide (wet/dry) sandpaper. Keep the blank saturated with finish for 10-15 minutes before wiping off the excess.

STEP 3 Polish the blank using 0000 steel wool until it is glass smooth. **Caution:** porous woods may collect bits of steel wool in the pores which must be removed.

APPLYING SURFACE FINISHES

There are almost as many ways of applying surface finishes as there are kinds of finish. Generally each type of finish has a "best method" of application. While it is beyond the intended scope of these instructions to discuss different surface finishes and how they might best be applied, in general: varnishes, polyeurythanes, shellac, and others may be brush-applied; lacquers and epoxies are best applied by spraying; and the various oil + varnish mixtures may be applied by hand. You should select the type of finish and method of application that best suits your abilities and which will yield the results you desire. In almost all cases, multiple thin coats of finish, lightly sanded between coats, will yield a much better finish than one or two heavy coats.

STEP 1 Prior to applying a surface finish, it is often necessary to prepare the wood to accept the finish. Porous woods such as walnut, zebrawood, padauk, and many others cannot be finished to a glass-like smoothness unless the pores are filled. Other woods such as cherry, maple, etc., may not require any special treatment, depending upon the type of finish used. In general, there are several schools of thought concerning preparation of the wood and, as result, at least three different techniques:

(1) Use of Fillers. Commercial wood fillers may be used on porous woods to fill the pores and such fillers work well provided they are similar in color to the wood. It was suggested that a filler coat may have been applied to porous woods during SANDING, step 5.

Following the instructions of the manufacturer will yield the best results. If a commercial filler is used, a sealer should also be applied after the pores are filled. The sealer should be compatible to the finish that is to be used (for example: if lacquer is the desired finish, then a lacquer-based sealer should be used).

(2) Use of Sealers. Sealers generally penetrate the wood more deeply than will the finish alone, and provides a good surface for the application of the finish. If both a filler and a sealer are to be applied, the filler should be applied first. The sealer must be compatible with the type of finish to be used (see the finish manufacturer's recommendations). At least one manufacturer (Birchwood-Casey) produces a combination filler and sealer for use in finishing gun stocks.

(3) Use of Finish as a Sealer and Filler. Some woodworkers prefer to use the finish as a sealer and filler, thus avoiding any problems with compatibility. The first coat may be thinned to achieve maximum penetration. Subsequent coats should then be applied, lightly sanding between coats, until all pores are filled.

STEP 2 Sand the entire blank using 320 grit garnet or aluminum oxide sandpaper. Examine the blank under strong light at various angles. When the blank is properly prepared for a surface finish, it should be glass smooth and free of visible pores.

STEP 3 Apply the desired surface finish following the manufacturer's instructions.

NOTE: My personal preference of finish is Birchwood-Casey TruOil, a varnish + oil finish. This type of finish can be hand-applied. The steps which follow outline the techniques that I use.

(1) Once the surface of the blank is properly prepared (step 2 above), a 1/8 inch tapered dowel is inserted into the tube hole (see information on construction of the drying stand, above).

(2) A fairly heavy coat of finish is applied to the blank. As it begins to dry, the finish is evenly spread over the surface of the blank with a finger tip. The finish is then allowed to dry. Once dry, any remaining unfilled pores or blemishes will be very apparent in the shiny surface

finish. If pores and/or blemishes are apparent, one or more additional heavy coats of finish may be applied, lightly sanding between coats.

(3) Once all pores are filled, the entire blank is sanded with 400 and then 600 grit silicon carbide wet/dry sandpaper.

(4) A very small amount of finish is applied to the surface of a lint-free cloth or paper wiper and is then distributed over the entire surface of the blank. Using the same wiper, all excess finish is then removed. The blank is rubbed until it appears almost dry, leaving only a very thin film of finish.

(5) The blank is then placed on a drying stand (as described above) in a dust-free area and allowed to dry overnight.

(6) Once dry, the blank is very lightly sanded using 0000 grade steel wool using just enough pressure to dull the surface of the finish.

(7) Steps (4), (5), and (6) are repeated (often 10 or more times) until the desired level finish is achieved.

STEP 4 (Optional, depending upon personal preference) Once you have completed step 3, you may find that the finish is too shiny for your personal tastes. The surface shine may be reduced by carefully rubbing the blank with a felt pad, parafin oil, and pumice (or rottenstone). Work with care since the pumice (or rottenstone) is a abrasive which, if used too enthusiastically, will remove the entire finish.

ASSEMBLY

STEP 1 Regardless of the type of finish used, the blank should receive several coats of quality wax prior to final assembly. Select a high-quality furniture or floor wax and follow the manufacturer's instructions. It is much better to apply two or three thin coats than one heavy coat.

STEP 2 Carefully clean the excess finish and wax from the stud hole using a #22 drill bit mounted in a tap wrench.

STEP 3 Carefully clean the excess finish and wax from the tube hole using a #39 drill bit mounted in a tap wrench or pin vise.

STEP 4 Apply a small amount of 24-hour epoxy to near the end of the tube which will be closest to the bobbin spool. Insert the tube into the apex of the blank and twist the tube (thereby dispersing the epoxy) until the end of the tube extends about 1/16th of an inch into the spool cutout area. Carefully wipe away any excess epoxy.

STEP 5 Apply a small amount of 24-hour epoxy to the unthreaded end of the stud. Insert the stud into the stud hole, twisting the stud as it is inserted to disperse the epoxy. The stud should extend into the spool cutout area.

STEP 6 Allow the epoxy to cure over night with the tube and stud in their proper positions.

STEP 7 The spool can be filled with the desired size and color of tying thread by several methods. Perhaps the best is to mount the spool on a tapered shaft held in the jaws of a variable speed drill. In addition, some sewing machines may accept the spool and the thread loaded in that manner.

STEP 8 Figure 2 illustrates the proper sequence of assembly of the spool components on the stud: (1) teflon washer having the larger hole; (2) spool; (3) teflon washer having the smaller hole; (4) siliconized rubber washer; and (5) knurled nut. The thread tension is adjusted with the knurled nut.

CARE OF YOUR BOBBIN

Your finished bobbin is a very fine precision instrument. As with any such tools, it can withstand normal wear and tear but not careless abuse. Dropping your bobbin off your tying table onto a concrete floor is very hazardous to its health.

There are two parts of your bobbin which will require some upkeep and care: the finish and the brass components.

Regardless of the type of finish (surface or penetrating), the bobbin should be cleaned periodically using a soft cloth and mild detergent, followed with several thin coats of fine wax. The wax serves as the primary barrier against soiling of the wood and, like for a fine piece of furniture, it should be renewed periodically.

Brass tends to tarnish when exposed to air and oils from the hand. To some, a fine patina on the brass is aesthetically pleasing; others prefer the brass to be bright. For the latter group, the brass can be brightened using commercially-available brass cleaner or steel wool. Once the brass has been cleaned and polished, a thin coat of wax will retard the oxidation process that results in tarnish.

NOTES: