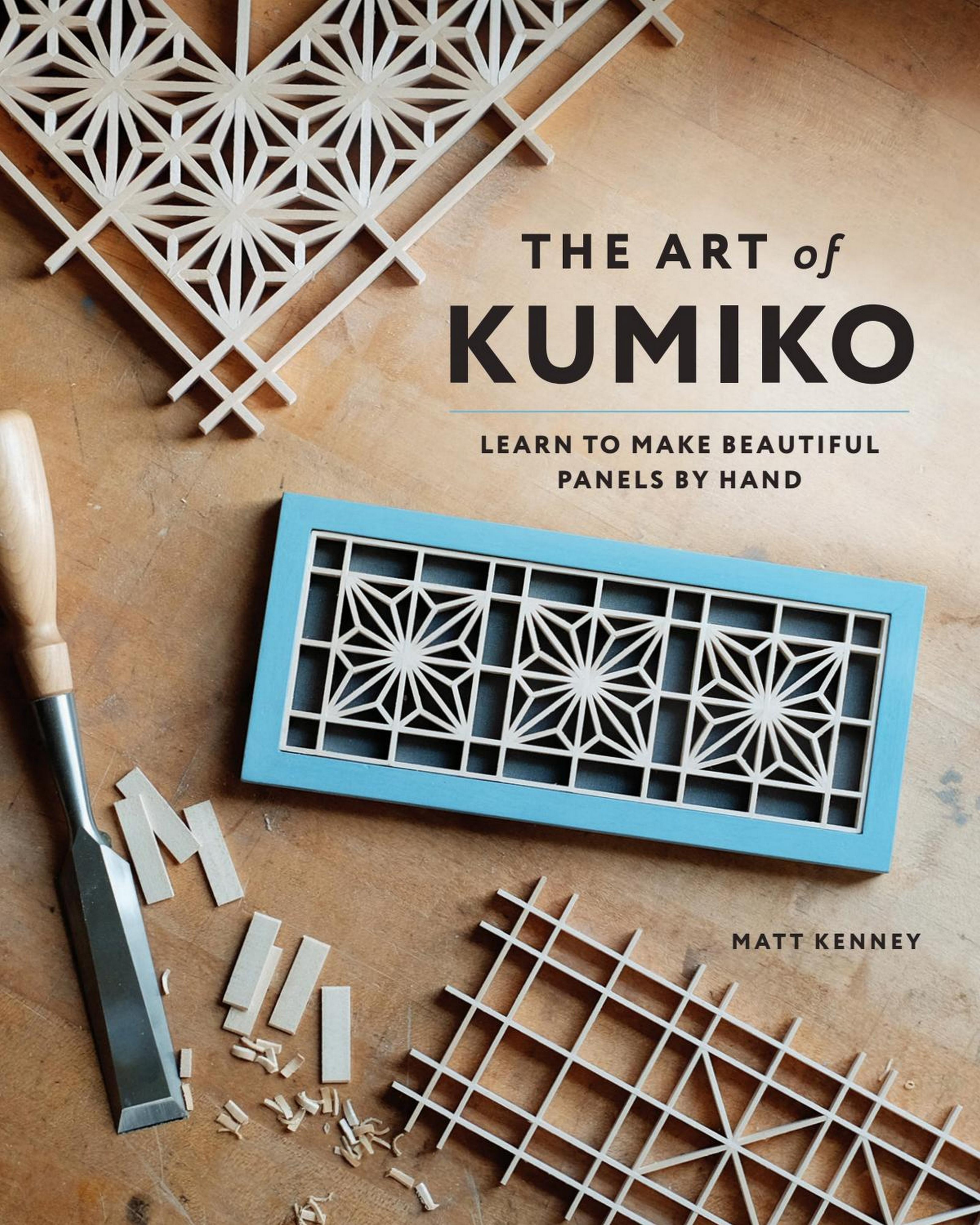


A wooden workbench with various Kumiko panels and tools. In the top left, a large, intricate Kumiko panel with a complex star-like pattern is partially visible. In the center, a rectangular Kumiko panel with a grid of star-like patterns is set within a light blue frame. In the bottom left, a chisel with a wooden handle and a metal head lies on the workbench, surrounded by small wooden shavings and strips of wood. In the bottom right, a smaller Kumiko panel with a grid pattern is visible.

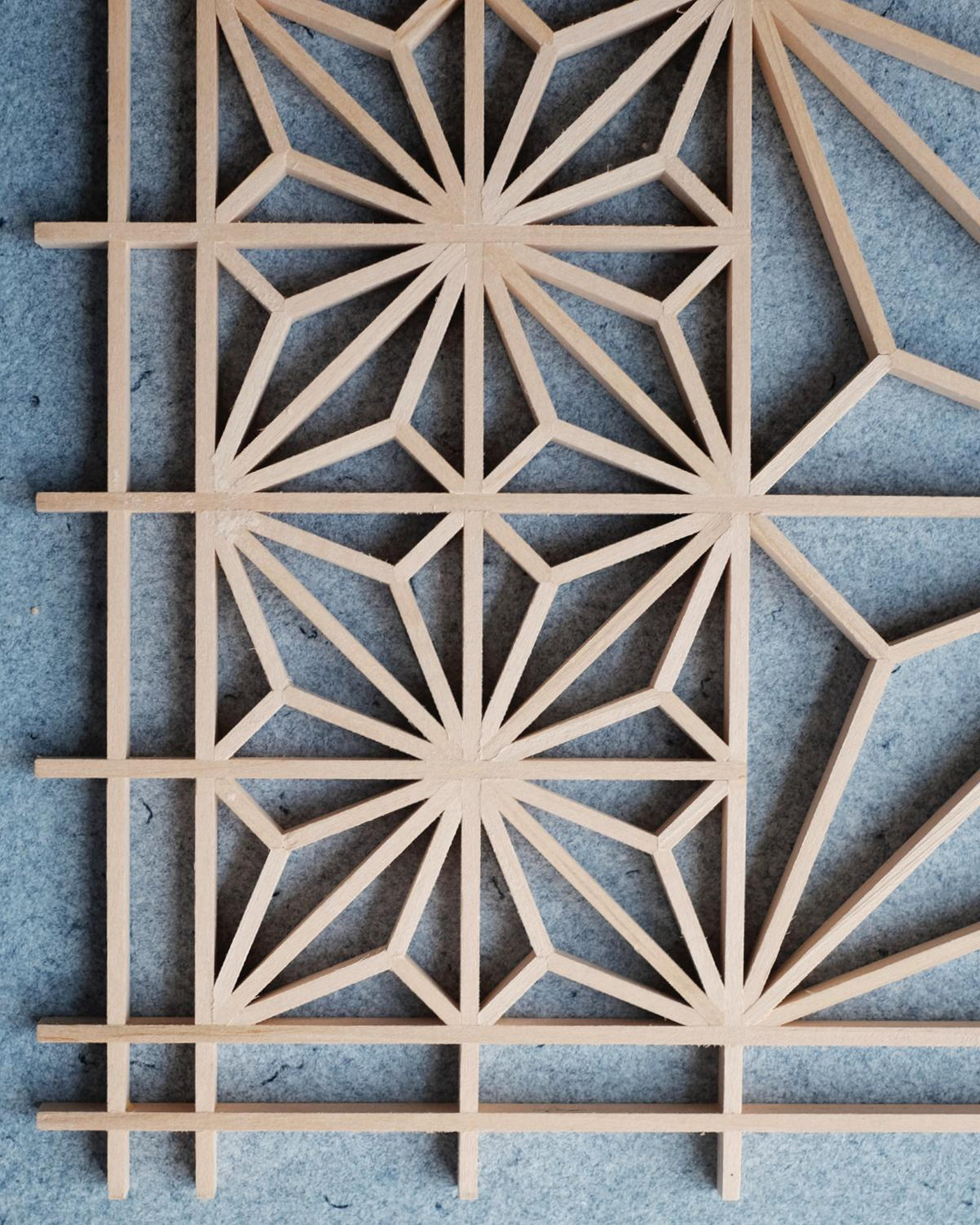
THE ART *of* KUMIKO

LEARN TO MAKE BEAUTIFUL
PANELS BY HAND

MATT KENNEY

THE ART *of*
KUMIKO

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I would not be where I am today were it not for my parents, Bill and Pat Kenney. From them I learned that through hard work, dedication, and a tenacious belief in yourself anything is possible. Their unending love and belief in me gave me the strength to put what I learned from them into practice, and to pursue my dreams. I hope that I have made you proud. I am eternally grateful for my children, Grace and Elijah. Without them I would not have the patience, empathy, and open heart needed to flourish as a creative person. I have learned so much being their father, and they have made me an infinitely better man than I was before them. I will always cherish my time in the shop with Joe Mazurek, who taught me how to make furniture, and never asked for anything in return. His kindness was the springboard that launched me into the world of serious furniture making. I am also grateful to Matthew Teague, for repeatedly asking me to write this book. I'm happy that I finally said yes. Lastly, I appreciate everyone out there who has shown their support for my work through the years. Your enthusiasm for the things I make in the shop inspires me, and I certainly would not be where I am today without your support. So, thanks!

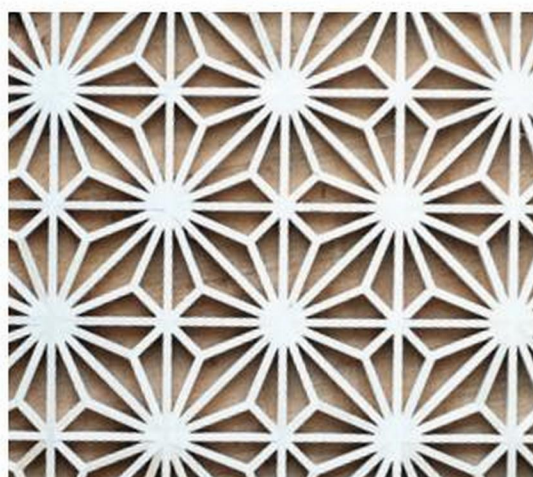
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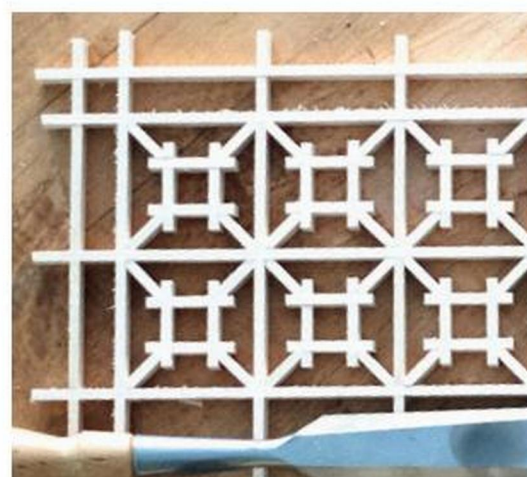
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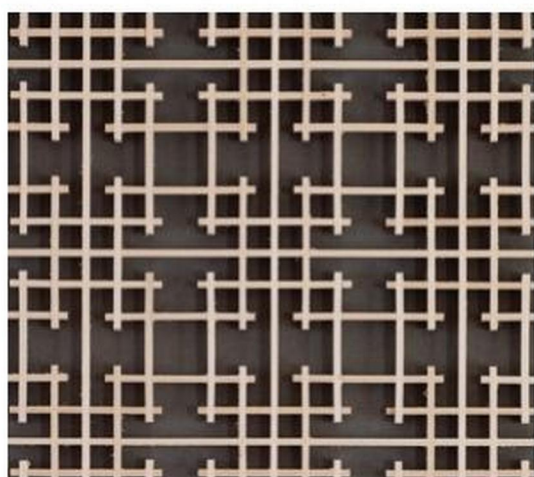
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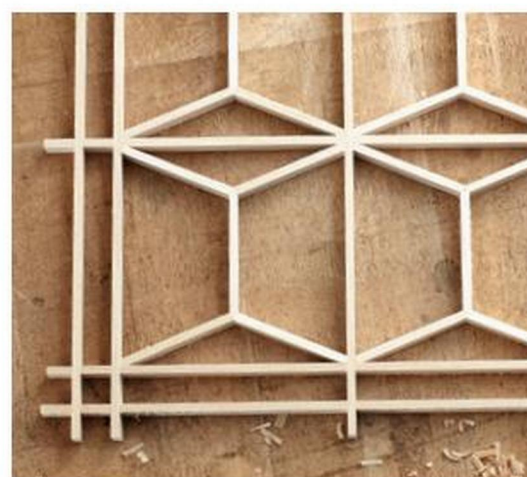
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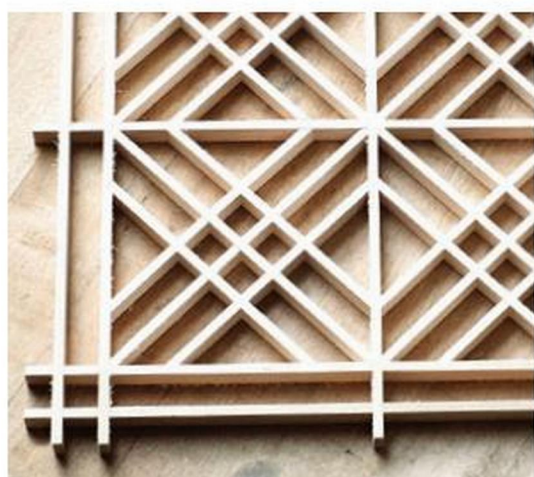
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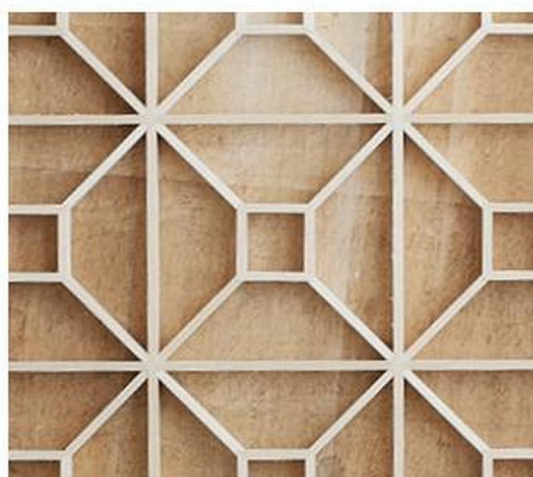
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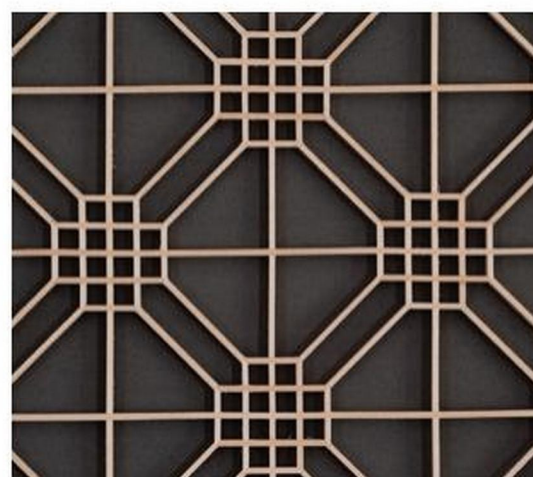
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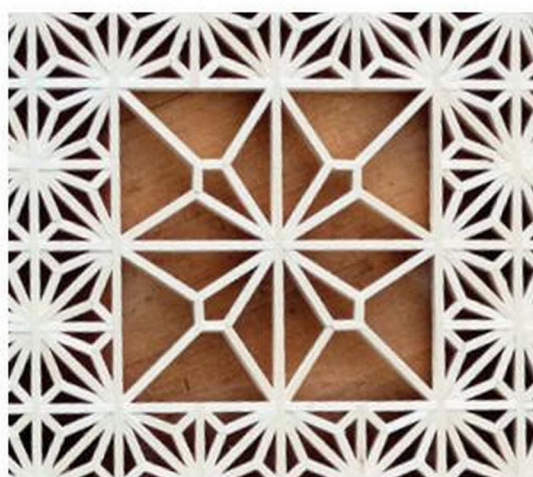
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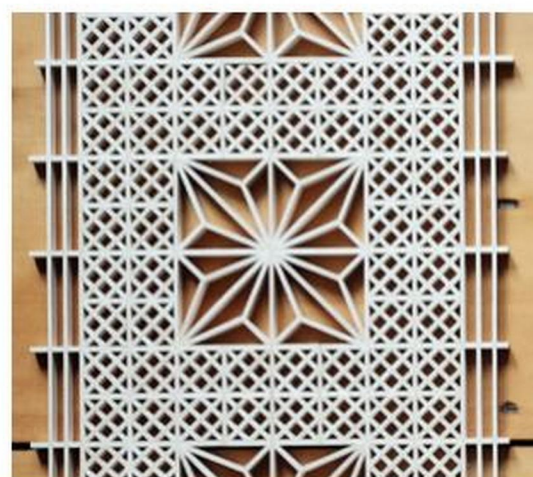
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INTRODUCTION

I made my first bit of kumiko in March 2016: a simple frame that I placed into the door of a tea cabinet I made as part of my attempt to make 52 boxes during the course of a year. Not long after that, I put a bit of kumiko into the plinth of another tea cabinet, the 51st box I made during that year. Even though I wasn't using infill patterns at that point, I was hooked. The clean lines and geometric shapes of the frames speak to me, and work very well in the modern aesthetic that I favor. Of course, I quickly began making the hemp leaf pattern (pp. 30-41). That led to my first decorative panel (pp. 142-144), and I was in love.

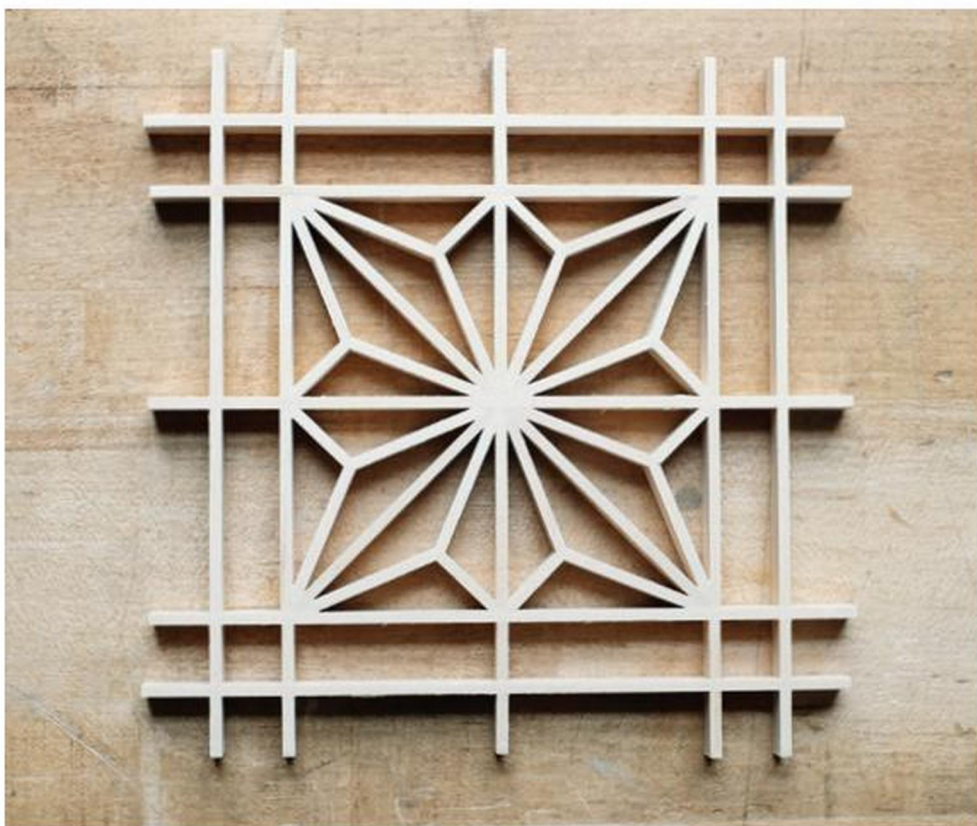
When I teach kumiko, I want my students to be successful right from the start, so I developed techniques that take the

mystery out of the process. These are the techniques that I'll share with you in this book. I'll show you how to make the specialized paring guides you need, how I make frames, and provide detailed instructions for 10 infill patterns. At the back, you'll find 10 kumiko panels I designed using these patterns, with the information you need to make the frame. I also explain how I make decorative frames for my panels, my process for painting them, what I think about when I pick fabric to back a panel, and how to incorporate a kumiko panel into a piece of furniture. There are a few more things that I cover, but let's leave those to be little surprises as you read.

To make kumiko, there are a few tools that you need (pp. 14-17), but even more important than the woodworking tools



My first experience making kumiko was the simple design used in the door panel of this tabletop tea cabinet.



The traditional *asa-no-ha*, or hemp leaf, pattern seen here is an iconic design that is attractive on its own or as part of a more elaborate panel design.

are patience and attention. The technical challenge that *kumiko* presents is not that great. The frame parts can be made quickly at the tablesaw with a finger joint jig. The pieces for the infill pattern are not tough to make either. A set of guides ensures that you pare the correct angles into the pieces' ends. But this doesn't mean that you can be thoughtless when making *kumiko*. In fact, you must be insanely focused, because the simplicity of what you are doing can lull you into sloppy work. The challenge of *kumiko* isn't a matter of skill or technique, but of precision, and that just doesn't happen when you're giving your work all the care of a goth teenager doling out frozen yogurt for a summer job.

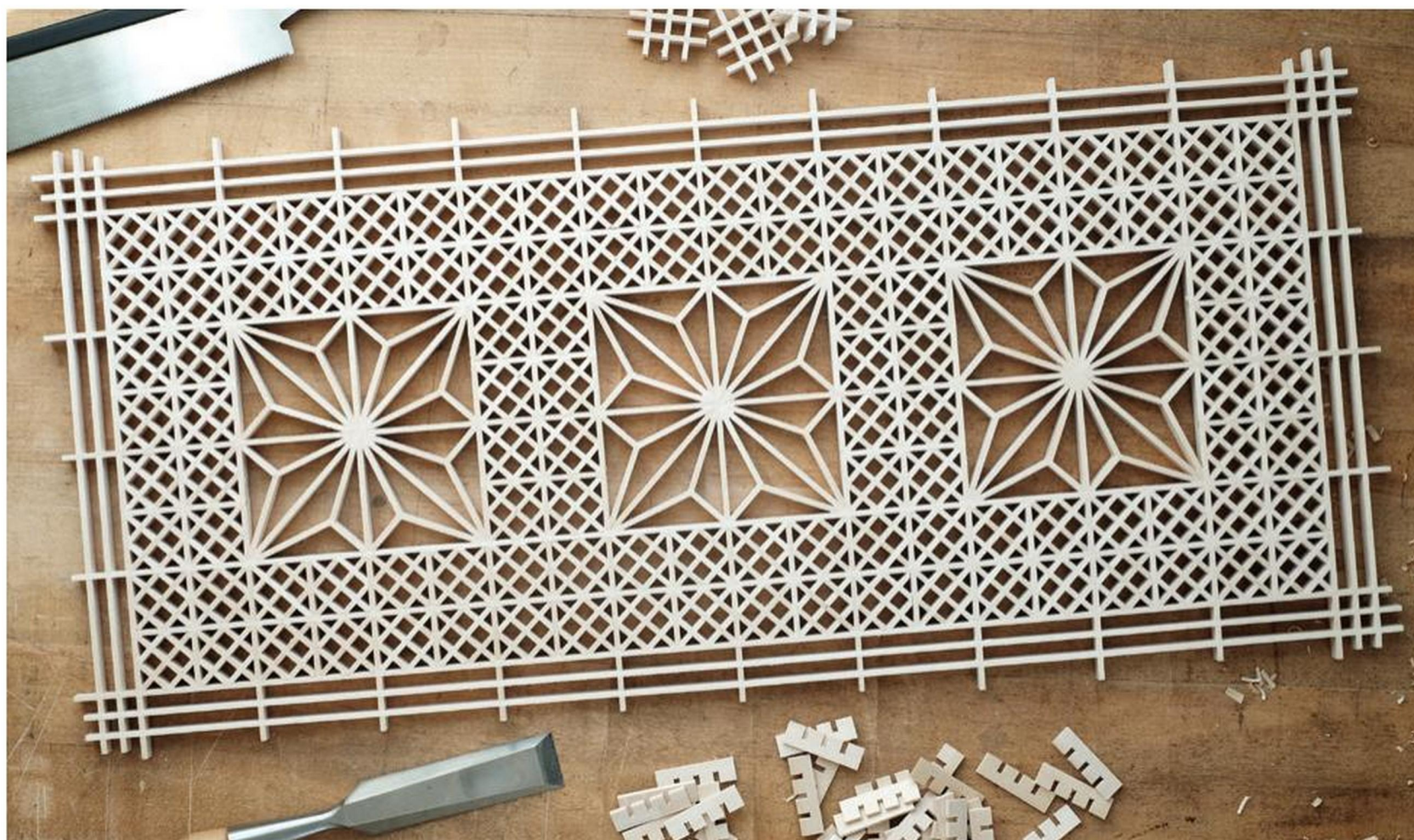
Certainly, in terms of technique you can do things to improve precision, but even the best technique falls short if you are not patient, and do not give your work attention. In this way, making *kumiko* is no different than making furniture (and many meaningful activities we undertake in life).

What does it mean to be patient? I think it's allowing the work that you are doing to dictate the pace of work. There's a cadence, a rhythm, to all the work we do in the shop. To be patient with your work you must consider each individual task and distill it. You must see its essential components, so that you understand where you can work quickly and where you must slow down. Patience means always moving at the correct speed for the work you're doing.

Attention is just as important, and it's not only a matter of being focused on the work at hand. You also must have a clear mind. If you're thinking about how your mother-in-law always smells like cabbage, your thoughts and the actions that flow from them will be muddled. When you are paring angles on the infill pieces of the *asa-no-ha* pattern, there should be nothing on your mind except your hand and how it holds the chisel, how it pushes the chisel through the small part beneath your fingers, the resistance the wood gives or doesn't give, the sound made as it slices through the wood, etc. That level of attention enables you to notice the smallest hiccup in the process, to notice minute blips that affect the precision of your work.

However, there is one thing more important than patience and attention: You must never fear failure in the shop. Don't worry if your first hemp leaf turns out less than perfect. Just make another one. And then another. Keep working. Your technique will improve. You'll become more patient, and your focus will improve. Soon enough you'll be making beautiful *kumiko* and enjoying every minute of it. So don't just read this book. Take it into the shop and get to work.

MY HISTORY *of* KUMIKO



I am not a scholar of Japanese woodworking, and I won't pretend to be one. I can't give you a detailed history of kumiko, either, and, to be honest, I'm not overly interested in its history. I am interested in making kumiko. So, what I am going to share with you here is not *the* history of kumiko. It's the story of how kumiko found its way into my work.

The art of kumiko has been practiced in Japan for roughly 1,400 years. For most of that time, it was found in the homes of the privileged. However, in the latter half of the 19th century it began to show up in the homes of average folks. Kumiko has a rich tradition and history in Japan. So rich, in fact, that I won't pretend to do it justice here. Instead, I'll jump to 1930, which is the year Toshio Odate was born. After the war, he worked as an

apprentice learning to make sliding doors. He came to the United States in 1958 on a grant to introduce traditional Japanese woodworking to Americans. You should check out his book *Japanese Woodworking Tools* (Linden Publishing). It's really good. I first encountered kumiko in his book *Making Shoji* (Linden Publishing), where I learned that the decorative framework in a shoji is called kumiko. The patterns that one finds in the framework is kumiko as well. Although Odate does explain how to make the *asa-no-ha* (hemp leaf) pattern, the book is really about making shoji.

I learned to make kumiko in 2016 by observing two great American furniture makers, both of whom wrote articles about it in *Fine Woodworking* magazine. First, there was the amazing piece by John Reed Fox on the back cover of issue 226. It's a sideboard

The panels I design often combine traditional patterns in what I hope are aesthetically pleasing ways.

with beautiful kumiko in the sliding doors. There is a short article in the same issue in which Fox explains how he makes the hemp leaf pattern. The technique he uses is the same as the one used by Odate in *Making Shoji*. It requires you to make a saw cut that stops before you go all the way through the piece. The trick is that you leave a thickness of wood equivalent to the shaving from a jack plane. No easy feat.

Mike Pekovich, my colleague when I worked at *Fine Woodworking* magazine, saw Fox's article and tried to make a bit of kumiko himself. He eventually wrote an article about how to make the hemp leaf pattern in *Fine Woodworking* #259.

Kumiko patterns and designs look as appropriate in modern settings as in traditional Japanese ones.

It's the same technique that I now use (pp. 30-41). Mike has since done some fabulous work with kumiko in his furniture. The best place to see it is in his Instagram feed (@pekovichwoodworks). Lunchtime discussions with Mike are what prompted me to first try kumiko in the boxes I was making at the time.

As my interest in kumiko grew, so did my desire to try patterns other than the hemp leaf. So, I found myself reading Dez King's series of books about kumiko, *Shoji and Kumiko Design* (D&M King). There are four books in the series now. All are chock-full of fantastic patterns for both square and hexagonal frames, and he provides all of the critical angles you need. He shows both the Odate technique for the hemp leaf pattern, as well as the one I show here. In fact, his approach to making the infill patterns is pretty close to the one that I take. Our jigs are a little different, though. King's books are a great resource and should definitely be on your bookshelf if you plan to go beyond the patterns in this book.

However, the most important factor in my development as a maker of kumiko has been my willingness to get into the shop, try it, and figure out things as best I could when I couldn't find any instruction on how to do something. I hope that what I am sharing with you shortens your learning curve, but you'll still need to get out there and make it to learn. It's in the shop where I continue to write my history of kumiko, and it's where you'll write yours too.





CHAPTER 1

GETTING STARTED

If you're like me, and I think most woodworkers are, then you'll want to head straight out to your shop and start making kumiko. Luckily, there are only a few tools that you need to gather before you can make your first panel. There are also a few guide blocks that you need to make (well, you can buy them from me). I strongly recommend that you do all of this before you start, so that you don't have to interrupt the fun stuff to make guide blocks or a finger joint jig, or to sharpen your chisels. Just think of this stage as developing the patience needed to make kumiko. Well made jigs and properly prepared tools are critical to creating successful work.

KUMIKO TOOL KIT

There are two ways to look at the tools you need to make kumiko. On one hand, all you need is a handsaw to cut notches for the frame and a chisel to pare bevels into the pattern pieces. But the more honest hand is that you need a jointer, bandsaw, and planer to make the strips for kumiko, along with at least a dozuki and chisel. Personally, I think a tablesaw is essential, because it allows you to make accurate frames quickly. Those machines are fairly common in modern home shops, so I won't touch on them here. Instead, I'll discuss the specific hand tools I wouldn't do without when making kumiko.

Bench Chisel

This should be a wide chisel. I prefer a 1-in. wide chisel, and love my Lie-Nielsen Toolworks bevel edge bench chisel. You could also use one as narrow as $\frac{3}{4}$ in. or as wide as $1\frac{1}{2}$ in. Why is the width important? Because the wider the chisel, the more stable it is when pressed down on the guide surface as you pare bevels into the pattern pieces. You get more accurate bevel angles, and your patterns go together without gaps. Also, with the chisel flat on the guide surface, the last pass over the pattern piece won't gouge the guide. For all of this to work, though, the back must be dead flat and the cutting edge genuinely sharp. It always comes down to sharpness—the keystone of all woodworking.

Dozuki

Unless you are mass-producing kumiko or making a really big panel, the easiest way to cut pieces to rough length is with a handsaw, a Japanese dozuki in particular. Japanese saws cut on the pull stroke, which is easier to control when you are working with small parts. Their blades (and kerfs)

Bench Chisel



Dozuki



Sharpening Kit



are, as a result, much thinner. This makes it easier and faster to cut with than a Western-style backsaw. It's important to get the right kind of dozuki, though. You want one with a lot of teeth, so that the cut is smooth. Saws with fewer teeth leave whiskers on the cut parts, and those whiskers can get between the part and the guide block's stop. What you end up with are parts shorter than you wanted. I use the Suizan 8 in. Ultra Fine Cut dozuki. It cuts fast, smooth, and with very little effort. You can find it online. But any dozuki that has about 30 teeth per inch should work just fine.

Sharpening Kit

Everyone says that sharp tools are essential. I'll say it, too, especially when making kumiko. There are times when you'll need to pare off just a fraction of a hair's thickness from a bevel. You cannot do that with a dull chisel. Sharpening is a subject to itself, so I won't go into great detail here. But I'll say this: Get some ceramic waterstones, a good honing guide, then practice. Use the same stones and techniques over and over again until you've got it down. One thing to keep in mind: You are not sharpening the cutting edge if you are not creating a burr as you work the bevel.

Guide Blocks



Guide Blocks

Many infill patterns are created by fitting together small pieces of wood that have bevels cut into their ends. I believe that the best way to cut them, at least for one person working on small panels, is with a chisel. To ensure that the chisel is at the correct angle as the cut is made, I use shop-made blocks with reference surfaces. The part sits in a groove, and the chisel rides the reference surface. There are stops in the grooves so that you can make a large number of identical parts. You can make these blocks yourself (see pp. 22-26), or you can buy them. I happen to know a charming fellow in Connecticut who makes and sells them (mekwoodworks.com).

Saw Hook

You are going to cut a lot of small pieces to length when making kumiko, so you need a way to hold them steady as you cut. You could get fancy with this, but don't. I've learned from my own work and from teaching other folks how to make kumiko that you eventually cut the saw hook in half. So, just make one that is disposable, so to speak. Mine is really simple. It's a stick of hardwood with a rabbet cut along one edge. It doesn't even need a cleat. I clamp mine between dogs on the benchtop. Also, I make them to hold up to 12 strips at once, so that I can create parts quickly.

Glue and Glue Sticks

You won't use much glue, but you will use some in the joints around the outside of the frame. Yellow PVA glue is fine. Squeeze it onto a scrap of wood or wax paper. Then take a short piece of kumiko and pare a bevel into one end so that it looks like a chisel. Dip it in the glue, then stick it into the notch on the kumiko strip.

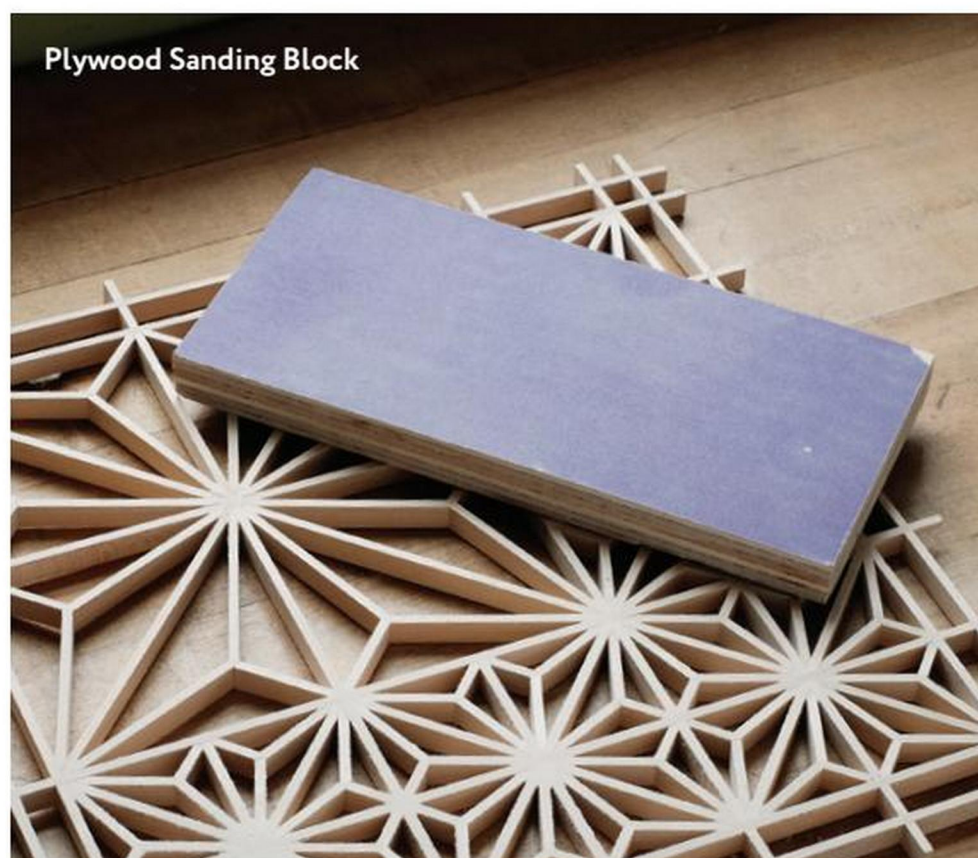
Plywood Sanding Block

After completing a kumiko panel, I turn the show face down onto a flat surface and press all of the infill pieces down. I then turn the panel over and sand it. This brings the frame and all the infill pieces into the same plane, so there will not be any shadows created by uneven surfaces. Kumiko is all about the clean lines that intersect to create patterns, and shadows disrupt them. So, sanding is an important last step. I make my sanding blocks from plywood and half-sheets of 220- and 320-grit sandpaper. If the panel is small enough,

you could also place a piece of sandpaper down on a flat surface and move the panel over it.

Dedicated Kumiko Tablesaw Sled

This could be the most important tool that I use when making kumiko, because it ensures that the frames I make are square. It also ensures that the squares inside a frame that should be the same size are, in fact, the same size. When it comes time to make the infill pattern pieces, your life is so much easier if you are fitting pieces in batches rather than individually. You can do that if the squares within a frame are sized uniformly. Another advantage of the sled and the finger joint jig attached to its fence is that it allows me to vary the size of the internal squares of a frame and still end up with all the squares of the same size actually the same size. It's like any other crosscut sled, but with a finger joint jig permanently attached (see pp. 18-19).



JIGS SIMPLIFY KUMIKO

The beautiful patterns of kumiko are possible only if the dozens to hundreds of individual pieces that go into them are made accurately and precisely. This can be daunting, especially when you are first learning. The way I learned to make kumiko, I believe, makes the accuracy and precision required manageable, even for those just starting out. I start by making frames with my tablesaw, a crosscut sled, and a series of finger joint jigs. This ensures that the openings in my frames are uniform in size. The benefit of uniform openings is that there is less fiddly fitting of the infill pieces that make the patterns. Like pieces tend to be the exact same size, so I use jigs with integral stops to cut the necessary angles into the ends of the pattern pieces. Not only does this speed up the process of making a kumiko panel, it also allows you to make pieces that fit perfectly into the pattern, and that allows you to make panels that are beautiful and strong.

Make a dedicated sled

You might be tempted to use your everyday crosscut sled for kumiko. Resist the temptation and make a dedicated one. Keep it on the small side so that it's easy to use. Most important is that a dedicated sled allows you to affix a finger joint jig to the fence and leave it there. The sled will be ready to use any time you want to make kumiko, and you can remake a specific panel design, knowing that it is exactly the same as the last time you made it.

1 Finger joint jig begins with a notch.

Place a strip of hardwood, roughly $\frac{1}{4}$ in. thick by 2 in. wide by 18 in. long, against the fence of your crosscut sled. The blade in the saw should be the blade you will use to cut notches for kumiko frames. It's totally fine to use a standard combination blade. That's what I use.

2 Keep it low. The jig's pin should be shorter than the frame notches you'll cut with the sled and jig. This eliminates the chance that the pin will hold the frame parts above the sled's surface during use. My frames are typically $\frac{3}{8}$ in. tall, so I cut $\frac{3}{16}$ in.-deep notch for the jig's pin.





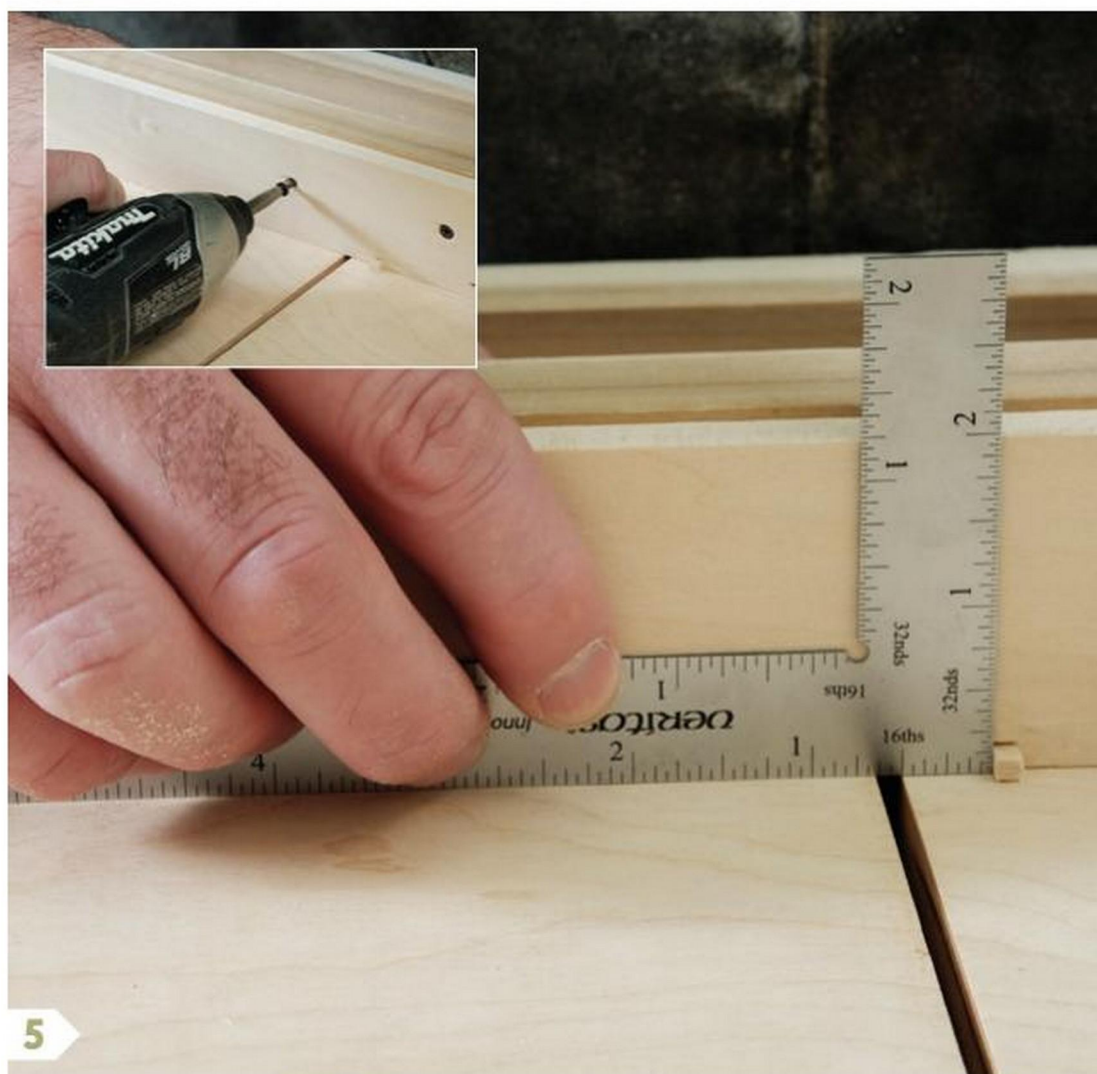
3 Flatten the notch's bottom.

Because combination blades have an alternating top bevel grind, they leave a little triangle in the bottom of the notch. Pop that triangle out with a chisel to flatten the notch. This creates a better glue surface for the pin.

4 Glue in the pin. Yellow PVA glue is a good choice for this application. The pin should overhang the back of the jig fence, and stick out a bit beyond its bottom edge. After the glue dries, trim it flush to the back and bottom edge.

5 Screw the jig to the sled's fence.

This is an important step, because the distance between the pin and blade kerf affects every frame you make with the sled. I set the pin $\frac{1}{2}$ in. from the kerf. That's the width of the borders I use around my panels. I've found that anything more than $\frac{1}{2}$ in. results in panels that are too large, because, as I'll explain in the next section, all the other spaces in my frames are multiples of the distance I use here. Attach the jig to the sled with screws (inset).



JIGS SIMPLIFY KUMIKO *(continued)*

Here's how to create varied spacing

The panels I make have squares of different sizes in them. This allows me to make the same pattern in different sizes, and to incorporate more than one pattern into a panel. What allows me to switch back and forth between different size squares in the same panel? Finger joint jigs! I make auxiliary jigs that fit over the one screwed to the sled, and that have pins farther from the blade. I'll show you how to make them here, and how to use them when I demonstrate the hemp leaf pattern (p. 30).

6 Notch an auxiliary jig fence.

Register the finger joint jig against the sled's front "fence" and run it through the saw. It's okay to use the front fence, even if it's not square to the blade, because the pin sticks out so little from the auxiliary jig's fence that even if it is slightly out of square it will not affect the frame notches.

7 Put the notch on the pin. Unlike the jig attached to the sled, the first notch in the auxiliary fence doesn't get a pin ... yet. It's the first of several evenly spaced notches.

8 Cut a series of notches. After cutting a second notch in the auxiliary jig fence, put the second notch on the pin and cut a third. Repeat as needed. In this case, I cut five notches so that I could create squares in a frame that are four times the spacing of the finger joint jig screwed to the sled's fence.





9 Glue in the pin. Pay attention! Trust me, it's very easy to glue the pin into the wrong notch. It goes into the first notch you cut, the one farthest away from the kerf when the pin is on the left side of the blade.

10 + 11 Trim it flush on the bottom and back. I do this with a chisel. It's important that the pin doesn't hold the jig up off the sled's surface or away from the sled's fence. Either problem would result in notches that are not spaced correctly, out of square, too shallow, or all three.



JIGS SIMPLIFY KUMIKO *(continued)*

Use guide blocks for accurate angles

Many of the small pieces that make up the patterns in the frames have double bevels cut into their ends, so that they fit into corners or create new corners for other pieces. The angles of these bevels must be precise. Otherwise, there will be gaps in the patterns, or the pieces won't fit together well and might even fall apart. I cut the bevels with a chisel, and use guide blocks to keep the chisel at the correct angle as it pares away wood.

12 Cut two grooves in the block.

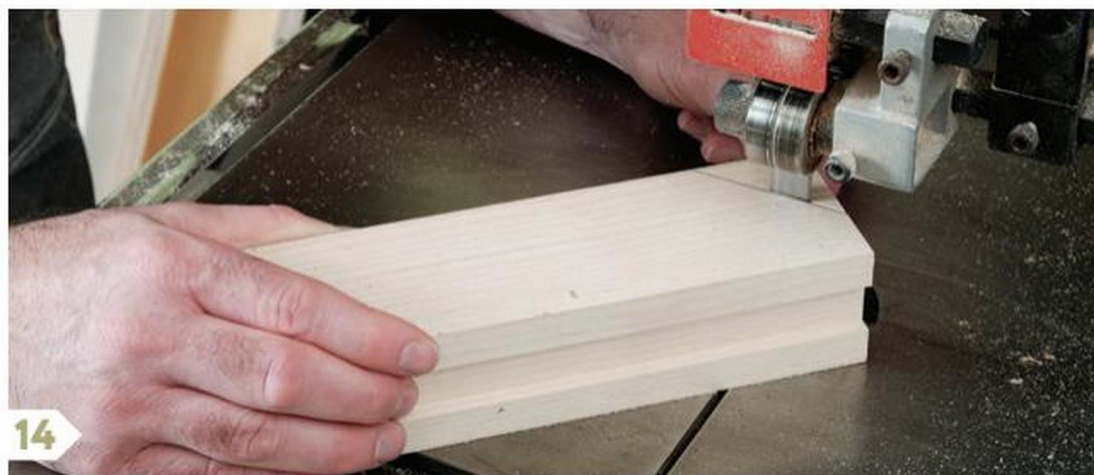
Using a dado set is the best way to cut grooves. It allows you to cut grooves to full width and depth in a single pass, which results in a groove with a smooth bottom and that's square to the ends of the block. The exact size of the blocks is not critical, but the ones I use are $1\frac{7}{8}$ in. thick x $2\frac{3}{8}$ in. wide x 9 in. long.



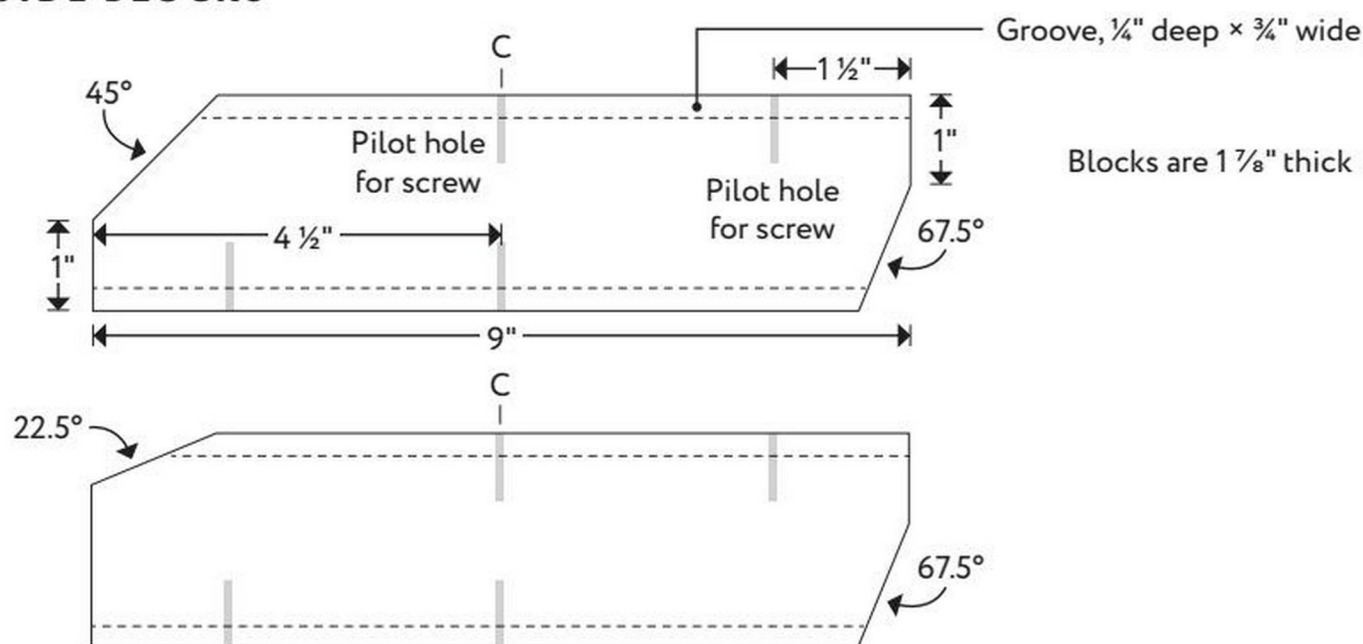
13 Lay out the guide surface angle.

For the 45° surface, use a good combination square. This layout line is for reference only, but you do want a line that's accurate, and easy to see (use a sharp pencil).

14 Rough cut with a bandsaw. This cut doesn't need to be perfectly at 45°. Leave a bit of waste outside the layout line. Don't worry if you dip below it. You'll take care of any bumps or dips when you clean up the guide surface (the next step).



GUIDE BLOCKS



A big protractor makes angles easy

The angles most commonly used in square frames are 45° , 22.5° , and 67.5° . And you'll need two 67.5° guide surfaces. I make two blocks. One has a 45° and a 67.5° guide on it. The other has a 22.5° and a 67.5° guide surface. Accurate angles are critical, and the best way to lay them out is with a sliding bevel. The degree lines on a small half-circle protractor, like the ones used in grade school, are close together and make accurate layout difficult. You can find larger, complete circle protractors at art supply stores. The degree lines are farther apart and more accurate.



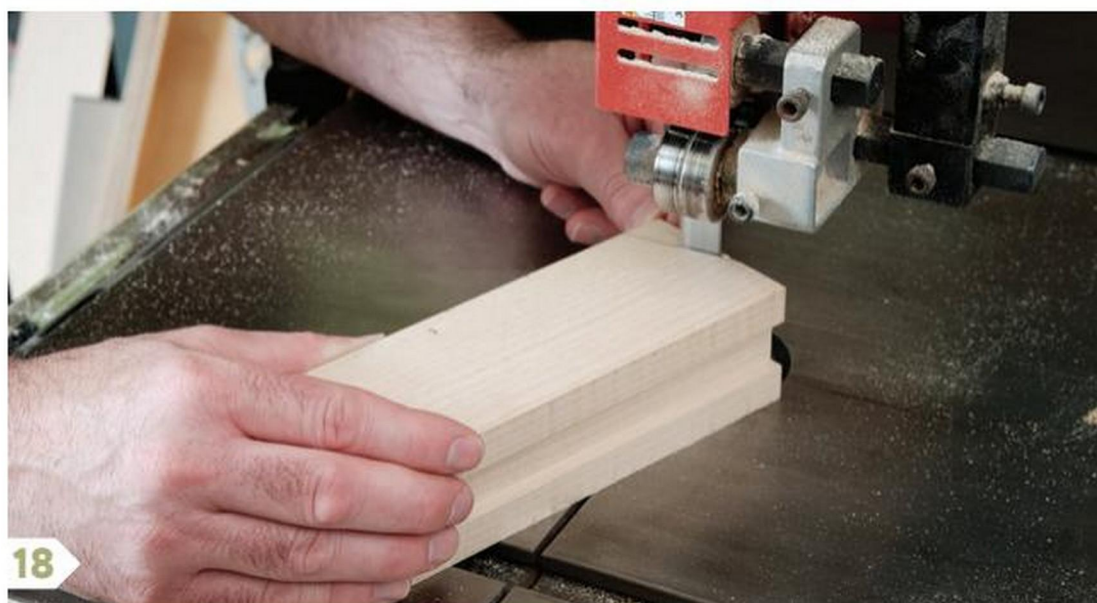
15 Mark the angle on a piece of MDF. After drawing a line square to the edge, place the protractor on the MDF so that its centerlines align with the drawn line and the MDF's edge. Use a sharp pencil to make a small tic at the 67.5° and 22.5° angles.

16 Set a sliding bevel to the angle. Register the bevel's fence against the edge of the MDF, and move the blade so that it's in line with the pencil mark denoting the angle. Lock the blade.



17 Transfer to the guide block. Again, this line is only for reference, but your life will be easier if the line is clean and easy to read, so use a sharp pencil.

18 Remove waste with a bandsaw. As you did with the 45° guide surface, cut just outside the layout line. A slightly ragged cut is fine, because you're about to clean up all the guide surfaces with a block plane.



JIGS SIMPLIFY KUMIKO *(continued)*

Clean up the guide surfaces

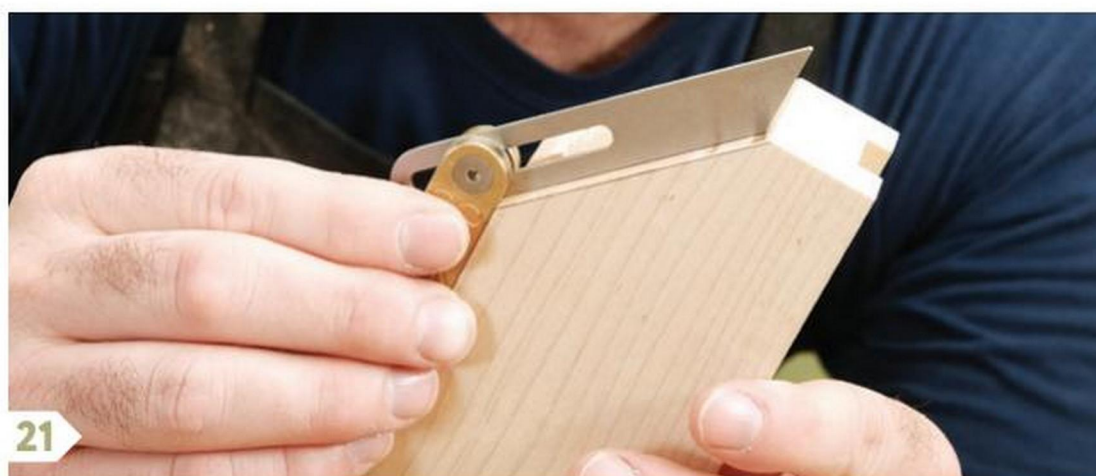
The technique I show here can be daunting, but stick with it. All of your woodworking will improve if you can truly sharpen a block plane and use it to clean up a bevel without taking it out of square or screwing up the angle. I'll show you how I do it.

19 A block plane is the right tool.

Because you are planing bevels, you are planing end grain. The low-angle, bevel-up blade of a block plane slices through end grain with very little trouble. This allows you to create a smooth guide surface, which, in turn, allows you to create kumiko pieces that are clean and fit together sweetly. Of course, the blade needs to be sharp. So, take time to learn to sharpen. It's the most important skill in woodworking, after all.

20 Check for square. As you progress through the planing, stop to check that the guide surface is still square to the block's edges. If it's not, the bevels you cut into the kumiko pieces will be at angles other than those you intend, and they won't be even across the piece's width.

21 Keep the angle right. It's also important that the guide surface's angle is correct, so check it as you clean it. Check across the full width of the surface. It's really only important from the top edge to about halfway down, because that's the only place your chisel will ride, but it needs to be dead on there.



Add a stop

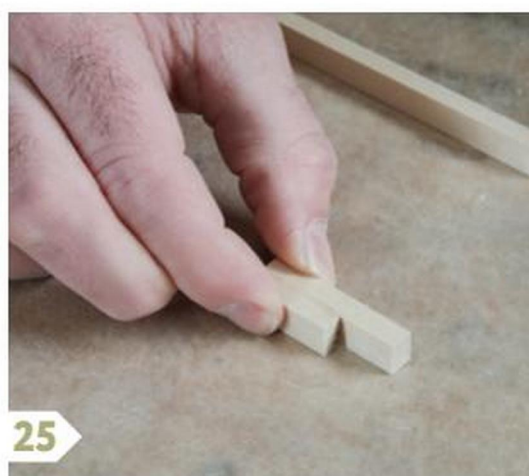
The last thing you want to do is fit dozens or hundreds of pattern pieces individually, making small adjustments to each one until it fits. Add a stop to the guide blocks, and you won't need to. Use one piece to dial in the length, put the stop in place, and bang out the remaining pieces. They'll all be the exact same length.



22 Drill two pilot holes. The first is centered on the block's length. The second is 1½ in. from the end opposite the guide surface. Drill holes in both grooves on each block.



23 Build a stop. You need two strips of equal width for the sides, then two shorter strips for the middle. I've made stops several different ways, but this is the best way to do it if you're making just a few blocks. The slot is guaranteed to be centered in the stop, and it's much safer than cutting the slot with a router.



24 Cyanoacrylate glue speeds up the process. These parts are too small to clamp easily while also keeping things square and aligned properly. Use a thick CA glue that sets quickly (some do in as few as 10 seconds), and do not use an accelerator (they make the glue brittle).

25 Glue one middle piece to one side. I locate the piece so that it sticks out past the side. After the stop is completely assembled, I cut the ends square. This guarantees that the two sides and middle pieces are perfectly flush, something that is tedious to do during the glue-up.

JIGS SIMPLIFY KUMIKO *(continued)*

Add a stop *(continued)*

26 Add the second middle piece.

Again, it is not flush with the end of the side piece. The pressure applied by your hand is more than enough to create a tight glue line and good bond between the parts.

27 Put glue on the middle pieces.

Don't apply glue right up to the end of the middle pieces. This prevents squeeze-out from creeping into the slot, or gunking up the walls of the slot.

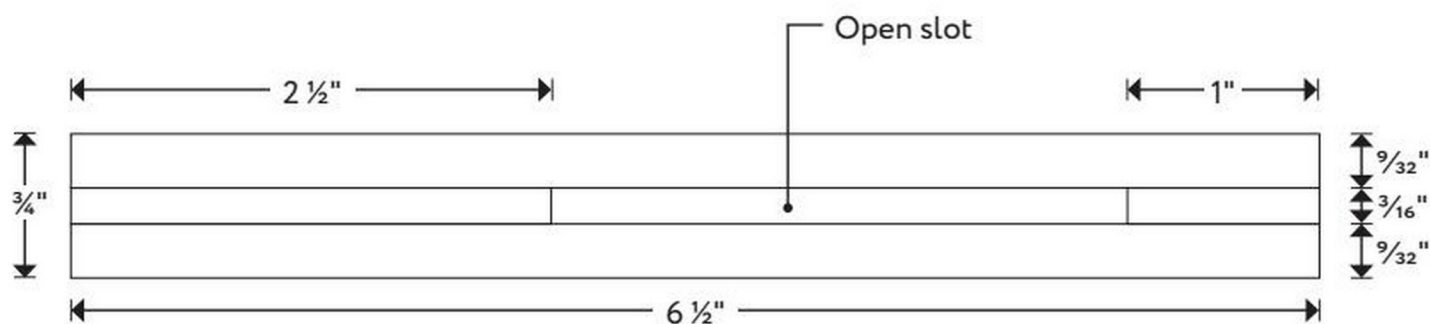
28 Attach the second side. Pinch the entire assembly together in your hands and hold for about 30 seconds. Then let the stop sit for about 10-15 minutes before you cut the ends square and clean up any squeeze-out.

29 A screw holds the stop in place.

There is no need to install a threaded insert and thumbscrew. When the block is held in a clamp during use, it can be difficult or impossible to get your hand on a thumbscrew to make adjustments. You'll never have that problem with a screwdriver.



STOP FOR GUIDE BLOCK



A simple saw hook is all you need

Unless you are making large panels with hundreds of small pattern pieces, or the same small panel in a production run, the easiest way to cut pattern pieces to rough length is with a dozuki and saw hook. The hook I use is not complicated, and it shouldn't be. I promise you that you will eventually cut it in half. I know I do. So, my saw hooks are "disposable." I take a long strip of hardwood, cut a rabbet into it, cut it into shorter lengths, and pinch one of the new saw hooks between two Veritas Bench Pups in my bench. When I cut through it, I just grab another one.



30 Lay out for a square kerf. The cuts do not need to be perfectly square, because you are going to cut angles into the ends of the workpieces using a chisel. Still, you want them to be as close to square as you can get them. Make a line across the top of the fence and down its back.

31 Cut along the lines. Use the same saw that you'll use when cutting pieces to rough length. Cut from the corner across to the front of the fence, following the pencil line as you cut. Then, cut down the back of the fence, following the line as you cut. Finally, bring the saw level and follow the two kerfs down.



WOODS FOR KUMIKO

The beauty of kumiko lies in the geometric patterns created by the thin strips of wood used to make it, so the wood used is of paramount importance. If there is anything about the wood that disrupts the lines and patterns, then it's not a good wood for kumiko. It needs to be aesthetically suitable. It also needs to have good working properties, because you will be paring it. My favorite kumiko wood is basswood, as it's perfect both aesthetically and in terms of workability. But it's not the only wood that you can use. If you want to try other species, look for woods that have as many of these qualities as possible.

Small or invisible pores

Kumiko strips should have a smooth, uninterrupted surface. This makes the pattern appear calmer and more harmonious. The big pores of a wood such as ash or white oak would introduce spots of shadow, like little black circles, all over the panel and that would disrupt the overall pattern. You want a bright and clean pattern, and you get that by using woods that have no visible pores.

Little to no visible grain

Some woods, especially softwoods, can have a pronounced difference in color between their growth rings, and the wood can appear striped when cut into thin strips. The alternating colors compete against the geometric lines of the patterns, and this tension leaves the panel as a whole feeling unsettled, as if it's engaged in a struggle.

Uniform color

The color of cherry, walnut, white oak, and many other woods can vary quite a bit from

board to board, and even within the same board. Shifts in color in a kumiko pattern can be visually unsettling. The pattern loses its cohesiveness. However, when the color of all the pieces, and within the pieces singly, is uniform the pattern as a whole is able to stand forward as a harmonious whole.

Takes crisp details

This is really about the size of the pores. Big pores, when they fall on the corner where two surfaces meet, break the sharp line of the arris. Kumiko is dependent upon the crispness of its lines. Without them, it just isn't the same. So the wood you choose should have small pores, so that the edges of the strips are crisp and exact, which is exactly what a geometric pattern should be.

Soft enough to pare easily

You have a lot of paring to do when making a kumiko panel. A wood like hard maple pares beautifully, and the surface you get is great for joinery, but man oh man is hard maple hard. You will get tired much more quickly than if you are using a wood like basswood. Even though it is a hardwood, basswood is soft and a sharp chisel cuts through it easily. It takes very little force from your hand, and that means you'll work more quickly, and your hand will not tire or get sore all that fast.

End grain doesn't crush and tear out

Here's the delicate balance you must walk. Softer woods pare easily, but their fibers don't always cut cleanly. This is especially true as your chisel begins to dull. So, you want a wood that has some meat to it, that



It's a lot of work, but the best way to get stock for kumiko is to buy rough-sawn boards and mill it yourself. You get more yield, spend less, and get a good workout to boot.

offers up some resistance. Walnut is like this, but of course it's too dark for kumiko in most cases. You know what does pare easily but has enough density to resist crushing? Basswood.

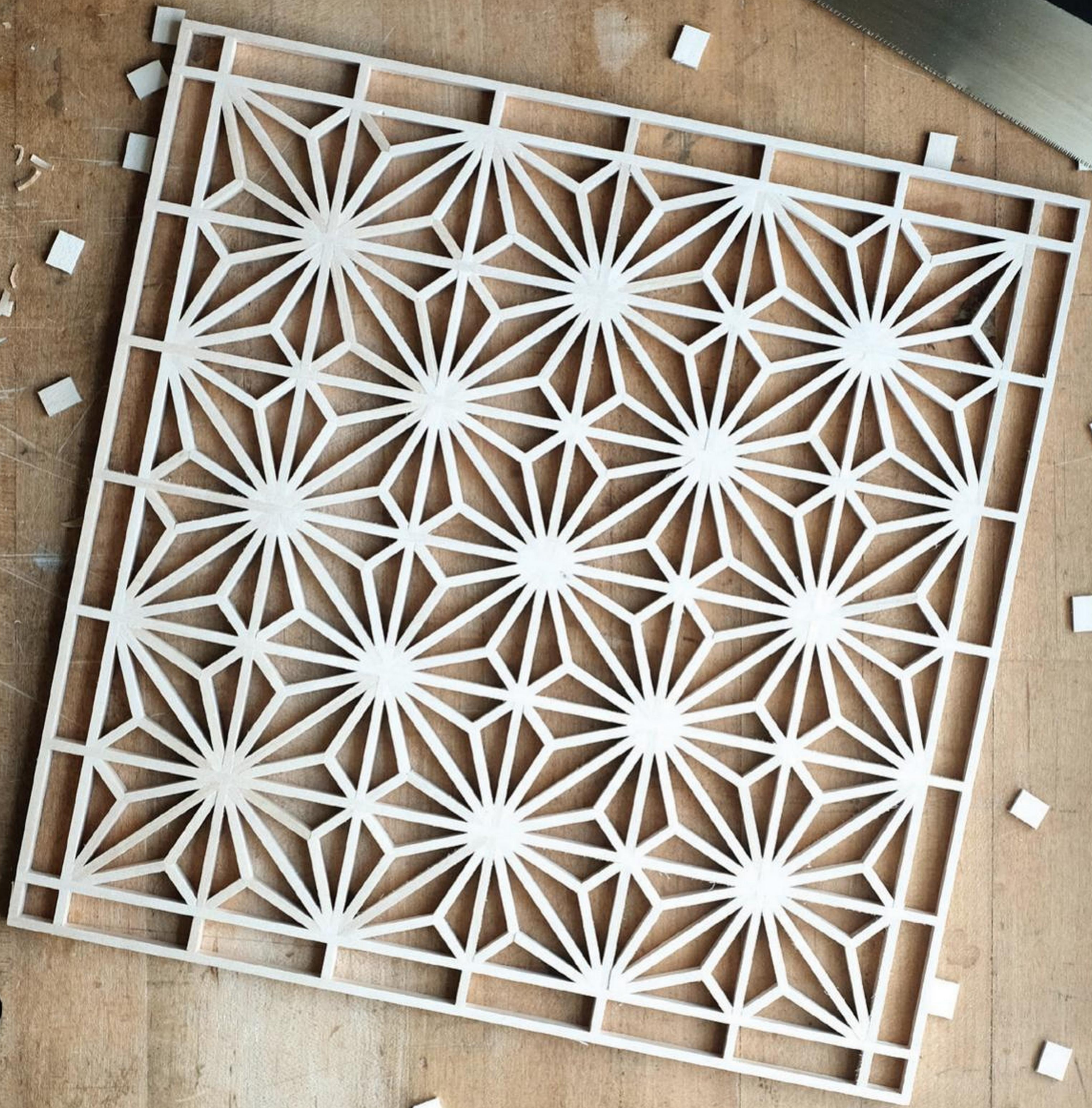
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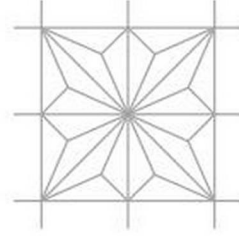
The harder a wood is, the more precise your parts need to be in thickness (for frames) and length (for patterns), because you cannot just jam the parts together. And, so, kumiko becomes a more tedious and demanding activity. It's better to use a wood that gives a little, so that you can fit the infill pieces a bit tighter. Your frame joints can be a smidge tighter, too, and that makes for a

stronger frame (see p. 35 for an explanation of how tight these joints should fit).

Sands quickly

After I've completely assembled a panel, I always sand the show face so that all of the pieces are in the same plane. Kumiko looks so much better when there are no shadow lines. But, honestly, I don't want to spend a half-hour sanding it. After a quick hit with 220- and 320-grit sandpaper, a panel made from basswood is level, smooth, and looks amazing.



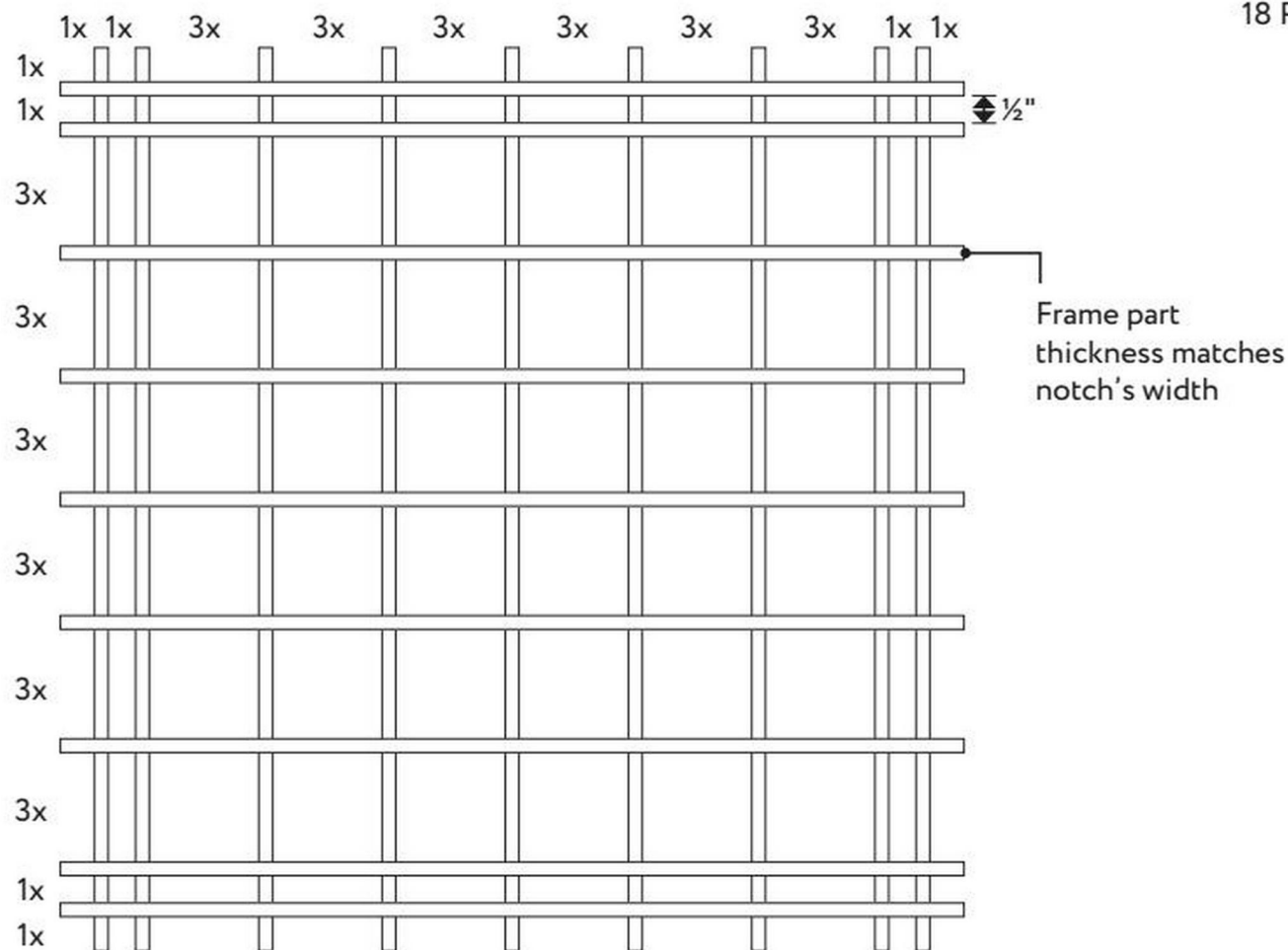


CHAPTER 2

ASA-NO-HA

The first pattern I learned to make is the asa-no-ha, or hemp leaf, pattern. It's the classic kumiko pattern, and a great place to start because you'll learn the fundamental concepts and techniques you need for all kumiko, as well as an advanced skill that comes in handy with other patterns. Master it, and you'll be ready for any pattern. But more important, the hemp leaf pattern is beautiful. And there is no better way to stoke your passion for a craft than by creating something gorgeous. A simple panel full of hemp leaves will surely inspire you to continue learning kumiko.

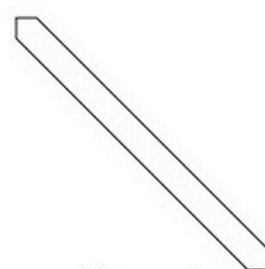
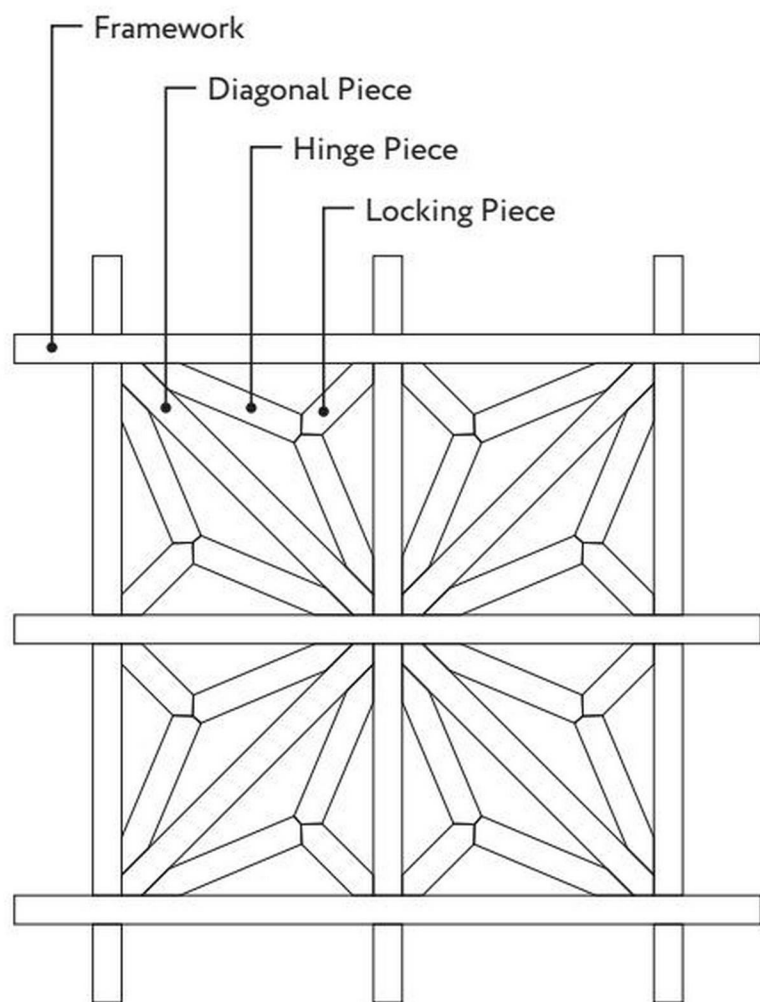
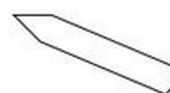
FRAME DRAWING



FRAME PARTS

18 Pieces

PATTERN DRAWING

Diagonal Piece
(x4)Hinge Piece
(x16)Locking Piece
(x8)

PATTERN PARTS

(4) Diagonal Pieces

(16) Hinge Pieces

(8) Locking Pieces

Note: All pieces are
the same thickness as
the kerf width.

GUIDE BLOCKS

45°

22.5°

67.5° (2 surfaces required)

SET THE BLADE HEIGHT

When you assemble the frame, it's critical that the intersecting pieces are flush with one another. So, cut notches that are just a bit deeper than halfway through the frame's height. This extra bit of space ensures that the joints will go together without problems and that you won't end up needing to sand the frame to make the parts level with one another.



1 Cut a notch. Place the end of the board against the jig's pin, and push the sled through the blade. Keep your hands in line with the sled's runners. This keeps them well away from the blade, but also ensures that you slide the sled square to the blade. Use your hand to keep the board flat on the sled.

2 Set a square to the notch's depth. Place the head of a small adjustable square on the board's face, and slide its blade into the notch until it bottoms out. Lock the blade at this setting.

3 Check from the opposite face. Register the square on the opposite face of the board, so that the blade is under the notch. If the notch doesn't reach the square's blade, it's not deep enough. Raise the blade and cut again. Reset the square's blade and check again. The blade height is right when the notch extends just past the square's blade.



FINGER JOINT JIG CONTROLS SPACING

It's far easier to make any kumiko pattern, especially the hemp leaf, if the squares that make up the frame are all the same size. The best way to create identically sized squares is with a finger joint jig and tablesaw. A pin in the jig registers each notch the same distance from the blade, so every notch ends up spaced the same distance from its neighbors. When the frame goes together, the squares are all the same size.

4 Place the first notch on the pin.

Make sure that the board is tight against the sled's fence along its length, and sits flat on the sled's surface. This ensures that the second notch is cut square and to the correct depth across the board's width. If you get these things wrong, your frame will not assemble square and the strips will not be flush with one another.

5 Cut the second notch. Pressing firmly down with your right hand, feed the board through the blade. After making the cut and turning off the saw, flip the board over and check that the cut was square and the notch is the correct depth all the way across the board.

6 Drop on the jig with larger spacing. Make sure that the correct notch in the second jig goes over the pin in the first. I mark the sled with a pencil line. Then for bigger spacing, I add a matching line to all the jigs so it's easier to put them on correctly.

7 Cut the remaining notches. Use the larger spacing of the second jig to cut six notches, then remove that jig and cut the final notch, which creates the narrow border around the panel.

8 Trim the board to length. Raise the blade. Set the last notch cut on the pin in the jig screwed to the sled's fence and crosscut the board. This cut makes the "horns" at either end of the strips the same length. The strips are easier to work with when they are the same length, and the panel looks nicer as you're working on it, too. That's worth the extra minute it takes to make the cut.



RIP THE STRIPS

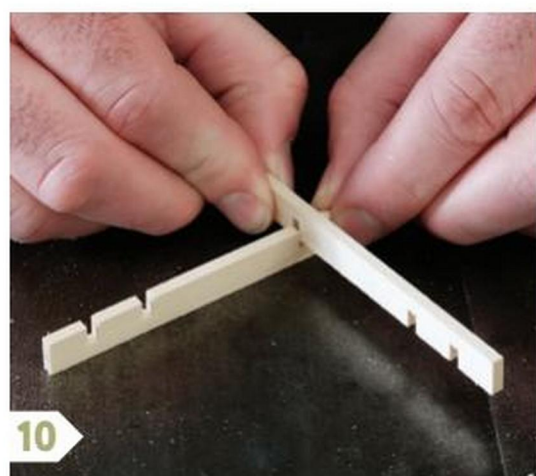
Now that all of the notches have been cut, it's time to make the frame's thin strips. With a sharp blade in your tablesaw, you can cut strips that have smooth sides and don't need any surface prep before you assemble them to make the frame. For the sake of your fingers, set the blade so it's just barely above the board's thickness, and use the saw's riving knife or a splitter.



9 Rip two test pieces. Measuring from the blade's teeth, set your saw's fence $\frac{1}{8}$ in. from the blade, then use a push stick to make the cuts.

10 Check the fit. It's best to test two strips together because you'll get a true sense of how tightly the joint fits together. Use a joint from the middle of the strip, as the ones near the ends flex open more easily. You should be able to press them together with your fingers. Pull the joint apart and look for compression on the strips. Ideally, there should be none and there shouldn't be any gaps when the joint is together. Adjust the rip fence to dial in the thickness of the strips.

11 Rip out the frame pieces. After you have two test pieces that fit together properly, rip out the remaining frame strips. It's a good idea to rip five or six more strips than you need, just in case you break one when putting the frame together.



ASSEMBLE THE FRAME

Here's the most important thing to keep in mind as you make the frame: Don't break any strips! Fortunately, broken strips are easy to avoid if you apply pressure only directly over the joint. You should be able to bring the joints together with finger pressure. Don't worry if you break a few. Everyone does, and that's why you make a few extra. It's fine to glue every joint, but I don't. It's just the joints around the outside of the frame that I glue, because I cut off the horns and they wouldn't stay together after that without glue.

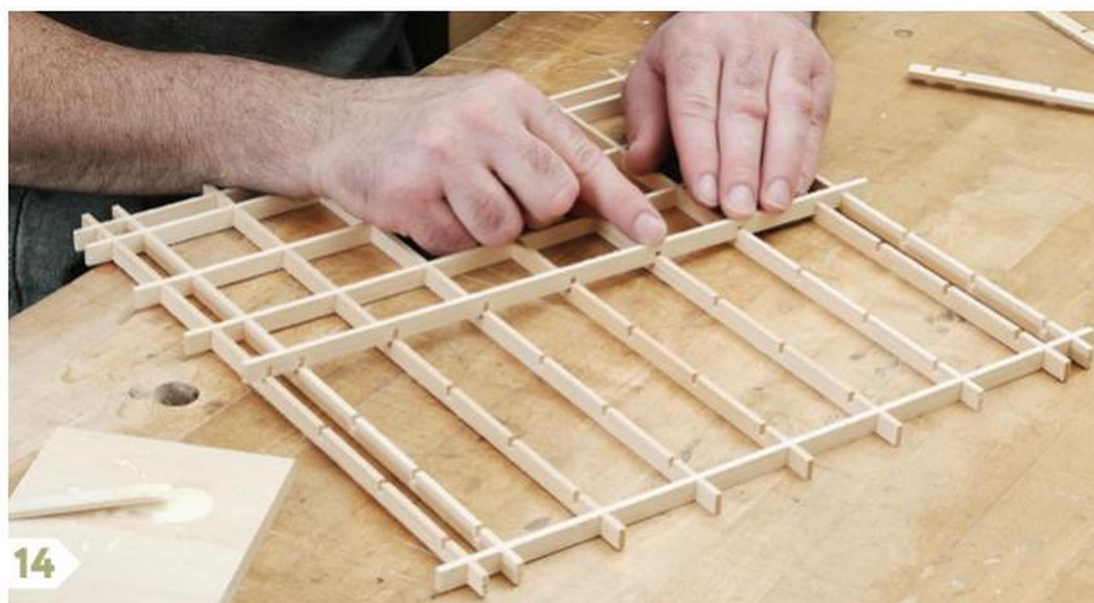
12 Glue the outside pieces together.

Put a bit of glue in one of the notches—I use a beveled glue stick to get into the narrow notch—then press the two pieces together. Check that they have closed up flush to one another. Repeat for the other three corner joints.



13 Add the middle pieces from one side.

All of the joints on outer edges of the frame should be glued. On your first frame, it's a good idea to do one frame strip at a time. As you get comfortable, you can put glue in the notches for four or five strips at once. Frames go together more quickly this way. Just don't forget to check that the joints are going together flush.

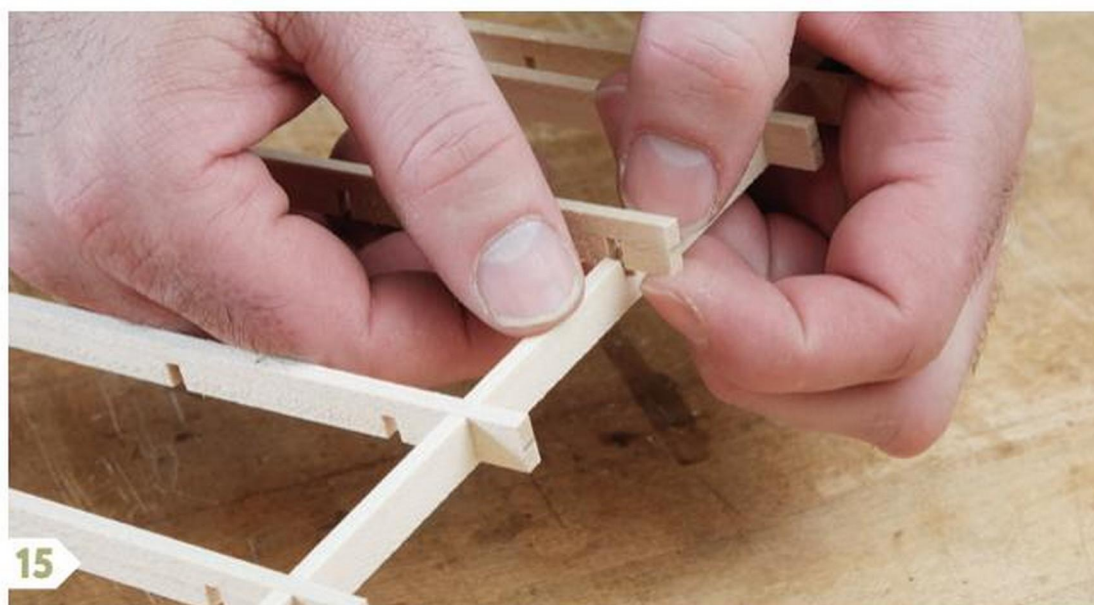


14 Rotate the frame and finish it.

Here's where things get a bit tricky. Always work on one strip at a time. Glue only the joints around the outside of the frame. Set the strip on the frame and get all the notches registered in their mates. Working from one edge of the frame to the other, seat each joint just a bit, then work back across, seating them a bit more. Go back and forth until the strip is fully seated and the joints are flush. This technique minimizes the chance that the strip will break. If you seat each joint completely as you move across the strip, you will surely break it toward the end.

15 Take care when pulling joints apart.

To disassemble a joint for fine-tuning, press down on one strip with your thumbs on either side of the joint. Push up on the other strip with a forefinger on each side of the joint. The joint will pop apart.



FIT THE DIAGONAL FIRST

Every pattern has an order in which it is made and assembled. The hemp leaf pattern begins with the piece that divides the square in half, bisecting two corners. The hemp leaf has four of these diagonals, and they form an X (not a box) when put into the frame. Because the diagonal locks into two 90° corners, each end has a point that's created by two 45° bevels. These bevels are cut with a chisel, and the guide block that holds the chisel at a 45° angle as you pare across the diagonal. Make sure that the chisel is flat on the guide surface as you take the final pass for each bevel.



16 Mark the diagonal's rough length.

Set a strip diagonally across a square, with one end just past a square's corner. Mark a line just past the second corner. The rough length should be a smidge too long, but if it's more than a smidge too long, you spend too much time trimming the diagonals to final length.



17 Cut at the diagonals. You need four for each hemp leaf pattern. That's 36 for the panel shown here. Add a few extra, in case you trim some too short as you dial in the jig's stop location.



18 Set the 45° jig's stop. Place the diagonal in the groove, with the bottom edge aligned with the intersection of the groove and 45° guide surface. Slide the stop against the opposite end of the diagonal then tighten the screw. Here's a tip: Don't over-tighten the screw. If you dent the stop, it becomes difficult to make the fine adjustments that are often necessary, because the washer will pull back into the dent rather than lock down where you want it.



19 Trim the ends. Cut a complete bevel across one side of the diagonal. This takes at least three passes. If you do it in one, you'll either get tearout, or pull the diagonal away from the stop and cut an angled bevel. Flip it over and cut a second bevel to create a point. Rotate the diagonal end-for-end and repeat the process to create a point.



20 Test the diagonal's fit. Press it into the square, but don't use too much force. The fit should be snug but not require you to really push down hard or, worse, use a hammer or mallet.

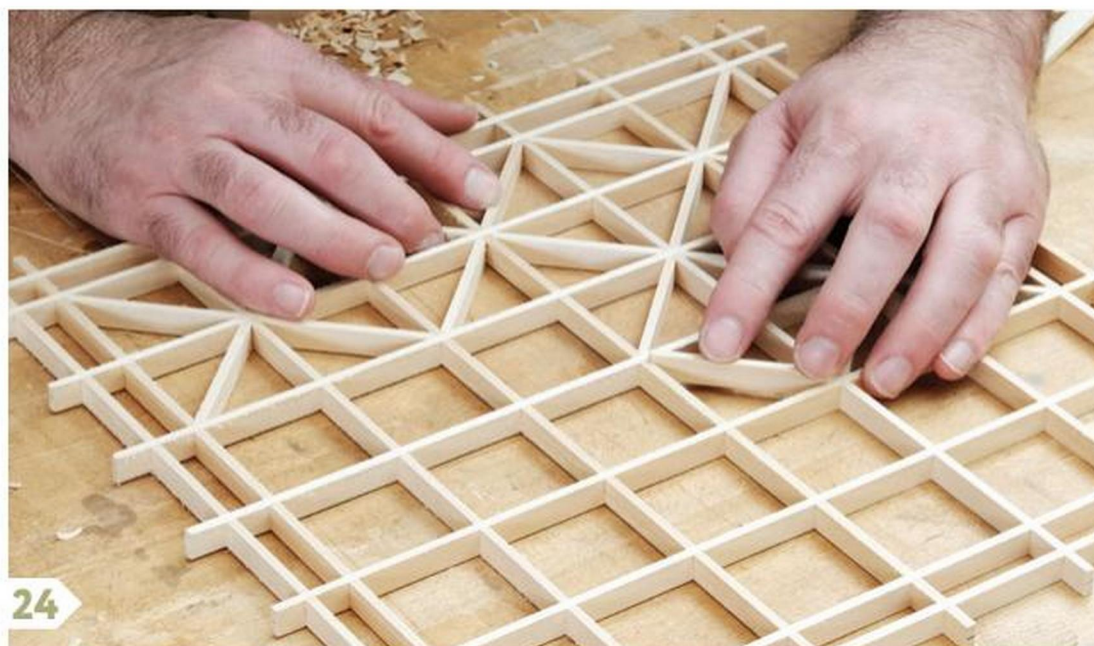
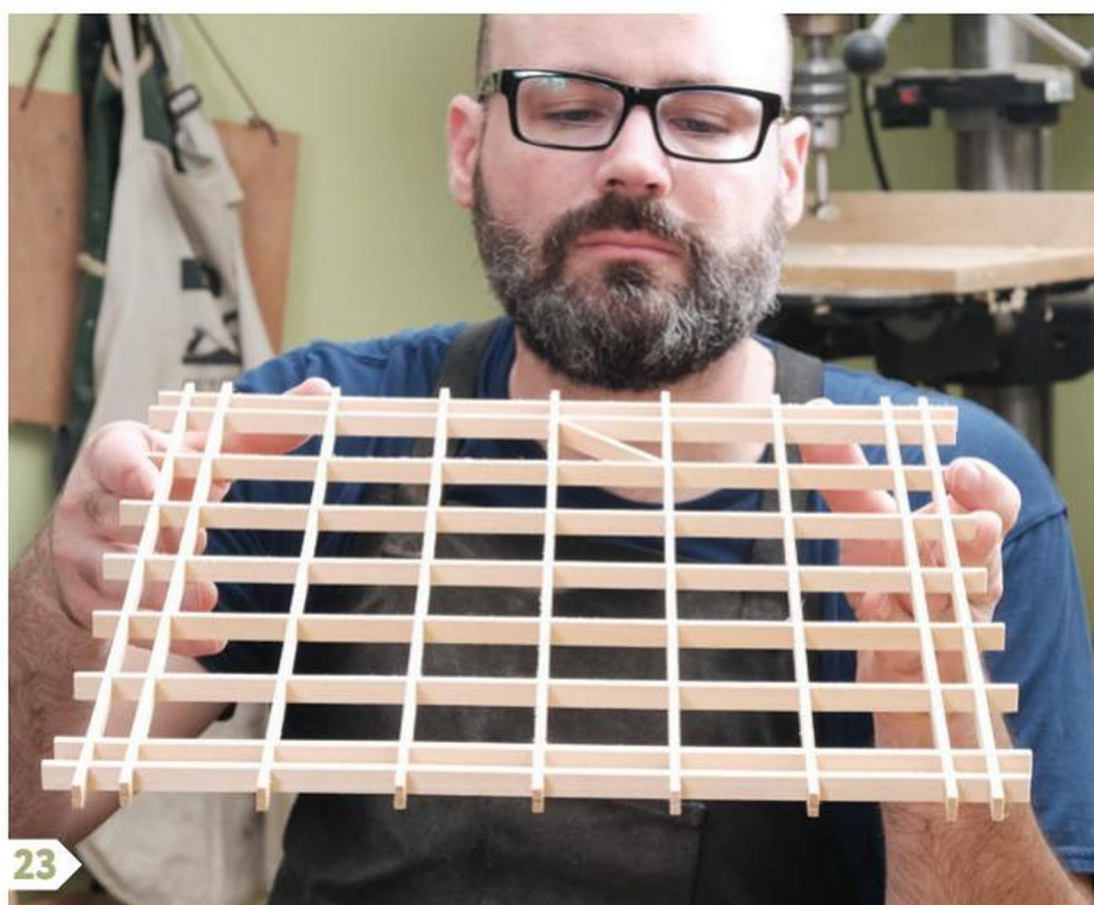
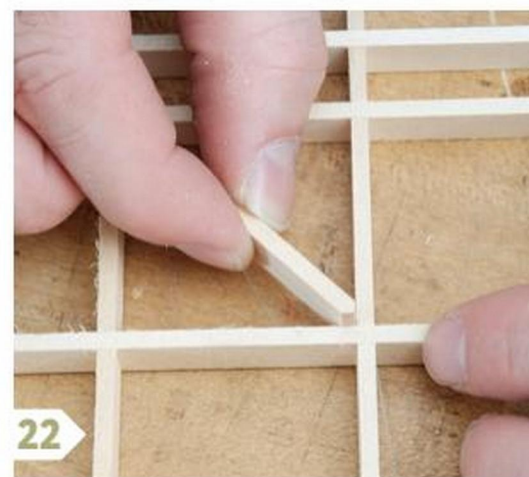
> FIT THE DIAGONAL FIRST *(continued)*

21 Shorten the length a shaving at a time. You'll most likely need to shorten the diagonal. Loosen the screw slightly and tap the stop's back end with your screwdriver. Retighten the screw, then trim both bevels at one end of the diagonal.

22 Re-test the fit. If it's too tight, move the jig's stop up and trim the diagonal again. If it's too short (i.e., it's loose, falls out when you pick up the frame, or you seen any gaps in the corner), trash the diagonal, move the stop back, and try again with a fresh diagonal piece.

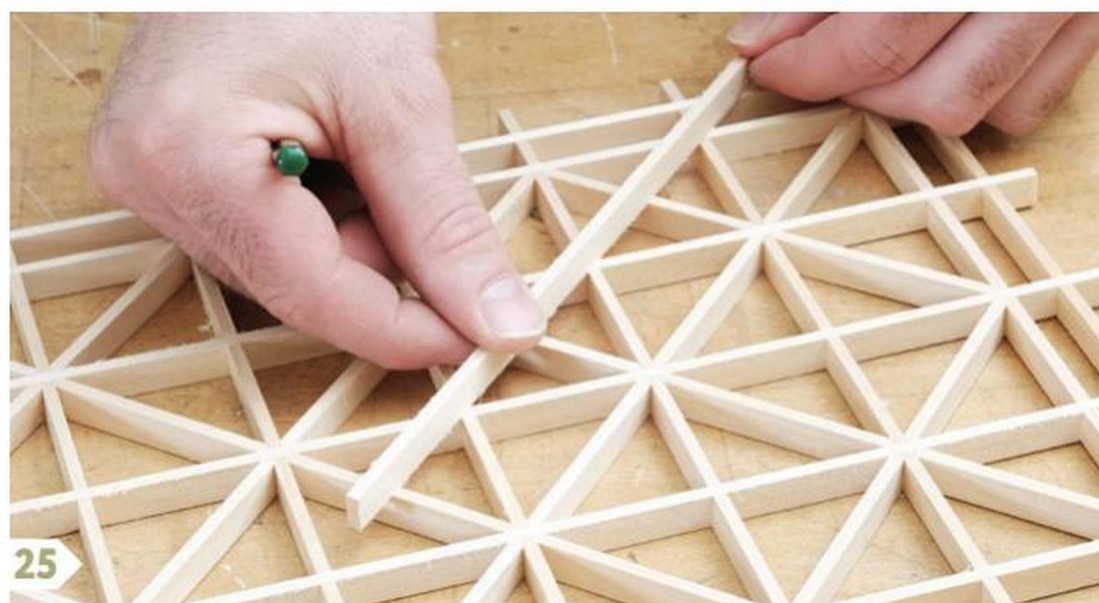
23 Look for bends in the frame. After you get the diagonal in, pick up the frame and sight down it, looking to see if the diagonal pushes out the strips. If it does, the diagonal is still too long. If it doesn't you're golden.

24 Make the rest and drop them in. Now that the jig's stop is just where it needs to be, knock out the remaining diagonals. This should go quickly. After you are done, put the diagonals into the frame. Remember that for the hemp leaf pattern they should form an X rather than a square.

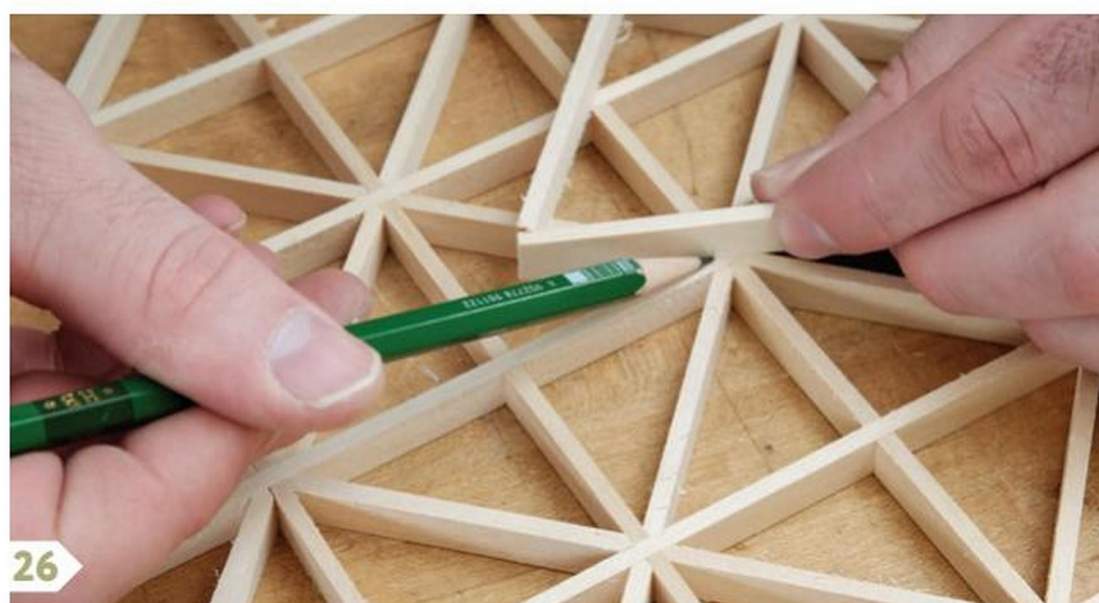


DIAL IN THE 67.5° END

The hinge piece is the hardest to make, because at one end the two bevels don't meet in the middle of the piece's thickness, like the two 45° bevels do on the diagonal. Instead, the two 67.5° bevels at one end of the hinge piece are split $\frac{1}{3}$ and $\frac{2}{3}$ on its thickness. To make both bevels, you should use two jigs. If you were to make this end after making the opposite end, which has two 22.5° bevels centered on the thickness, you'd need to adjust two stops to adjust the piece's length. That's a gamble, at best. Instead, get the 67.5° end set first, then adjust the length by trimming the opposite end.



25 Lay down a strip. It runs through the corners left empty after you've put in the diagonals. One side of it should line up with center of the corners, so that it identifies the centerline bisecting the corners. This strip is used as a reference, so you could use anything that's straight and long enough, such as a 12 in. rule.



26 Mark the hinge piece's length. Place a second strip on the frame, running from the 45° corner of a triangle created by the diagonal out to just past the reference strip you just put down. Use a pencil to draw a line on the strip just past the 45° corner of the triangle. Cut 16 hinge pieces for each hemp leaf pattern, then cut eight more so that you have spares as you dial in the jig stops.



27 + 28 Set the stops for both 67.5° jigs. Set one jig so that you cut a single bevel all the way through the strip. The strip should look like a chisel after you cut it. Now move to the second jig and set its stop to cut the bevel that is $\frac{1}{3}$ of the hinge piece's thickness. Why start with the $\frac{1}{3}$ bevel? Because if you go a bit too far, and the bevels meet near the middle, you can move the stop forward and use the second jig to cut the $\frac{2}{3}$ bevel. When the two stops are set, cut both bevels into all of the hinge pieces.

TRIM TO FIT

After the 67.5° bevels are set, turn your attention to the opposite end. It bisects a 45° corner, so its bevels are both 22.5°. Be careful when setting the stop. Because the angle is so slight, you remove quite a bit of material when creating the bevels, and the piece can quickly become too short. I start with the stop set farther back than it needs to be and work up to creating the point so that the piece initially is as long as it can be.

29 + 30 Trim the hinge piece to length. Set the stop on the 22.5° jig. Cut one bevel, flip the piece over and cut the second. Repeat the process on a second hinge piece. You need two to figure out when the hinge piece is the correct length.

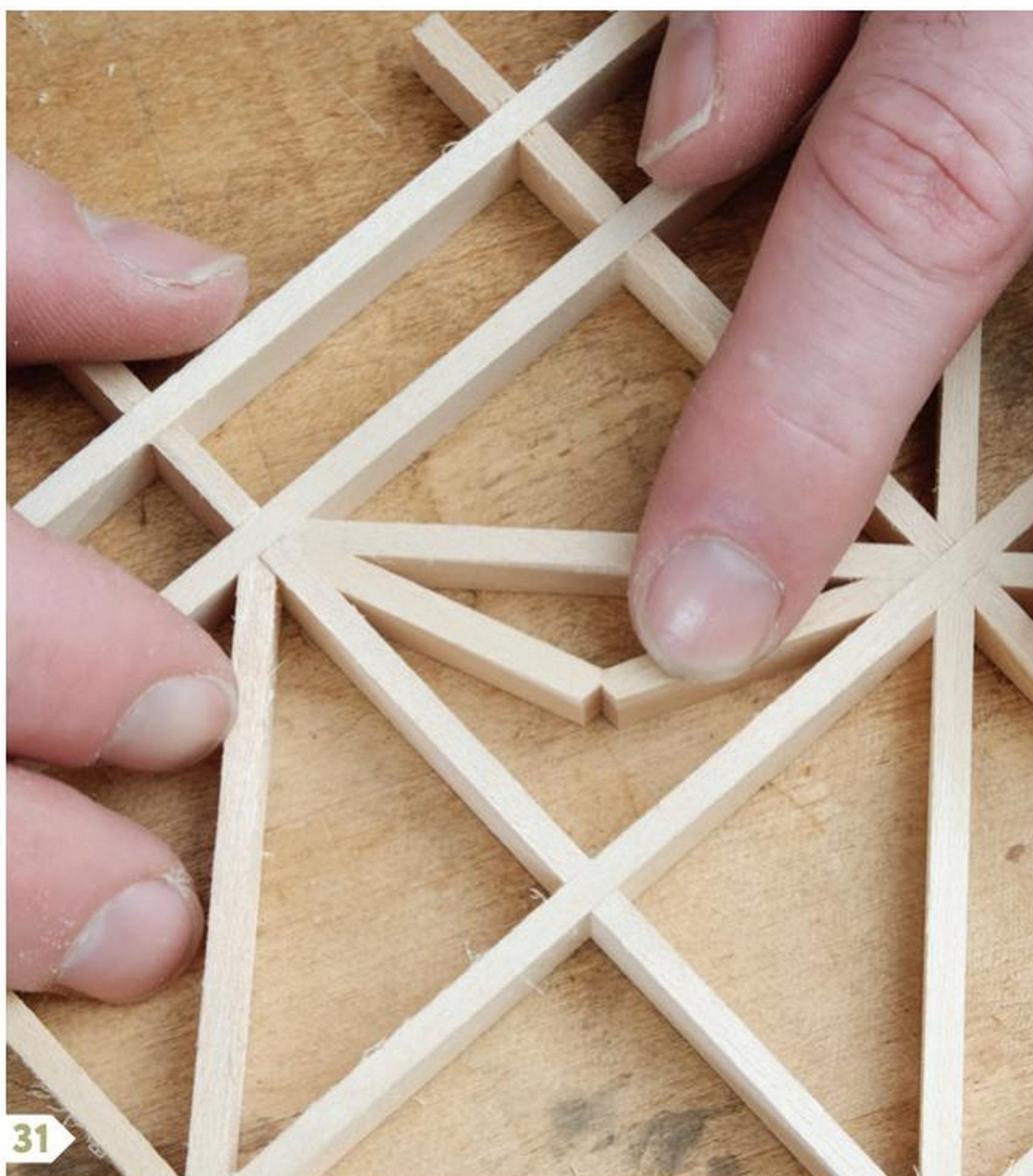
31 Here's what a good fit looks like. Put the two hinge pieces into the frame, so that the 1/3 bevels touch and the 2/3 bevels form a V-groove. Look at the opposite end of the hinge piece, where it tucks into the 45° corner. Do you see any gaps? If the gaps are on the same side as the diagonal, then the hinge pieces are too long. If the gaps are on the other side of the hinge pieces, then they are too short. If there are no gaps in the corner, but the hinge pieces don't touch in the middle, they are too short.



29



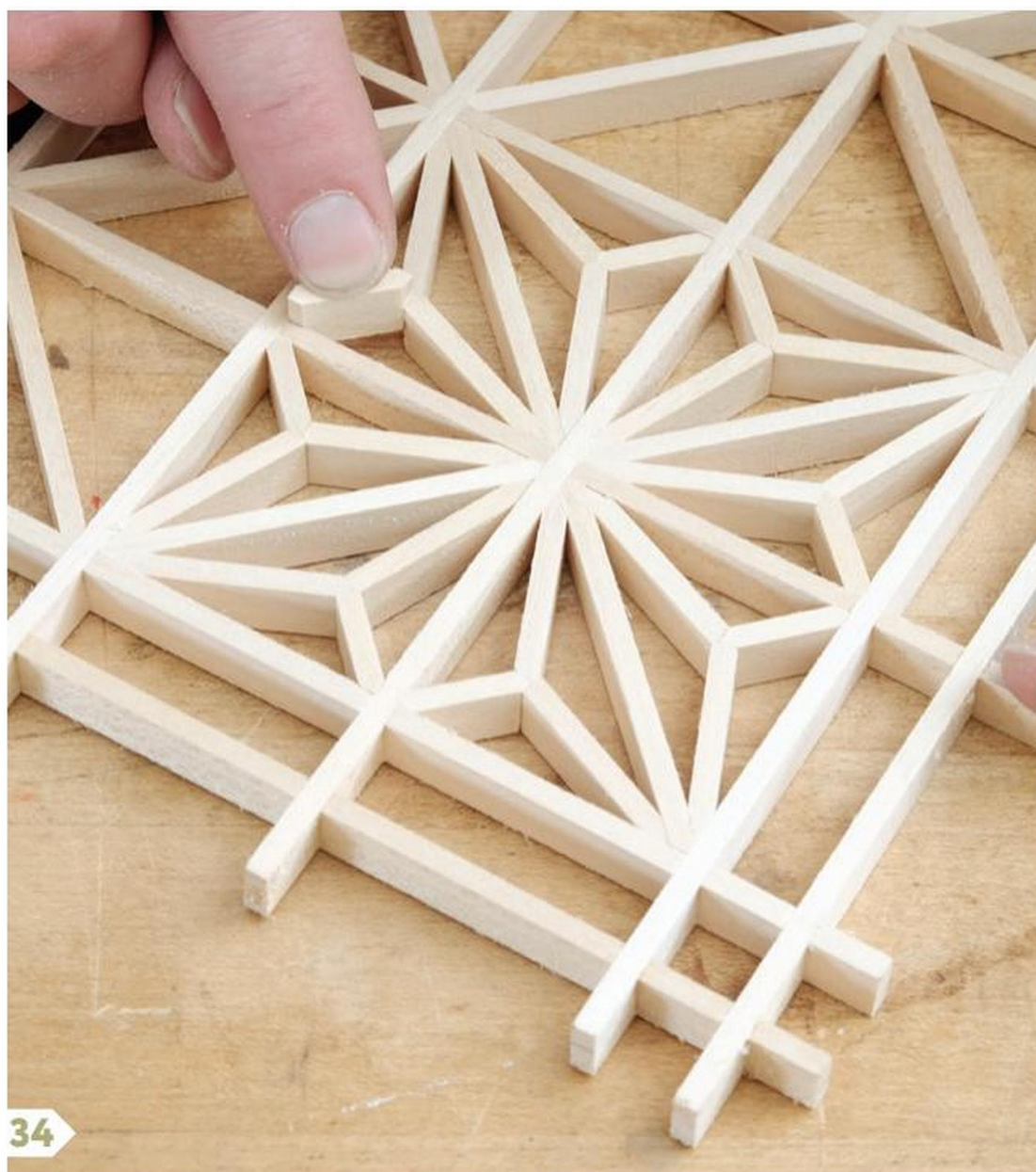
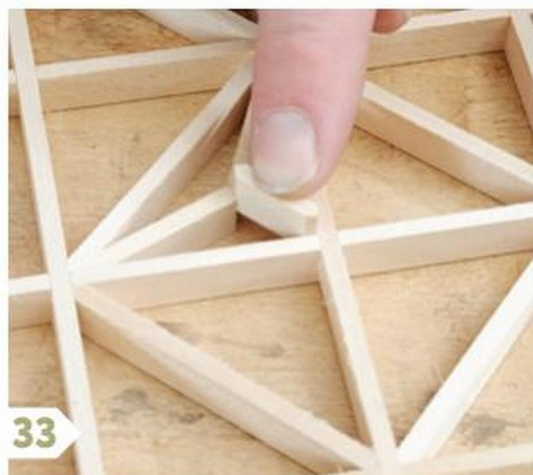
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31

LOCKING PIECE HOLDS IT ALL TOGETHER

The surprising thing about the hinge pieces is that the birdsmouth they create where they meet is actually a 90° corner. This means that the locking piece fits into two 90° corners, and that like the diagonal piece, its bevels are made with the 45° jig. In other words, the locking piece is just a shorter version of the diagonal. So, make it like you did the diagonal. You need eight locking pieces for each hemp leaf pattern.



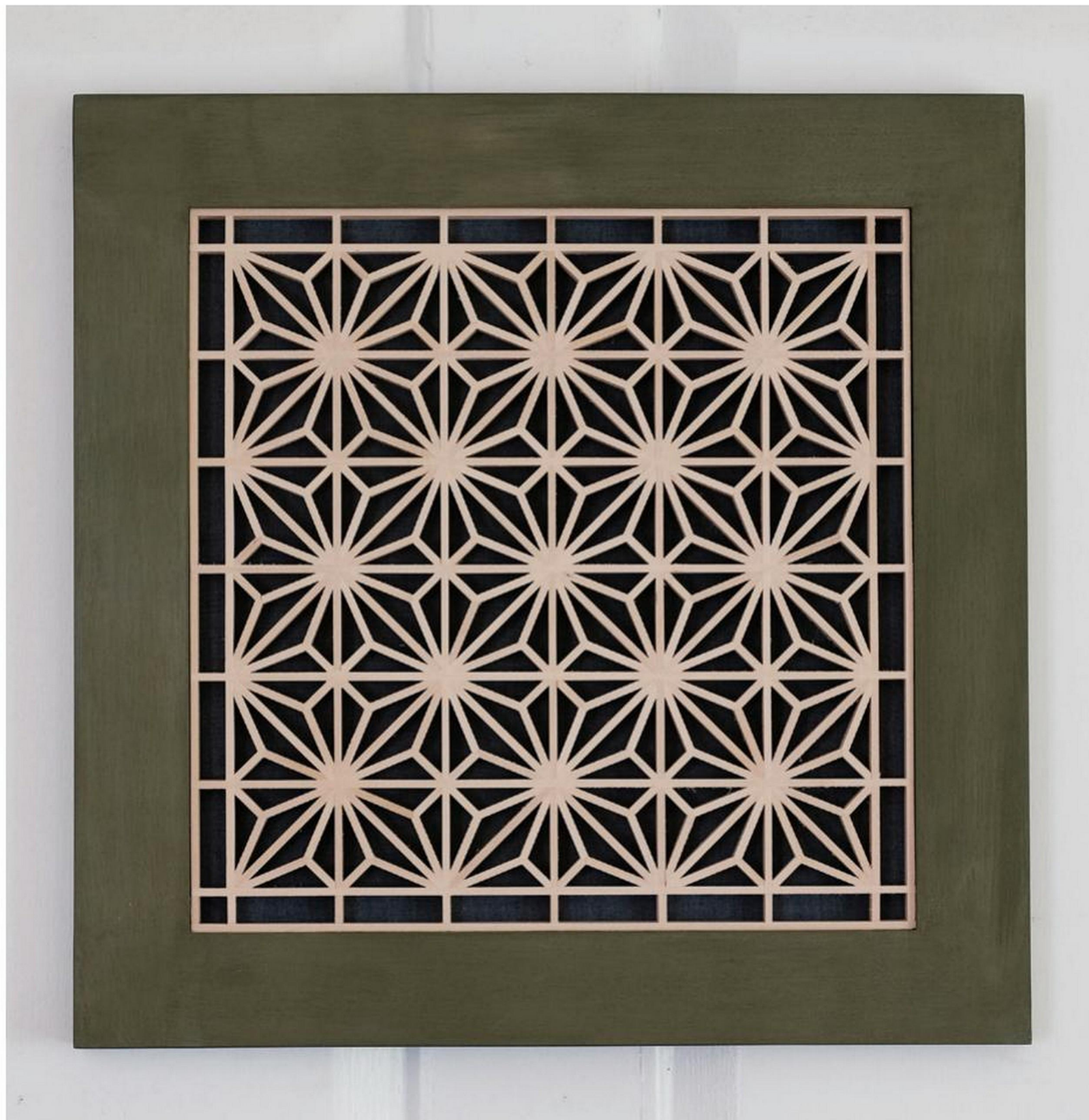
32 Back to the 45° jig. Set the stop just as you did when making the diagonal, so that the bottom edge of the piece's end lands where the groove and reference surface meet. Trim both bevels onto the first end, then rotate the piece end-for-end. Cut the bevels.

33 Press it into place. This should not take a lot of pressure. Nor should it require a hammer. After you get the locking piece in, look at the place where the diagonal and hinge pieces touch. See any gaps? If you do, then the locking piece is too long. If it's not too long, pick up the frame and shake it. Does the locking piece fall out? If so, it's too short.

34 Complete the pattern. After you have the jig's stop set, cut the rest of the locking pieces. Put two hinge pieces in, then a locking piece. Repeat until the pattern is done. Take a moment to appreciate what you've just done. Maybe a few things went wrong, and maybe there are a few gaps, but don't fail to see all that you did right! And please don't point out any small problems to other folks. They won't see them and will love what you've made. I promise.

HOW TO MAKE A FRAME

Many of the panels I make are intended to be used as decorative art, so I frame them. That might take your mind immediately to miter joints, because that's the joint you find in the vast majority of frames. But I think the angled glue line of a miter joint wouldn't fit well with the square joinery used to make a kumiko panel. Instead, I join my frames using modified half-lap joinery. I also figured out a way to cut a through-rabbet on the frame parts, and have the joint fill the rabbet when it's glued together, so that there isn't a gap on the outside of the frame: this results in a quick-to-make and very strong frame.

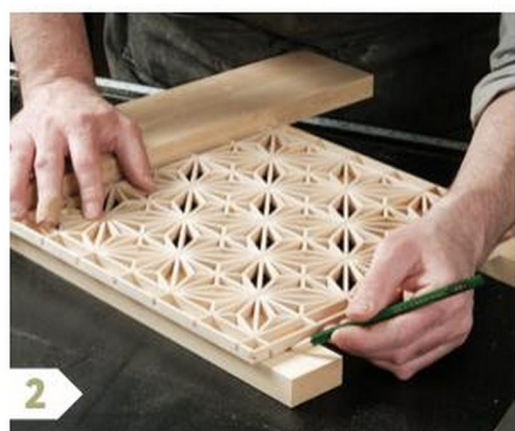


RUN A RABBET

After milling the frame parts to their final dimensions (I'll show you how to determine the length), cut a rabbet with a dado set along one edge of the frame piece. After the frame is assembled, a plywood back will fit into this rabbet. Fabric is glued to front side of the plywood to provide a lovely background for the kumiko panel.



1 Square an end. At the tablesaw, cut one end of all four frame parts clean and square. All of your layout begins from this end.



2 Determine the sides' length. Lay two parts down on a flat surface. Place the other two frame parts together at the end you just squared up. Lay the kumiko panel on top of them. Make a mark on the opposite side of the panel. That's how long all of your frame parts should be cut.



3 Cut to length. Back at the tablesaw, clamp a stop to your miter gauge's fence and cut all four frame parts to their final length.



4 Use a sacrificial fence. After marking the rabbet's depth on the plywood fence (inset), attach the fence to your table saw's rip fence with a few clamps. Lock the fence in place, with about $\frac{1}{4}$ in. of the plywood over the dado set.

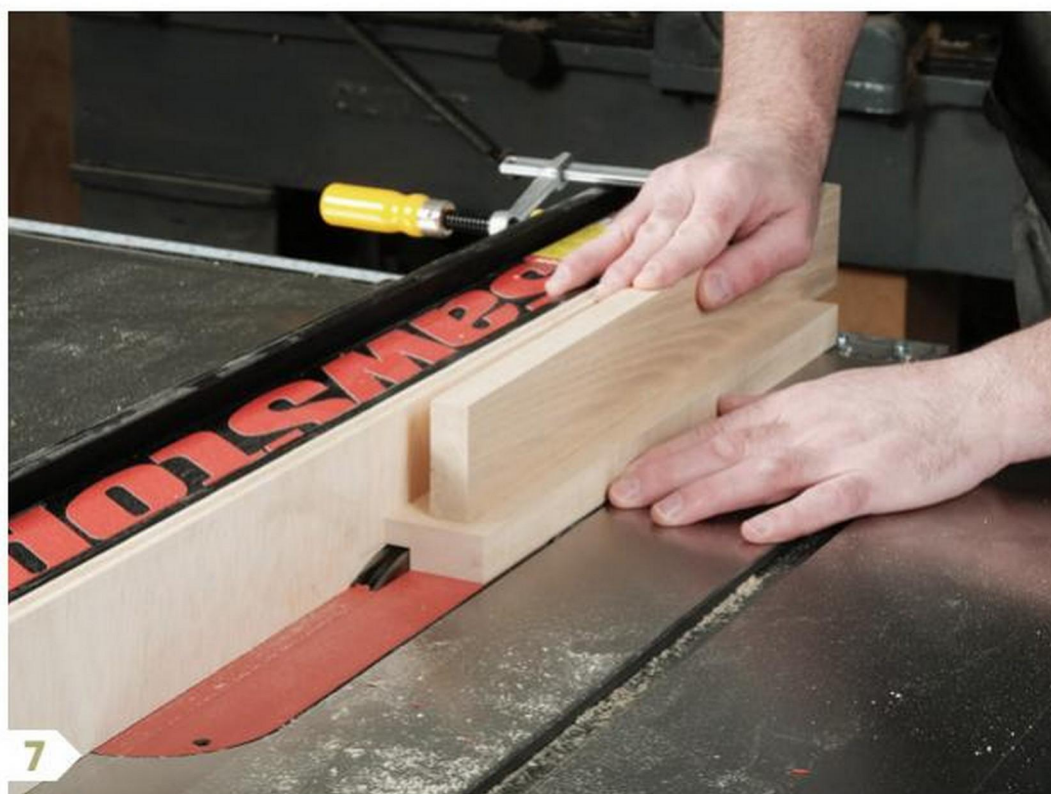
HOW TO MAKE A FRAME

RUN A RABBET *(continued)*

5 Raise the dado set into the fence. Keep an eye on the layout line. When the blades get to it, stop raising them. They are now at the exact right height.

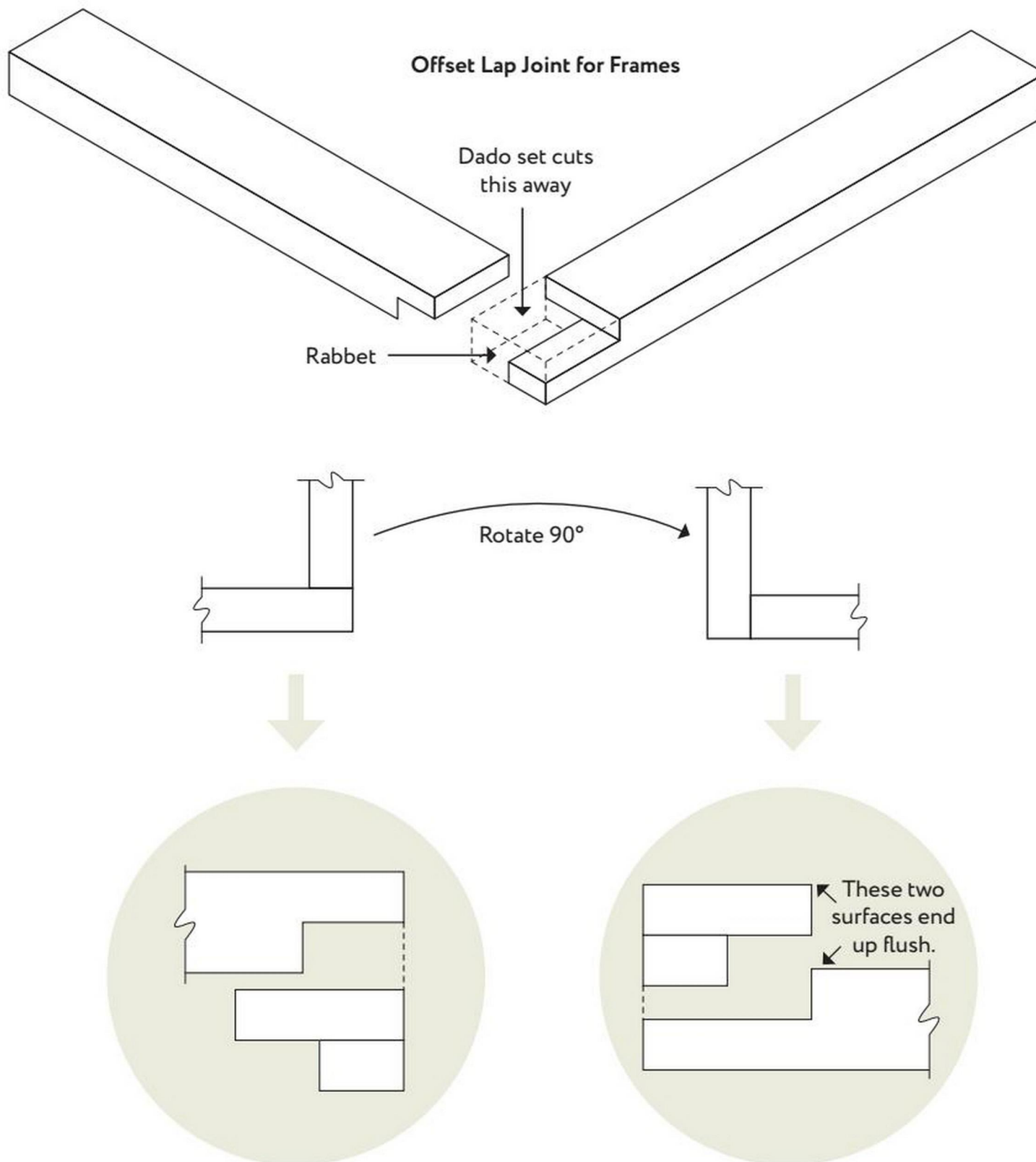
6 Set the width. The rabbet should be at least $\frac{1}{2}$ in. wide to give you plenty of room to staple through the plywood and into the frame.

7 Cut the rabbet. Keep consistent pressure downward and toward the fence, so that the blade doesn't raise the frame part up and cut the rabbet too shallow. Do not adjust the height of the dado set after you are done.



OFFSET THE LAP JOINT

This is not a half-lap joint, because the cheeks cut into the mating parts are not half their thickness. Why? Because the rabbet would be visible from the outside of the frame after assembly. To fill the rabbet, one cheek (the upper one in the drawing) is wider but shorter than the other. When joined, the narrower but longer shoulder fills the rabbet.



HOW TO MAKE A FRAME

OFFSET THE LAP JOINT *(continued)*

Start with the joint's top side

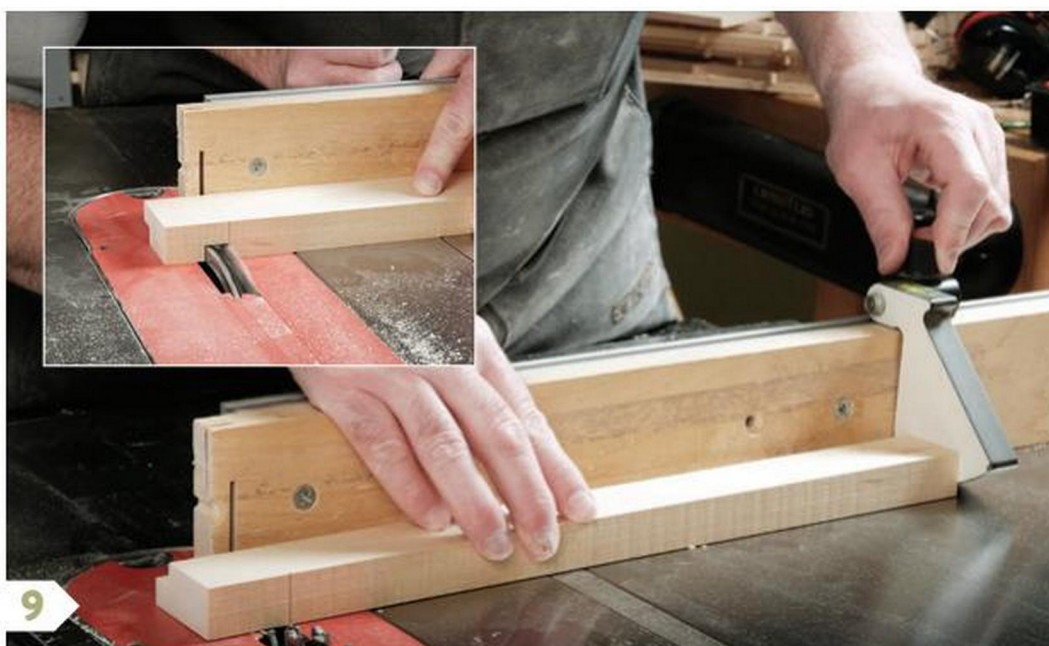
To make the cheek on this piece, you'll cut away material from its bottom face. The dado set already is at the correct height for this cut.

8 Lay out the cheek's length.

Because the rabbet has been cut, this cheek is not as long as the frame part is wide. Rather, it's only as long as the distance from the outside edge of the frame part to the rabbet. Transfer this length by placing two parts perpendicular to one another, with the rabbets oriented exactly as I've done.



9 Dado set cuts the cheek. Set a flip stop on your miter gauge so that the dado set cuts the layout line. Make the first cut to define the shoulder.



10 Flip the stop. Slide the frame part away from the blade and make a second cut. Repeat until the cheek is fully cut. Rotate the part 180° and cut the other cheek, then repeat on a second frame part.



The bottom side completes the joints

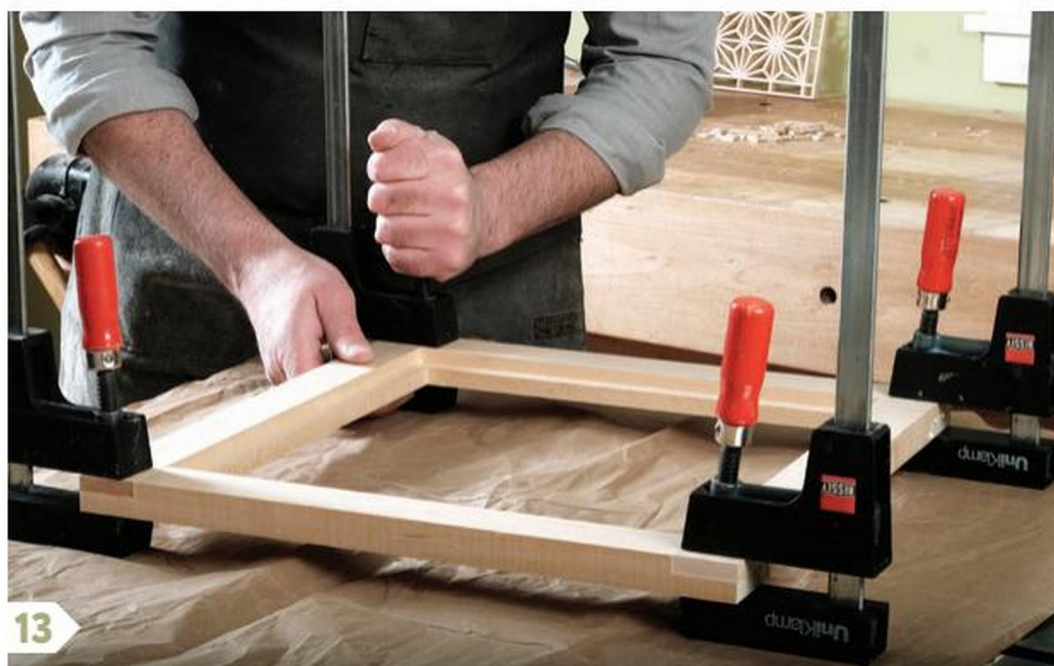
This time, you are cutting material away from the top face of the two frame parts that are on the bottom of the joint, with the dado blades set to cut up to, but not into, the rabbet.



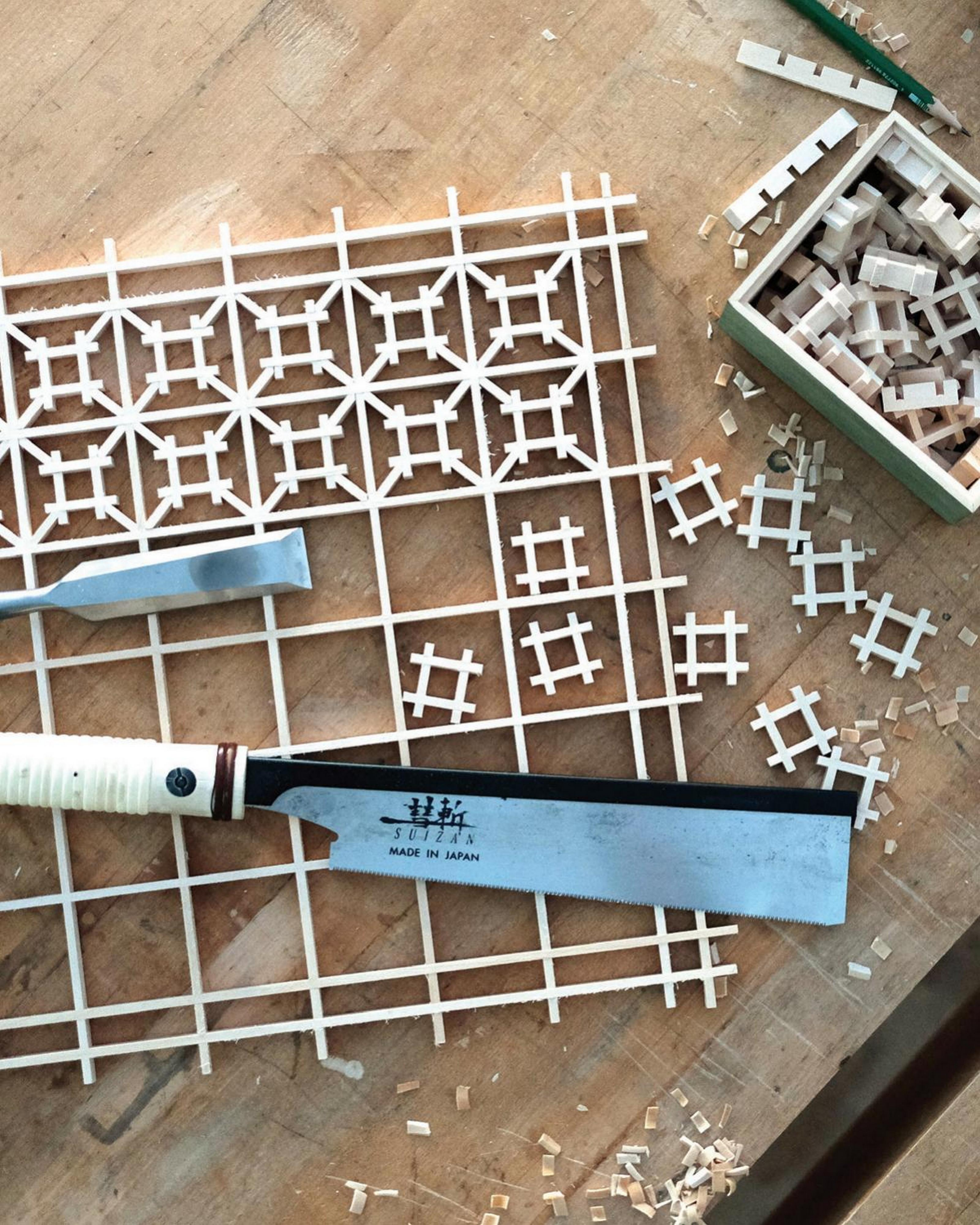
11 Lay out the cheek. Place one of the frame parts on top of another, flush to the end and square to it, so that it looks like a corner in the completed frame. Trace along the edge of the piece you've already cut a cheek into to mark its full width on its joint mate. Use a square to carry the line down the edge.



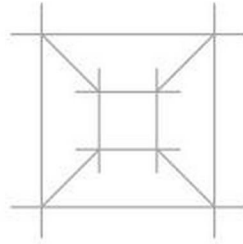
12 Cut the cheek. Set a flip stop so that the dado set cuts up to, but doesn't cut away, the layout line. Make the first cut to define the shoulder. Flip up the stop, slide the part back and remove the rest of the waste. Rotate and repeat.



13 Glue up the frame. Normally, I need clamps only to pinch the joint together, but if the shoulders on the top are not closed, add clamps across the frame to pull them tight.



蘇新
SUZAN
MADE IN JAPAN

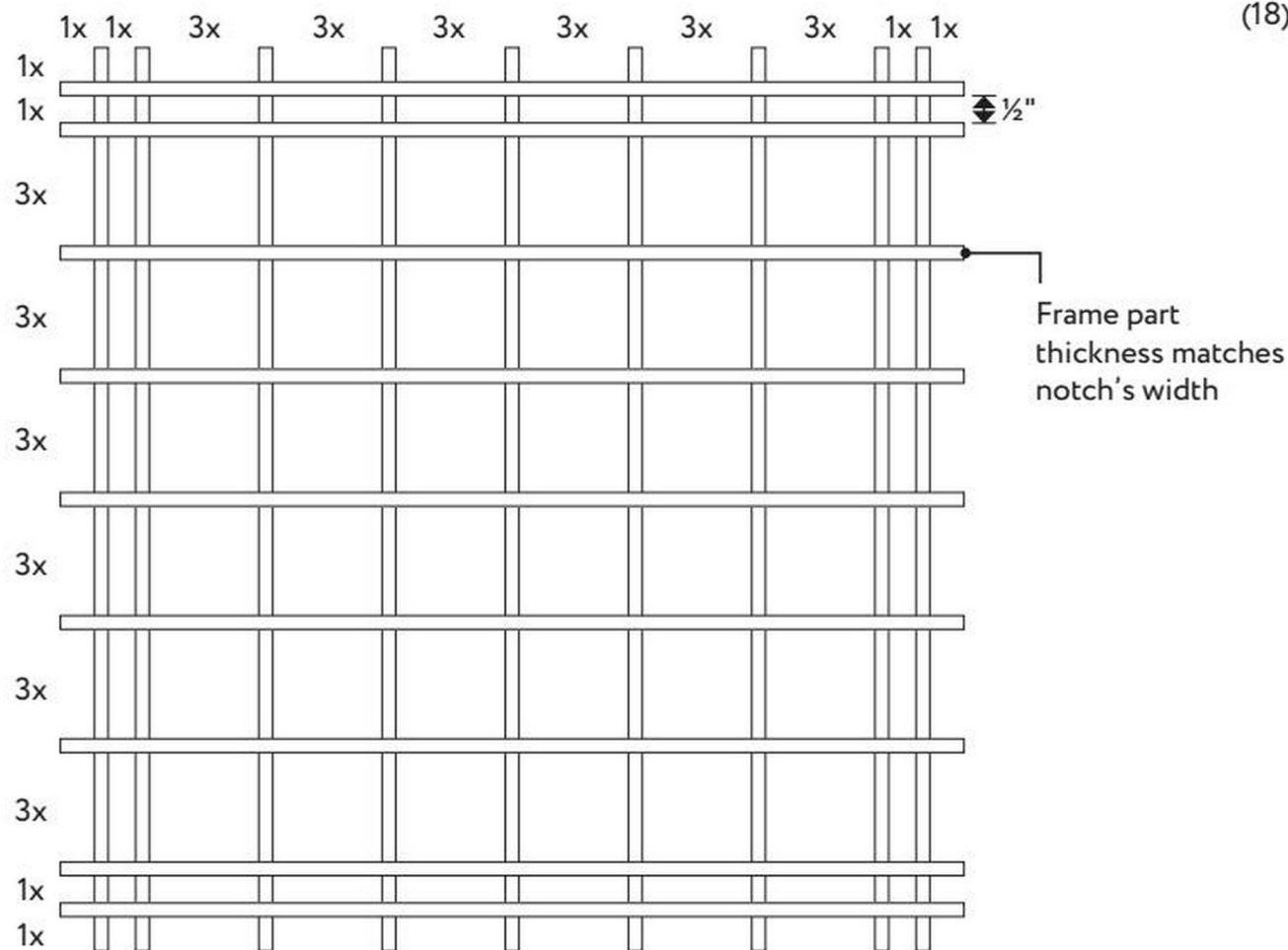


CHAPTER 3

HASHTAG

Great design is timeless. Design that presages an age hundreds of years off? Astounding. Or perhaps I should be ashamed of seeing the now-ubiquitous hashtag in this simple but elegant kumiko pattern. Yeah. Definitely the latter. Regardless, this is a fun pattern. The square at its center is quick to make at the tablesaw, and the four locking pieces that hold it in place are identical. The only trick is to make sure that the hashtag is in fact centered in the frame. Fortunately, all you need is a bit of patience to get you there.

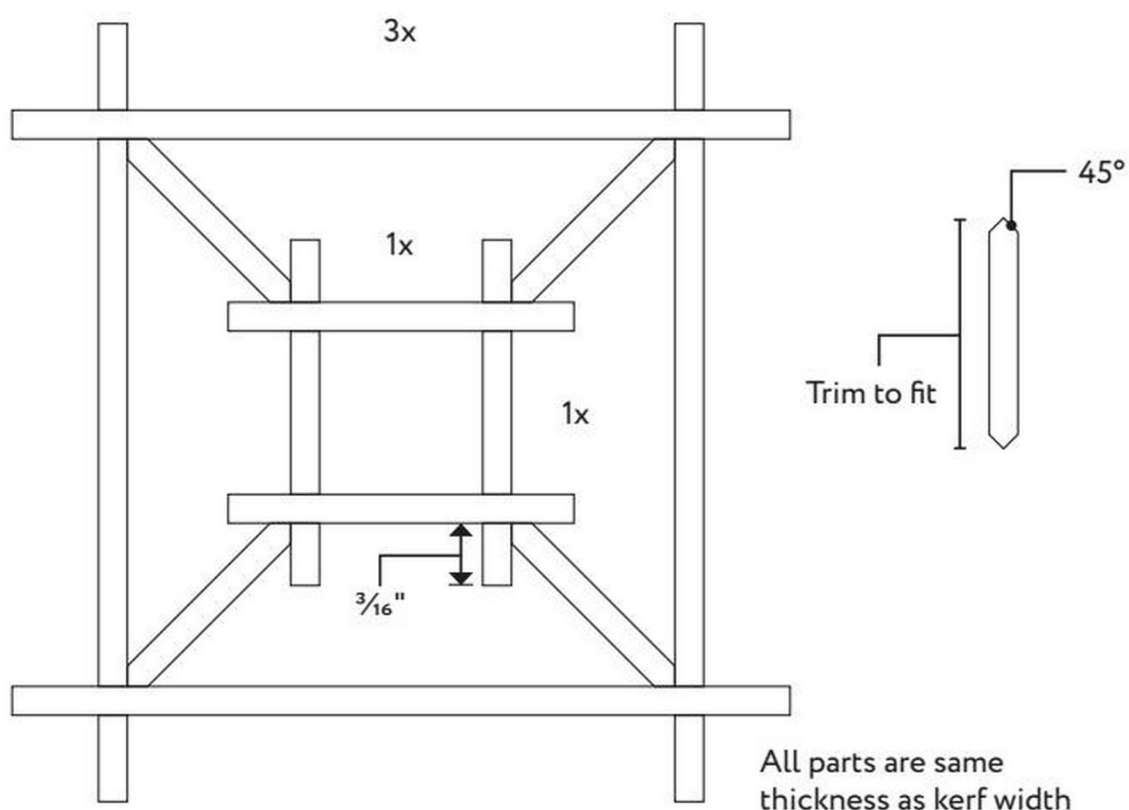
FRAME DRAWING



FRAME PARTS

(18) Frame Pieces

PATTERN DRAWING



PATTERN PARTS

(4) Hashtag Sides

(4) Locking Pieces

GUIDE BLOCKS

45°

START WITH A LONG BLANK

Tablesaws are dangerous, and the last thing you should do is try to cut notches into extremely short, but quite wide, boards. Instead, use a board long enough that you can cut the notches in it for multiple groups of hashtag pieces. After cutting the notches, cut the hashtag pieces to length. This technique not only is safer than working with a bunch of short blanks, it's also much faster. Cutting the notches takes no time at all.



1 Butt the board against the pin. Cut a notch that's just past halfway into the board's thickness. The distance from the pin to the notch is slightly longer than the length of the hashtag's horn.

2 One space separates the notches. Place the first notch on the registration pin and cut the second one. These notches become the joints that hold the hashtag together.



3 Jump three spaces between parts. Add an auxiliary finger joint jig onto the sled and fence. You need the additional space between pairs of notches so that you can crosscut the pieces to length and maintain the correct horn length outside the notches.

> START WITH A LONG BLANK *(continued)*

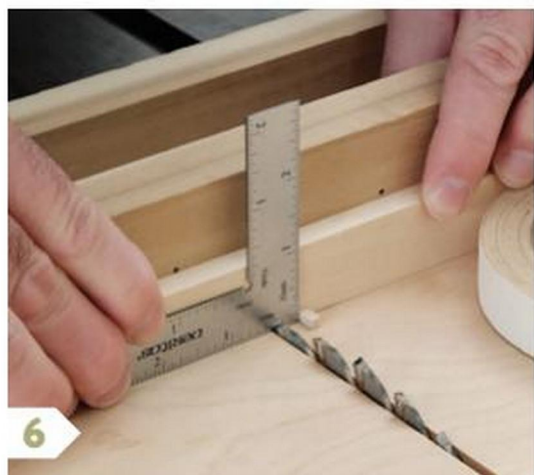
4 Cut the second group. After cutting the first notch with the auxiliary jig in place, remove the jig and cut the second notch.

5 Finish out the board. Cut as many notch pairs into the board as you can, keeping in mind to use the auxiliary jig between pairs so that they are separated by three spaces.



CUT THE HASHTAG PIECES TO LENGTH

The bit of kumiko that extends past the notches, what I call the horn, should be the same length on all pieces, so that the hashtag has a uniform, clean, and elegant appearance. The quickest and most accurate way to make them the same length is a finger joint jig. Register the notches on the pin and crosscut the pieces. It's the same technique used to ensure that all the horns on a frame are the same length.



6 Locate the pin. Tape or screw a finger joint jig to a crosscut sled so that the pin is $\frac{3}{16}$ in. from the blade. I don't use my kumiko frame sled because the pin in its fence gets in the way.

7 Trim the end. Raise the blade so that it's about $\frac{1}{16}$ in. higher than the board's thickness. Then, place the first notch in the board over the pin and push the board through the blade. The horn is now $\frac{3}{16}$ in. long.



8 Cut free. Rotate the board 180° and place the second notch onto the pin. Push it through the blade and cut the hashtag pieces free from the board. Repeat until all of the groups of pieces are cut to length.

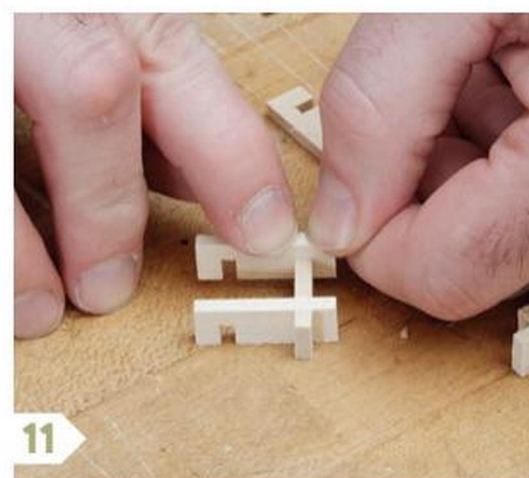
RIP THEM FREE

I'll say it again: Tablesaws are dangerous. These are very short parts, and they are wider than they are long. However, you can rip the strips from them safely, but you'll need to take some time to make a push stick to guide them safely through the blade. Do this. Do not tempt fate. It's not worth it. Unlike Frodo, you won't be a hero for losing a finger. You'll just have nine (or fewer) fingers.

9 Make a custom push stick. There are two layers, both as thick as the little board you are ripping. Glue them together, with the one on top extended past the one on bottom, so that it completely covers the tiny board. The push stick should be at least as wide as the workpiece.

10 Keep your fingers safely away from the blade. Attach a handle to the push stick or use a push pad with a grippy foam bottom to push the workpiece and push stick through the blade. Also, the blade should rise only just above the workpiece, so that it is buried in the push stick as you make the cut.

11 Assemble the hashtags. There is no need to glue them together. And even though these pieces are very short, you can still break them, so apply pressure directly over the joint.



MAKE THE LOCKING PIECES

Like the short pieces that hold the hemp leaf pattern together, the locking pieces for the hashtag pattern have 45° bevels cut into each end. The length of all four pieces is critical, because their lengths is what determines the hashtag's location in the square. All four need to be the same length to center the hashtag.



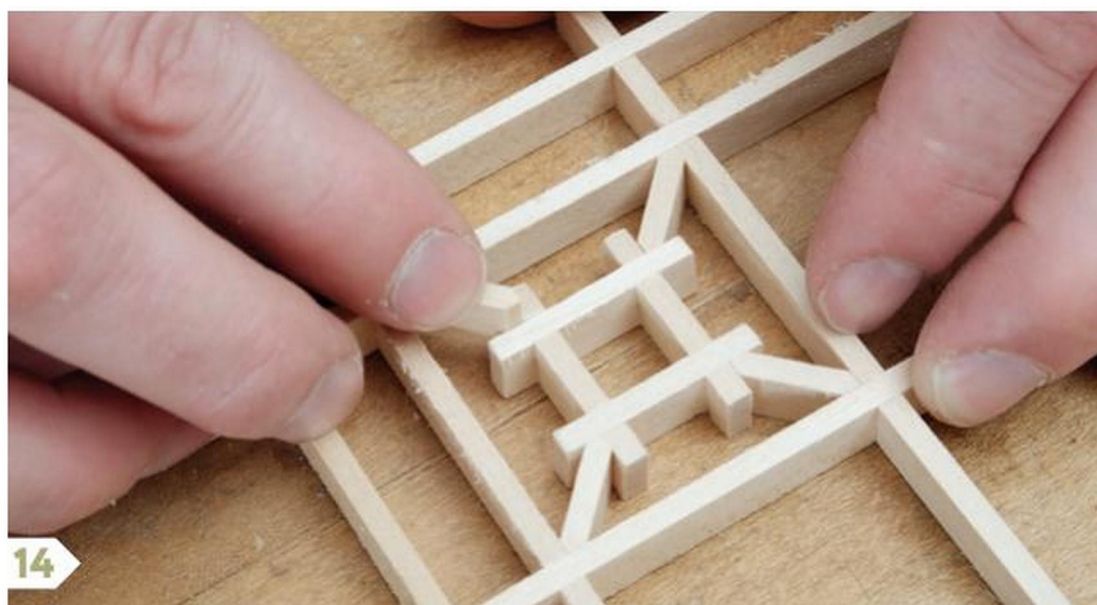
12



13

12 Mark the rough length. After placing the hashtag in the center of the square (you'll have to eyeball this), place an un-notched strip diagonally across the square and hashtag. Don't try to mark it exactly. It should be long at this point, just in case your eyeballing isn't as accurate as you thought.

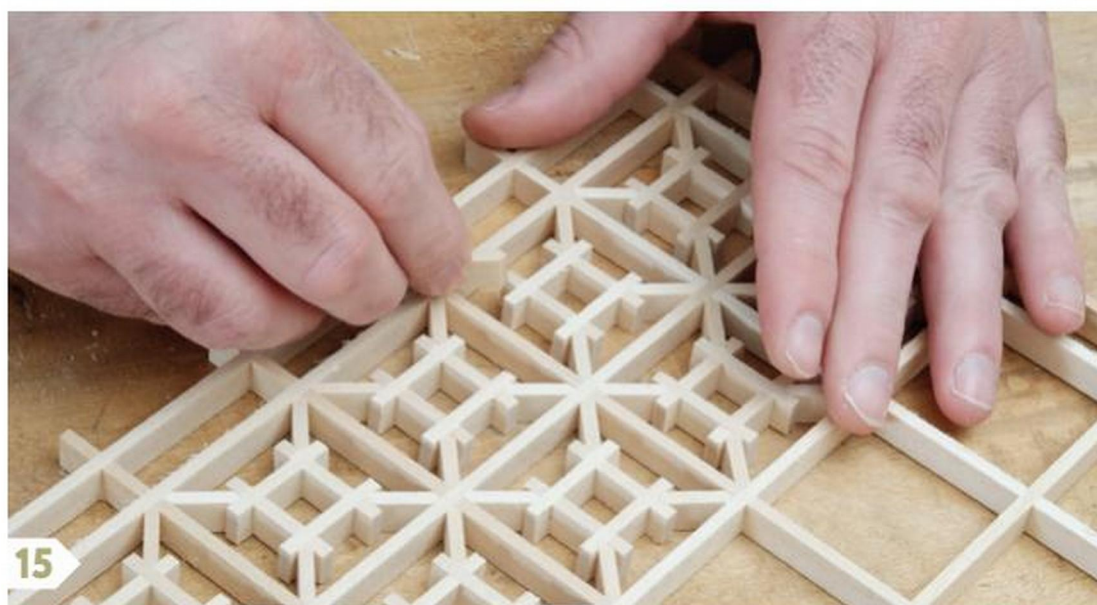
13 Bevel the ends. The process here is the same as it was for the diagonals and locking pieces in the hemp leaf pattern. Cut both bevels at one end, flip the piece, then bevel the other end.



14

14 Test four diagonals at once. When all four fit snugly, and you don't have to force the last one in, they're the right length and the hashtag is centered.

15 Complete the pattern. Make all the locking pieces then fit the pattern together.



15

MILK PAINT

Most of the kumiko panels that I make are intended to be hung on the wall as decorative art. So, I frame them (pp. 42-47). I paint the frames, because I believe a natural wood frame, say cherry or walnut, would compete for attention with the kumiko. There just isn't enough difference between the natural wood and the basswood panel. Paint, however, is a different medium altogether. Visually it encloses the panel and allows it to stand forth. The kumiko is the lead singer. The painted frame is the backing band. The specific type of paint that I use is milk paint from the Old Fashioned Milk Paint Co. I love the traditional colors the company offers, and the ability to mix different colors to create new ones. It's easy to mix and apply. After it dries, the paint has a variegated color that appears almost to have a texture. It gives the paint a softness and organic feeling that latex and acrylic paints do not have, and that's a lovely complement to the geometric boldness of the kumiko.

POWDER + WATER = PAINT

Milk paint comes as a powder that you mix with water. This starts a chemical reaction. As the mix thickens, you can add more water, and you can store it overnight. If you do that, cover it up to slow down the loss of water. The paint is good for up to 24 hours.

1 Use plenty of warm water. I've found that the best ratio is 1 part milk paint powder to 1½ parts warm water. You could even go as high as 2 parts warm water. The mixture should be thin initially, as it thickens over time.

2 Stir and let sit. Use a wide stick of hardwood, about ¼ in. thick, to mix the powder and water together. Do your best to mash clumps out of the powder and break them apart. Wait about 1 to 1½ hours before using the paint, mixing it periodically during that time.



MULTIPLE COATS PRODUCE THE BEST COLOR

After a first coat of milk paint, you might think that all you've done is stain the wood. If you are like me, you'll want to apply at least two more coats of paint, so that the wood is completely covered. If I'm not happy with how the paint looks after three coats, I'll keep adding them until I am happy. There is no magic number.



3 Brush on the first coat. The best type of brush for milk paint, at least in my experience, is one with Taklon bristles. You can find them at craft and art supply stores. You don't need to be precious when you apply the paint, but do brush with the grain.



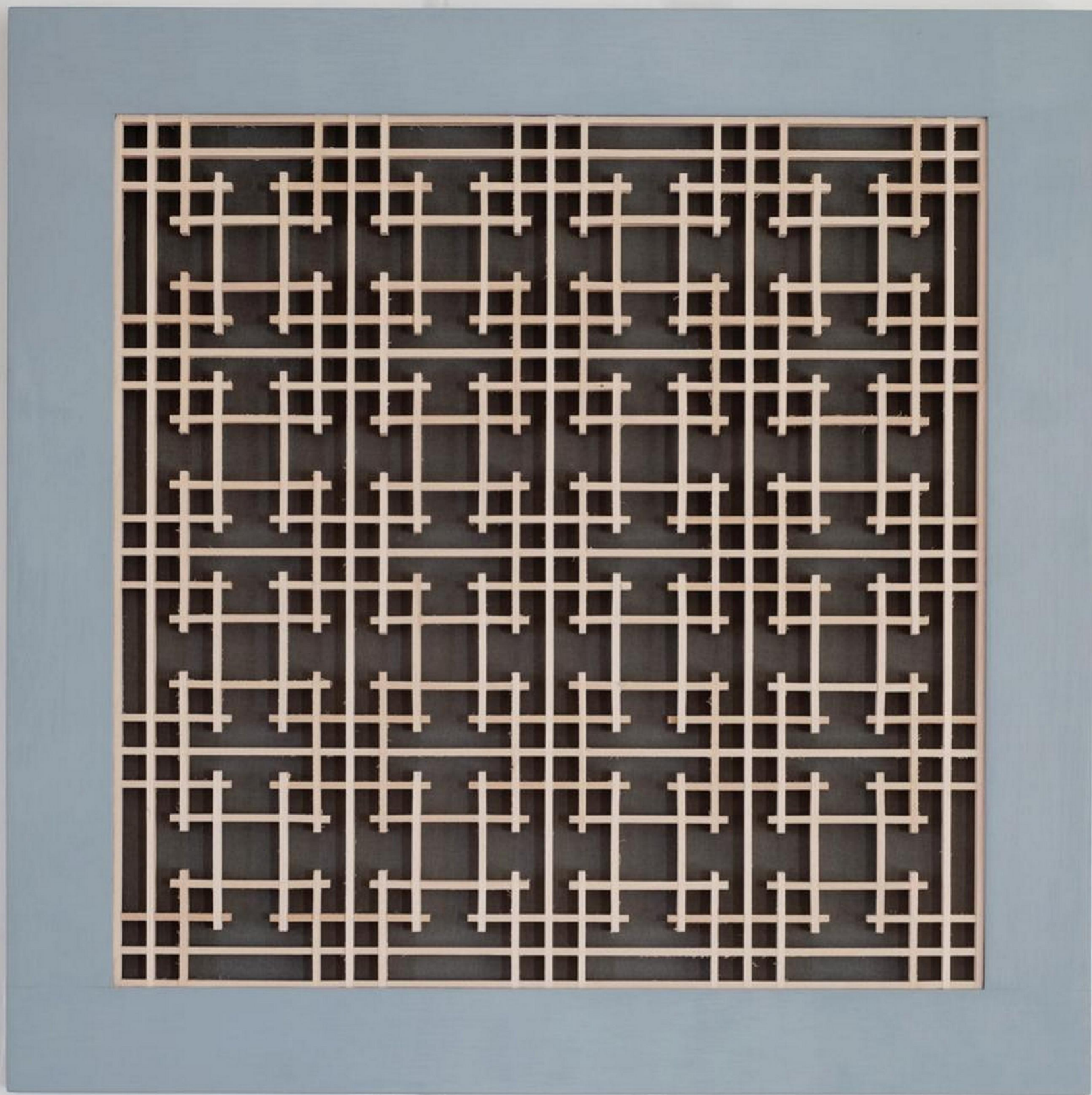
4 Sand smooth. Because of the high water content of milk paint, it does raise the grain. After the first coat is dry, knock down the grain with P-320 grit sandpaper. It takes about an hour for the paint to dry in most parts of the country. However, in very dry climates, I've seen it dry in as little as 15 minutes.

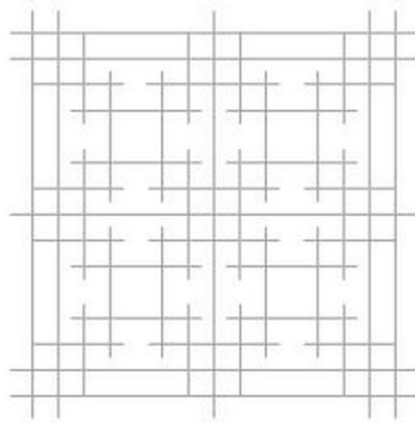


5 Add more coats. Wipe down the frame to remove the sanding dust. Apply another coat. Sand it when dry, then apply at least one more coat.



6 Rub on some wax. After the final coat of paint is dry, sand the frame one last time. Use P-400 grit sandpaper. Then wax the frame with a high-quality furniture wax.





CHAPTER 4

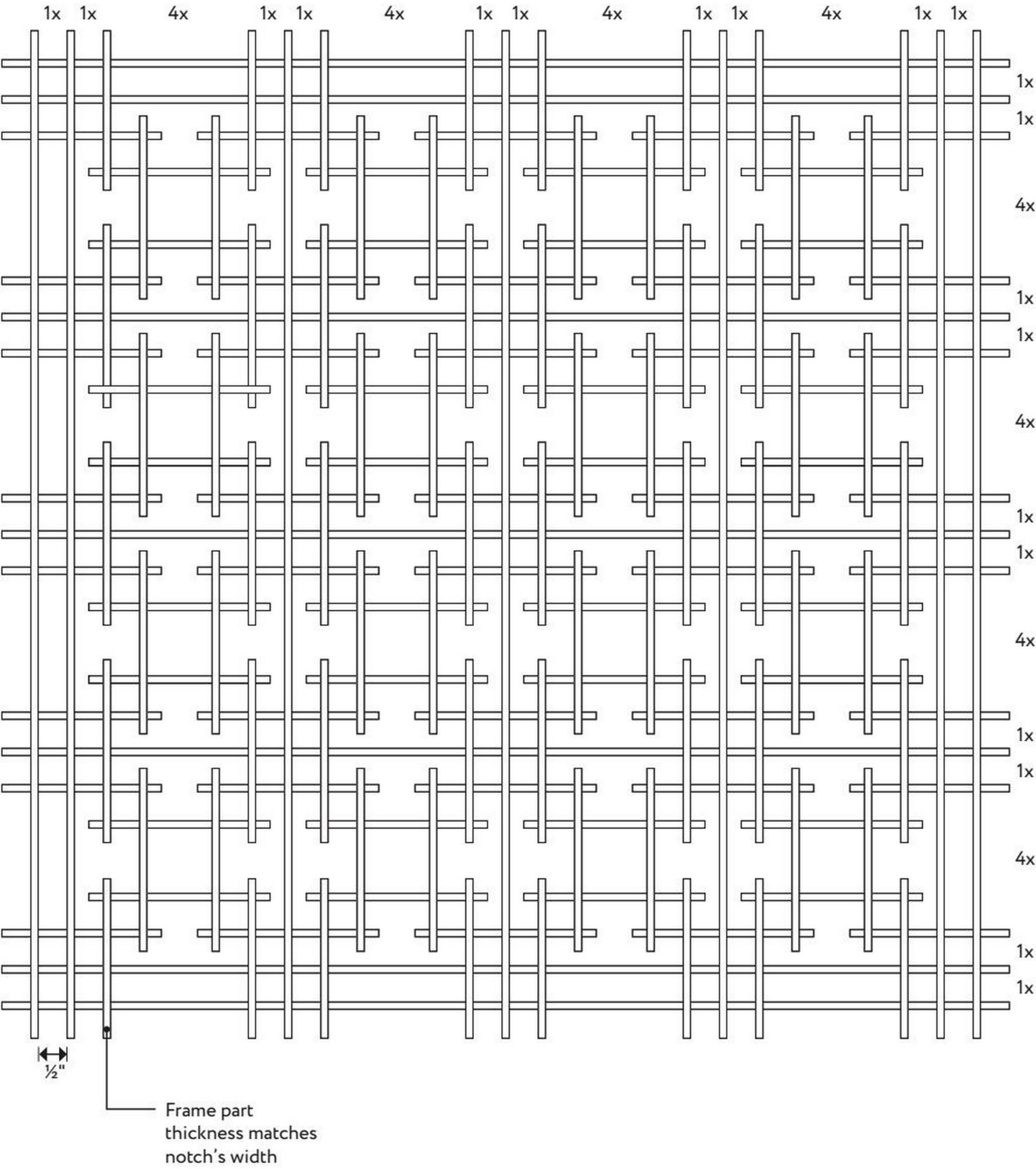
HOLDING HANDS

I love this pattern. The interwoven kumiko strips create a field of squares that are linked to one another. It reminds of a group of happy children. But like a group of kids, it can quickly turn against you if you don't manage it just right. So, keep your eye on how tightly the parts fit together as you are ripping them. If they are even just a smidge too thick, you'll end up with a panel that curls up like a potato chip. There are so many notches, and the small amount one notch must spread to accommodate its mate is compounded as you build the pattern. There should be absolutely no compression in your test joints.

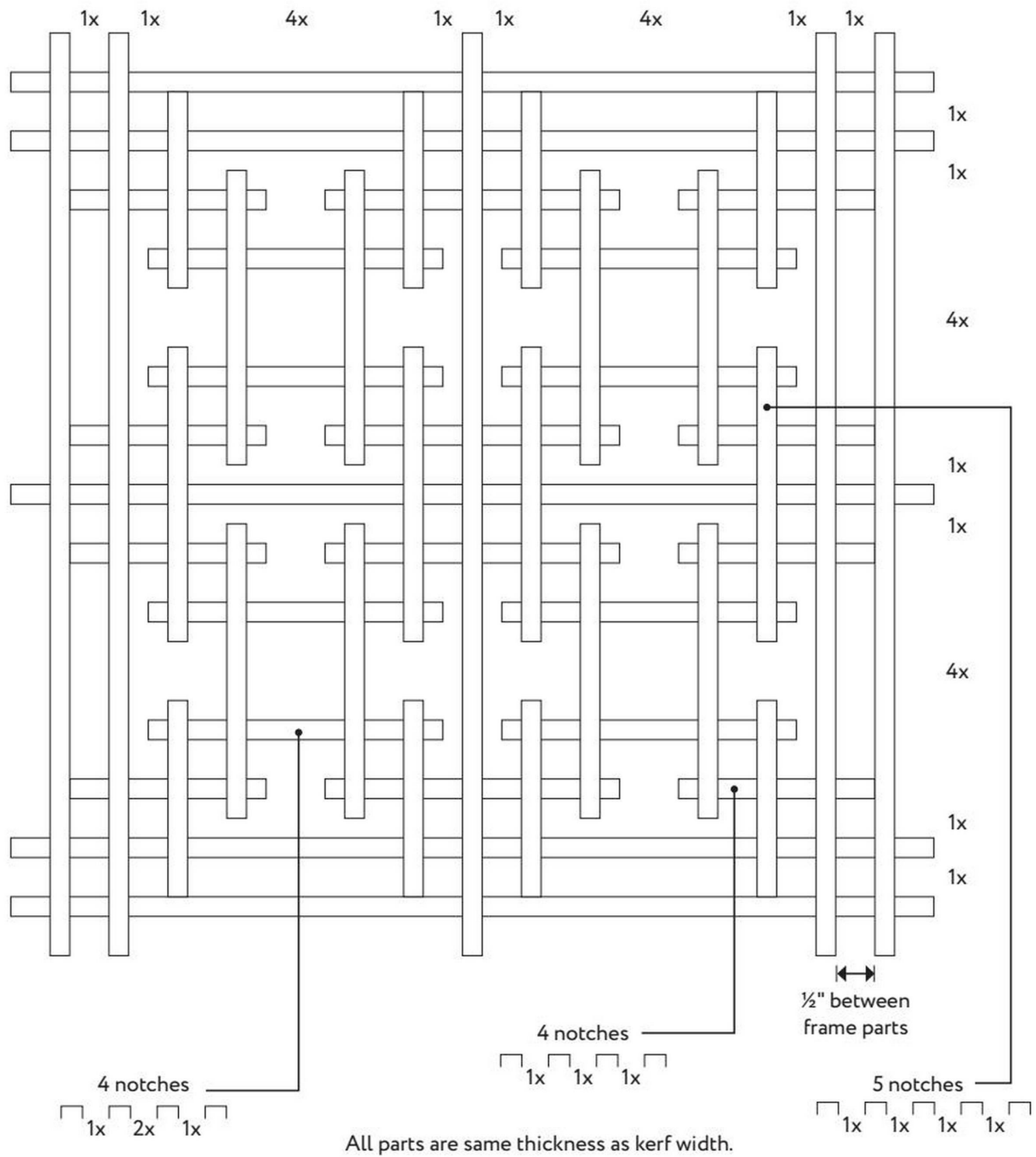
FRAME DRAWING

FRAME PARTS

(14) Frame Pieces



PATTERN DRAWING



PATTERN PARTS

(64) 1-2-1 Pieces

(64) 1-1-1 Pieces

(48) 1-1-1-1 Pieces

GUIDE BLOCKS

None Required

MAKE STRIPS FOR THE NOTCHED PATTERN

There are two different strips needed for this design. One has five notches, with a single space between them. The second starts with two notches separated by a single space. Then there are two spaces between the second and third notches, and a single space between the third and fourth notches. In other words, there are five notches, but the one in the middle isn't there. I'll show you how to make the five-notch strip here.

1 Use the pin as a stop. Set the board's end against the pin and push the board through the blade. As is the case with frames, the blade should cut just past the middle of the board's thickness, so that the strips are flush when the joint is brought together.

2 Second notch is a space away. Put the first notch on the pin and cut the second one.

3 Cut three more notches. There are a total of five notches on this pattern piece, each one separated by a single space from those beside it.

4 Jump two spaces between sets of five. Position your auxiliary fence so the first notch is set over the pin on the sled. This extra distance comes in handy when cutting the parts to length. There's more than enough room for the blade's kerf between the horns on adjacent strips.

5 Notch the rest of the board. The 4-notch strip is made the same way. Just be sure to jump 2 spaces between the second and third notch. Calculate how many strips you'll get from one section ($\frac{1}{8}$ in. for each strip + $\frac{1}{8}$ in. for each ripping cut = $\frac{1}{4}$ in. of board width to make one piece) then how many five-notch sections you need. Cut some extras, too.



CUT THEM TO LENGTH

It's important that the length of the horn at the ends of the strip are the same length, so use a finger joint jig on a crosscut sled. Otherwise, the pattern will appear jumbled and chaotic (and that's not kumiko at all) rather than calm and orderly. But the horns are short, so take care not to break them off.



6 Measure to locate the pin. I space the pin just over $\frac{1}{8}$ in. from the blade. This keeps the horns long enough to minimize breakage, but short enough that they don't crowd the pattern either visually or physically.



7 Attach the jig. A few screws work great, but so too does double-stick tape. Either way, make sure the jig doesn't move, so that the horns will all be the same length. Even a small difference will be seen by the eye.



8 Trim the first end to length. The first notch in from the end of the board is registered on the pin, and the blade, for the sake of safety, should be just a hair higher than the board.



9 Rotate and cut free. Spin the board 180° , put the fifth notch on the pin and make the cut. Repeat this process to cut the remaining sections free from the board.

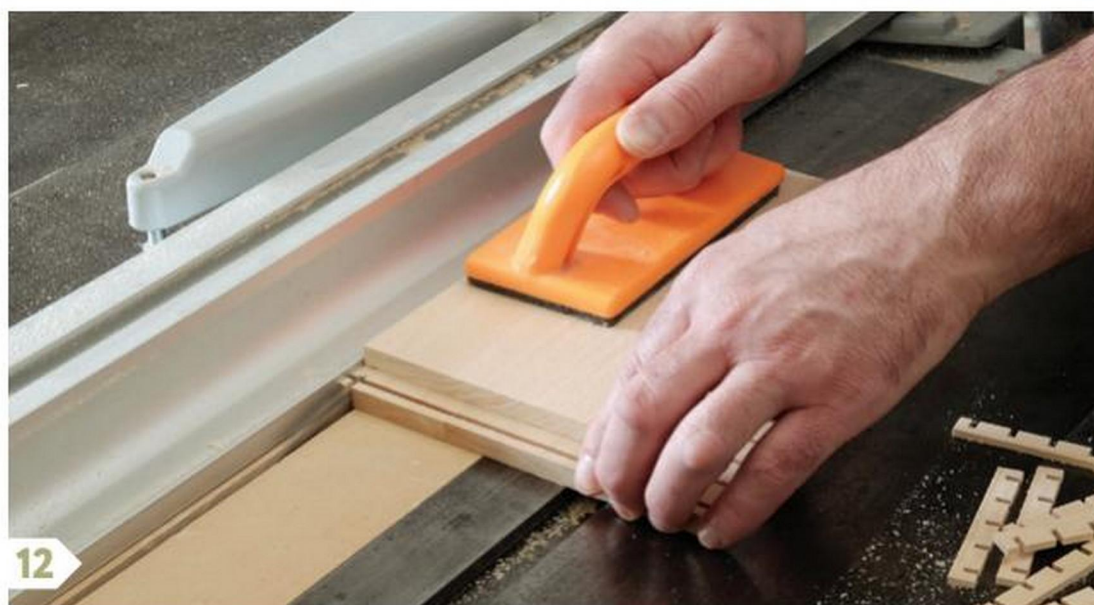
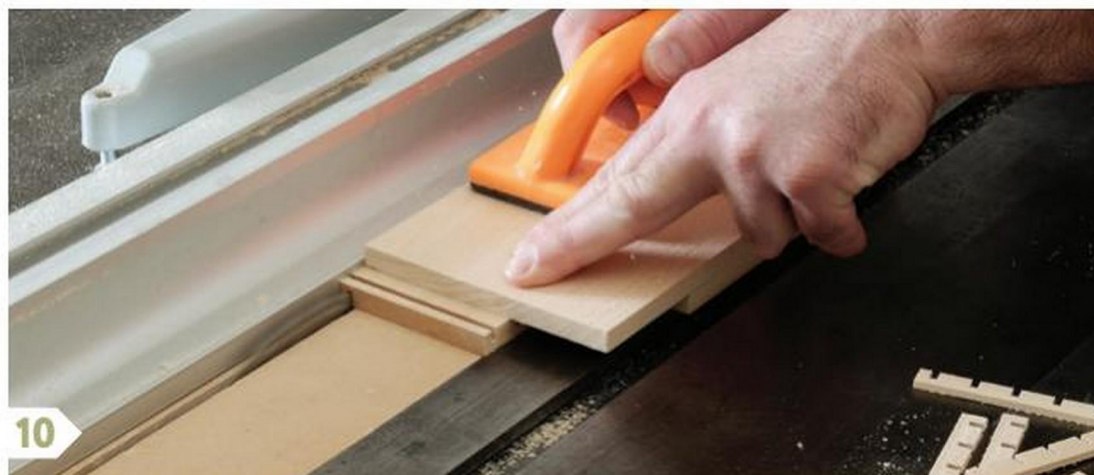
RIP THEM OUT

Take your time here to dial in the thickness of the strips. Your test joints should go together with little to no pressure, but without gaps, too. It might be tedious to get it just right, but it's worth the effort. There is no doubt that patience is the most important tool when making kumiko.

10 Use a custom push stick. Make this one just like the one used for the hashtag pattern. Glue two pieces of wood together, the bottom one the same thickness as your workpiece. The top one should cover more than two-thirds of the part's length.

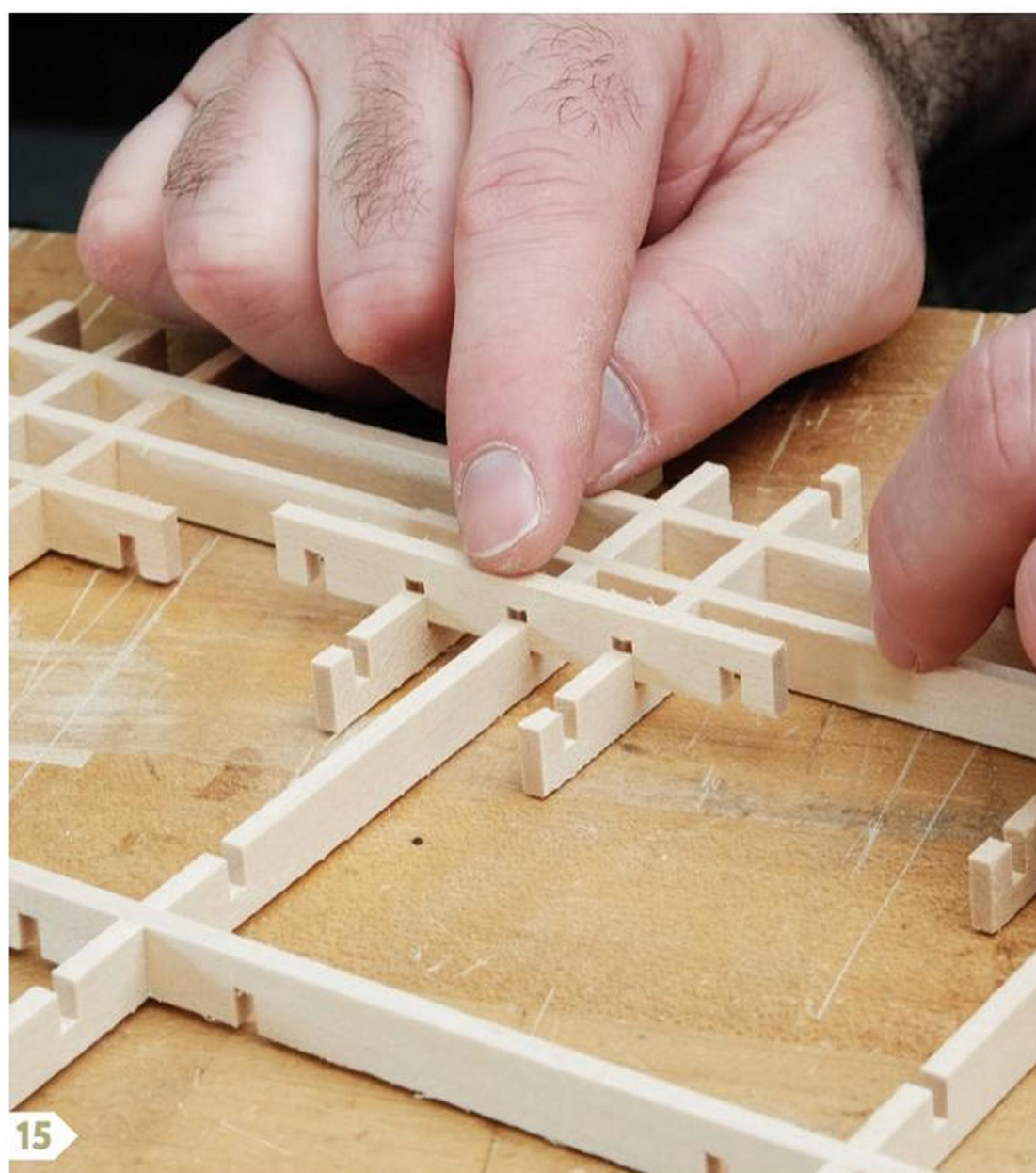
11 Hold tightly but safely. When the workpiece becomes too narrow, slide the next piece in beside it. This allows you to apply downward pressure and keep your fingers a safe distance from the blade.

12 Keep ripping. You should be able to cut strips from the workpiece until it's completely gone. Slide the next piece over and cut some more strips. You need a lot of them!



ASSEMBLE THE PATTERN

There are a lot of pieces to put together, and there is a specific order in which they need to be added to the pattern. It can get confusing, but if you slow down and enjoy the process, you won't have any problems keeping things straight. It's better to do something right than fast.



13 Use glue around the perimeter.

I use a strip of kumiko and pare a chisel bevel into one end, which allows me to get down into the notches. Because these joints are glued together, you can cut the horns off later.

14 Work around the outside. These pattern pieces actually need just four notches, but use the five-notch strips. The second notch in from the end mates with the notch in the outer frame piece.

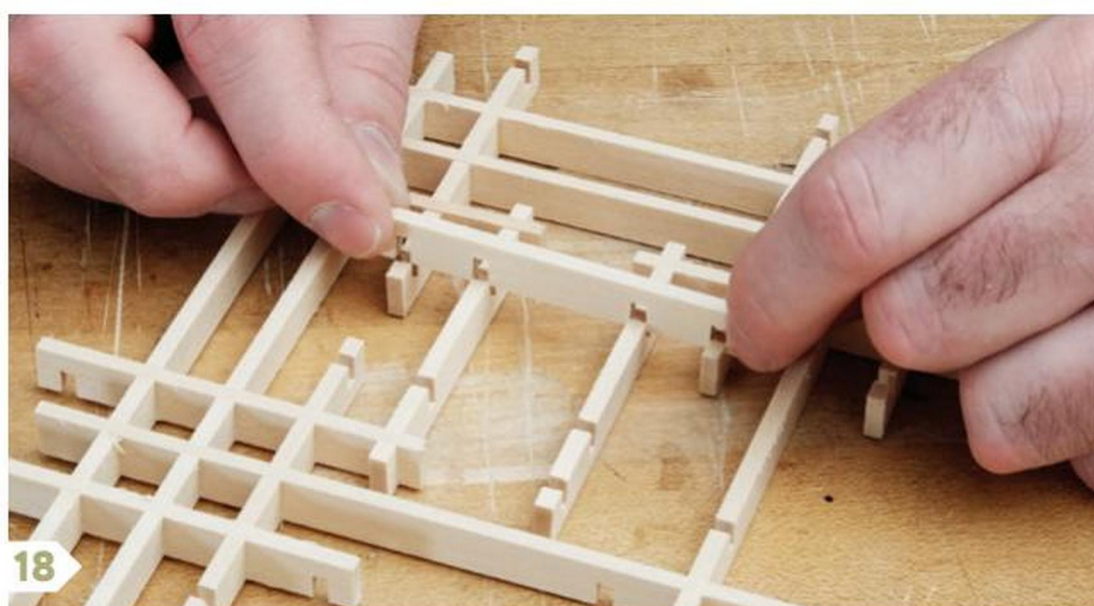
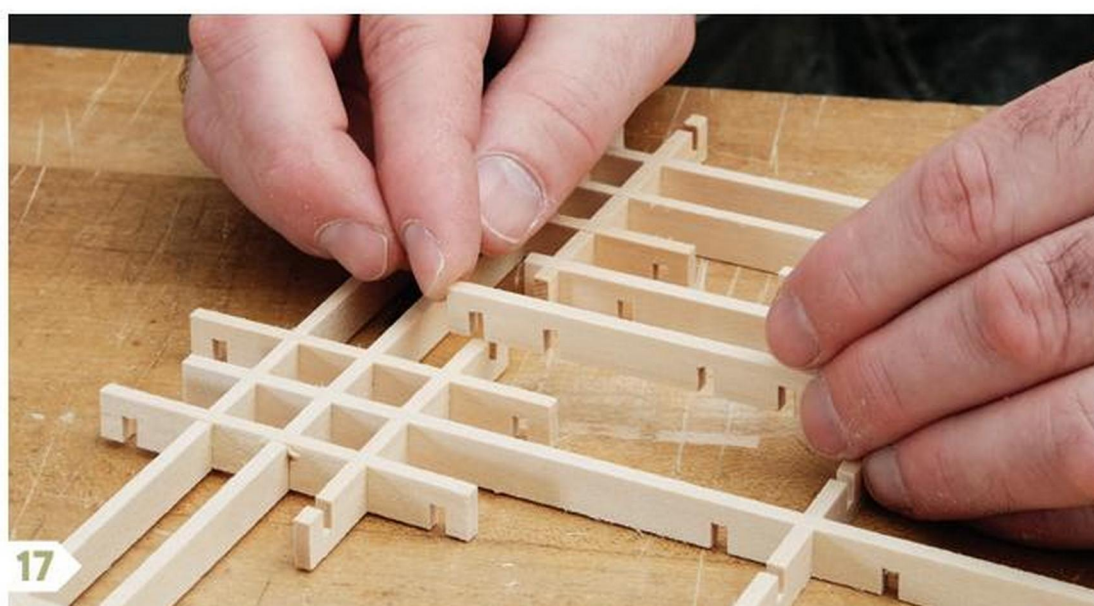
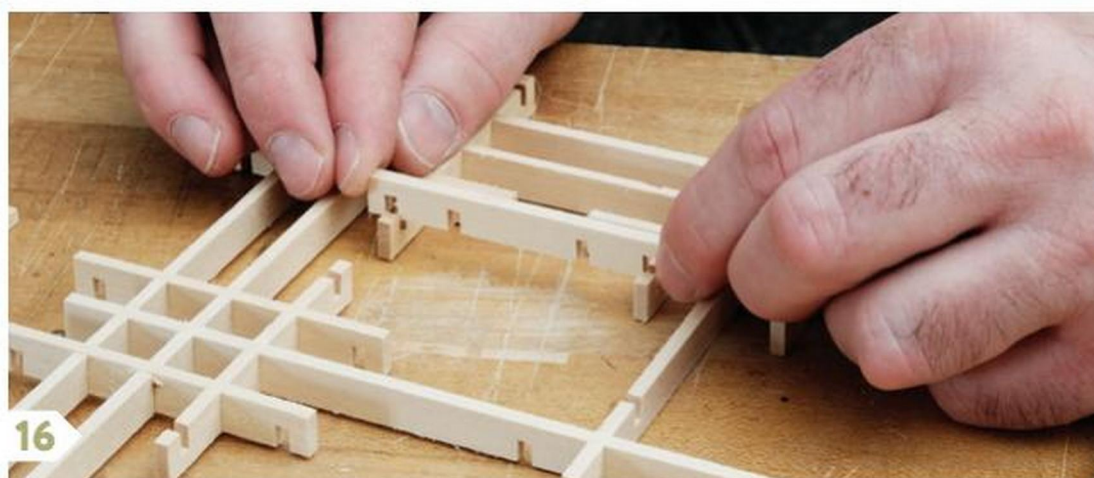
15 Link them together. Here's where all five notches come into play. This piece joins the pattern in one square of the frame to the pattern in the square next to it. Seat each joint a little at a time until the entire strip is completely seated.

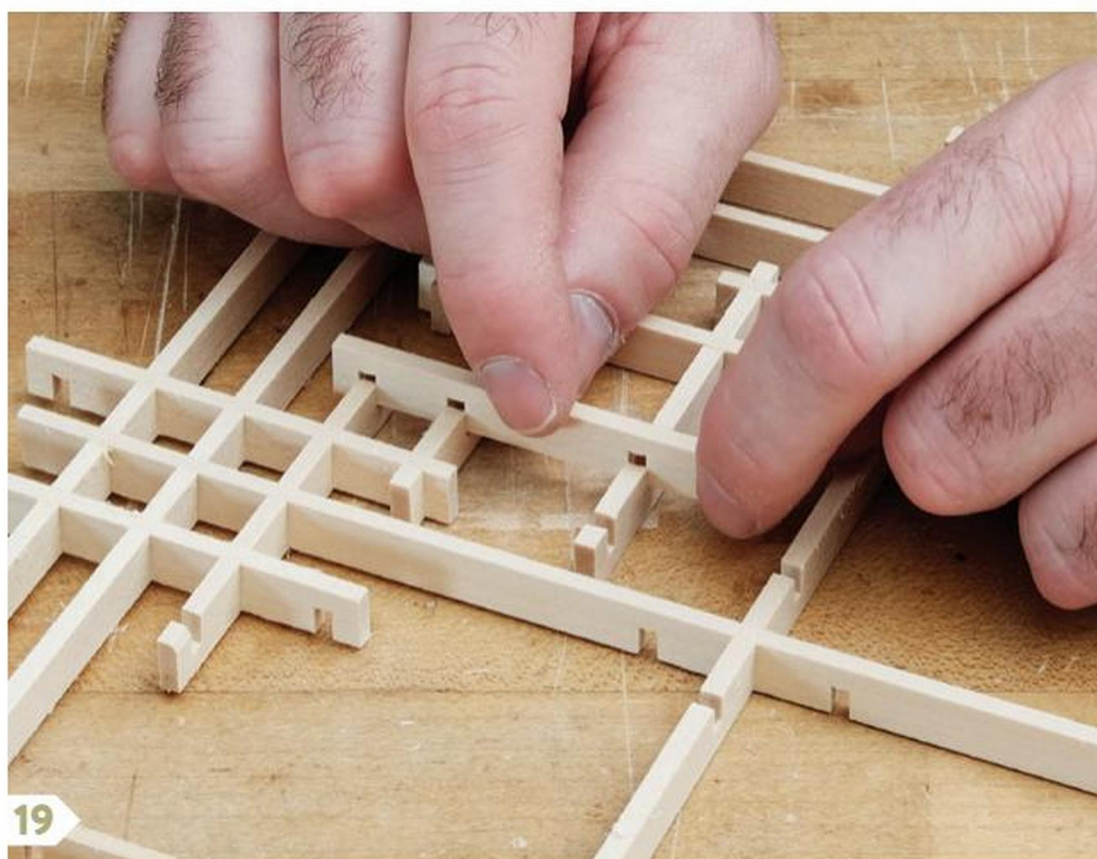
ASSEMBLE THE PATTERN *(continued)*

16 Begin making the squares. Switch over to the second type of strip, the one with middle notch missing. The two outer notches hold hands with the strips already in the panel. There is no need to glue these joints together.

17 Add the square's second side. Right now, this piece is joined to just one other strip.

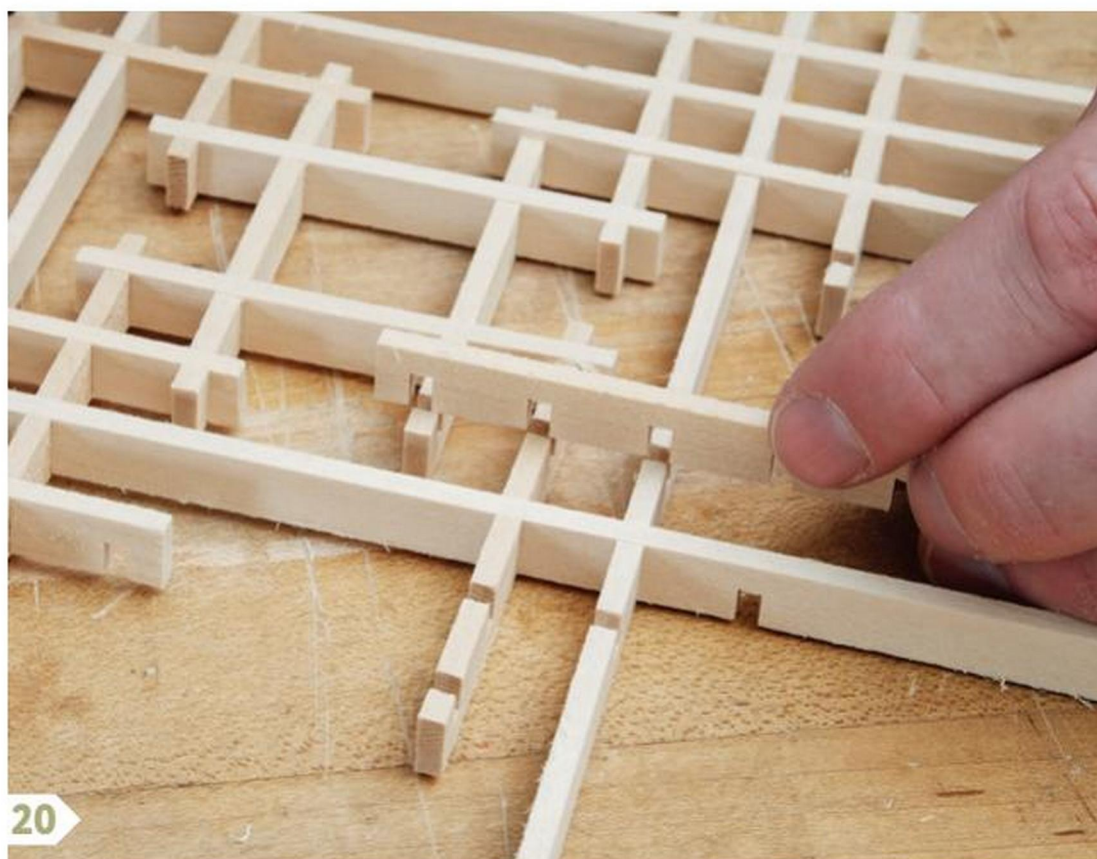
18 Push the third side into place. I rotate the frame so that it is more comfortable to press in the last two sides of the square. Here, you are bringing four joints together. Work back and forth slowly, so that you don't break the strip.





19 Complete the square. The last notch on the inside end is open for now, but the square in this section of the frame is now done.

20 Bridge over to the next section. Use a strip with five notches to connect the pattern in this square to the pattern in the one next to it. Then flip the frame over and add an identical piece to link the pattern on the other side.



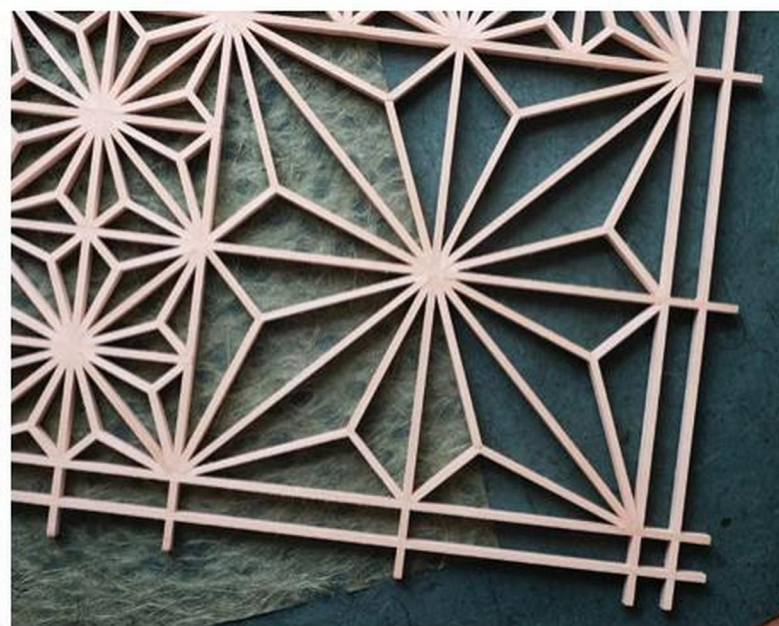
SELECTING FABRIC

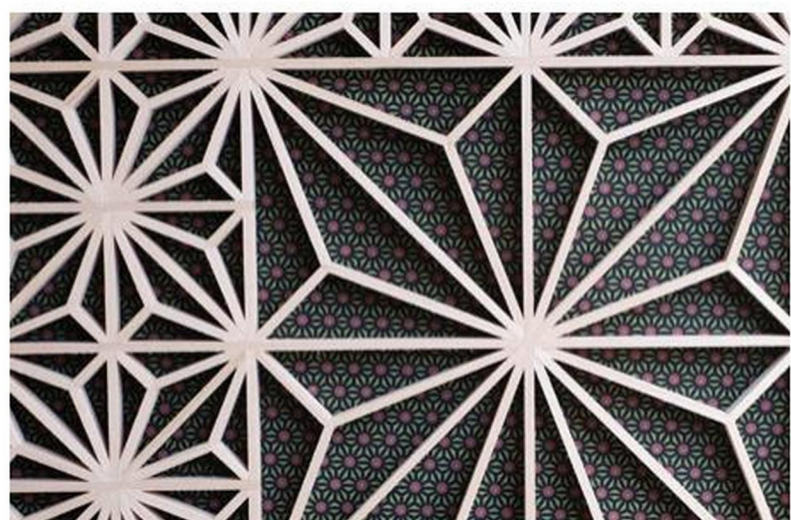
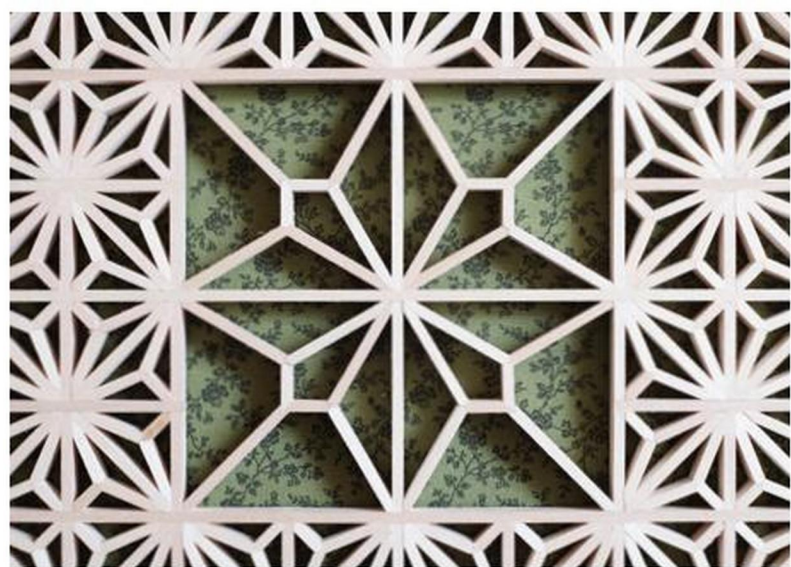
In Japan, the traditional backing for kumiko is shoji paper. It's translucent, letting in the warmth of the sun and softening its light. It's made from wood fibers. For some reason, we call it rice paper in the West, even though there is zero rice in it. You can buy it by the roll and by the sheet. The panels I make are intended to be hung on a wall and do not need to let in light, so I've never backed them with shoji paper. I prefer to use fabric or decorative art papers, because of the greater variety in color and pattern they afford, offering me a broader range of design choices. However, because there is so much fabric to choose from, you've got to be careful not to choose something that fights with the kumiko. Here are a few things to think about when you are selecting fabric to back your panels.



STRIVE FOR HARMONY

The focus of a decorative kumiko panel should always be the kumiko. So the fabric that backs it, and the frame that surrounds it, should not compete against it. The purpose of the fabric or paper and frame, rather, is to help the kumiko stand forth and shine more brightly. The fabric, then, must be subtle. Wild patterns create discord. They create struggle. And that distracts the eye from the kumiko. And avoid fabrics with geometrics patterns. The lines of the fabric's pattern will fight against the kumiko lines, and that tension will make the panel as a whole not quiet. Kumiko has a quiet elegance, and the fabric you choose should not speak over it.





COLOR MATTERS

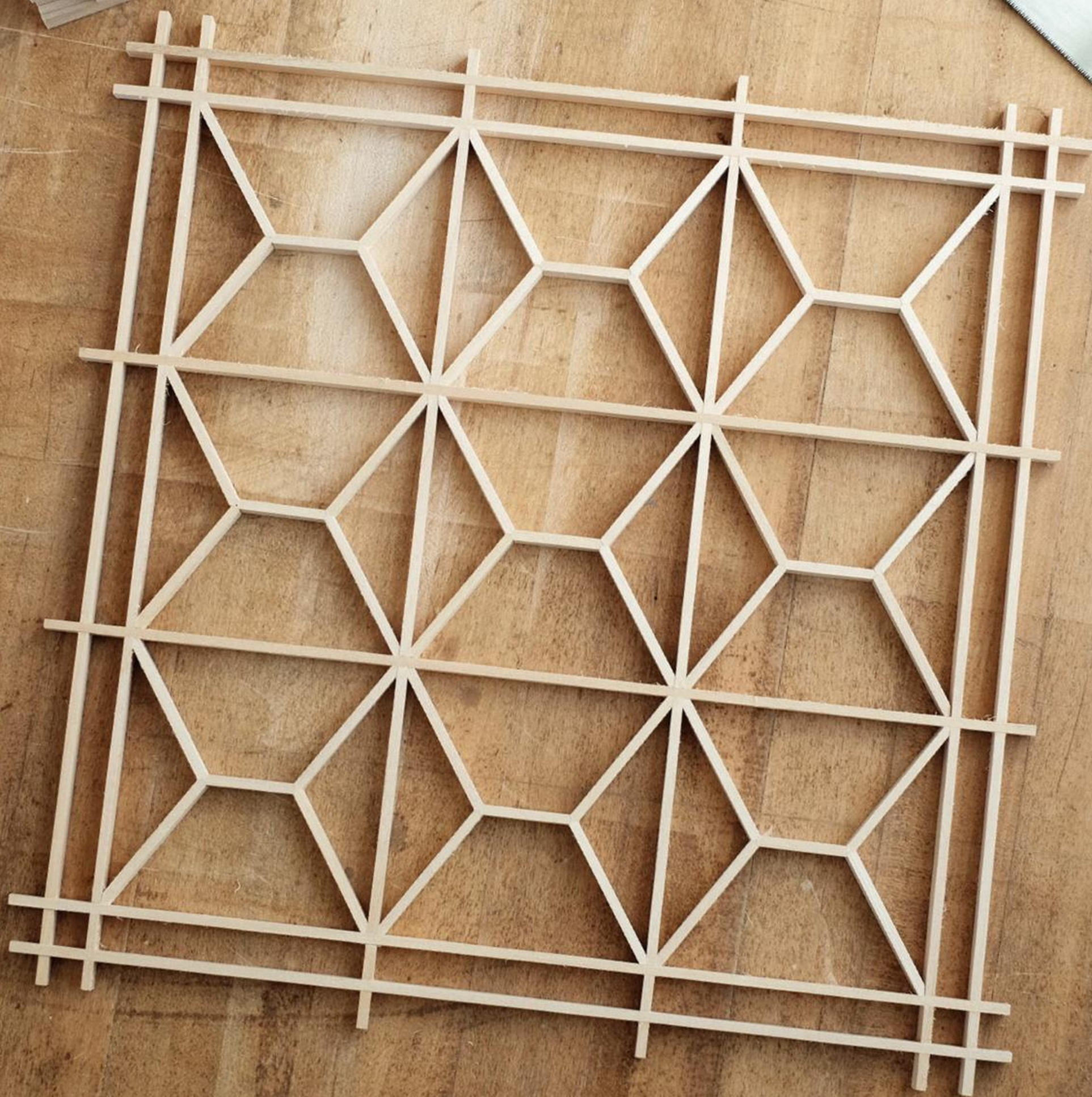
If you've made your kumiko from a light-colored wood such as basswood, then the fabric or paper should be darker so that the kumiko stands out against it. It doesn't need to be black or dark blue, though. I like reds, greens, and blues, because they go well with most of the frame colors I use. Darker yellows also look quite nice behind basswood kumiko.

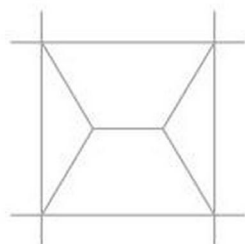
SMALL PATTERNS WORK BEST

If you want to use something other than a solid-color fabric or paper, and I often do, then pick one that has a small, repeating pattern. If the pattern is also subtle, that's even better. A yellow pattern on a dark blue fabric, no matter how small, is really going to stand out. As a result, it will compete for attention with the kumiko. However, a light blue pattern on a blue fabric is less loud, and should work well.

CONSIDER THE FRAME COLOR, TOO

As a general rule, the frame and fabric should not contrast too strongly, because a stark contrast will distract from the kumiko. So, strive for complementary colors. Check out an online color wheel if you aren't sure about which colors are complementary. I like to make the frame darker than the fabric, but this isn't an unbreakable rule.



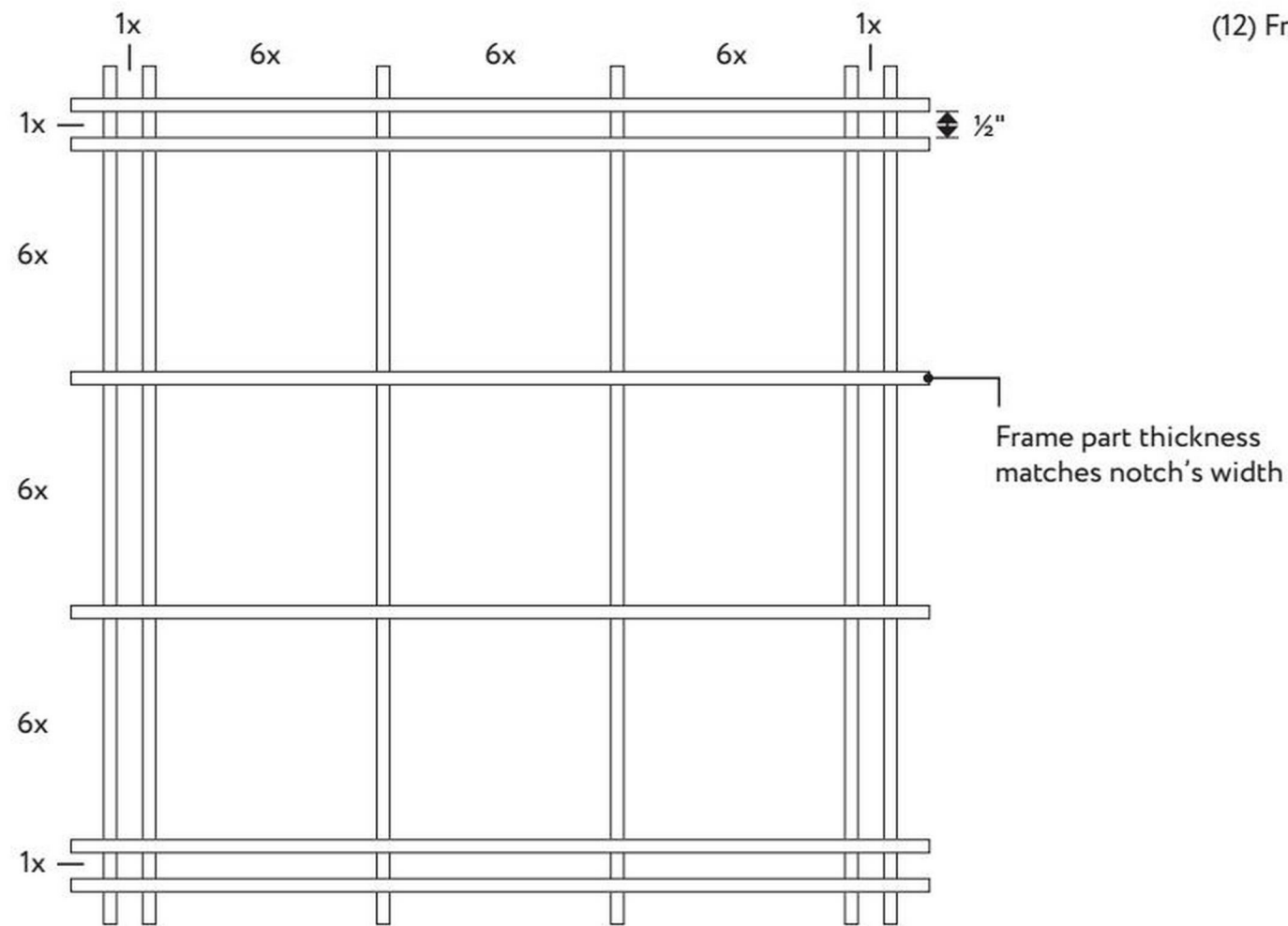


CHAPTER 5

ABACUS BEAD

The appeal of kumiko is certainly due in large part to the geometric patterns created by the frame and infill pieces, but you shouldn't overlook the negative space in a panel. This pattern illustrates perfectly that what's not there can be just as beautiful as what is there. Its Japanese name, soroban-kuzushi, is a reference to the Japanese abacus (soroban), because the kumiko pieces create a hexagon that looks like an abacus bead. However, it's the negative space that dominates this pattern and gives it a simple but striking beauty. Once you understand the potential of what is absent, you'll be able to create panels that say a great deal with very few words.

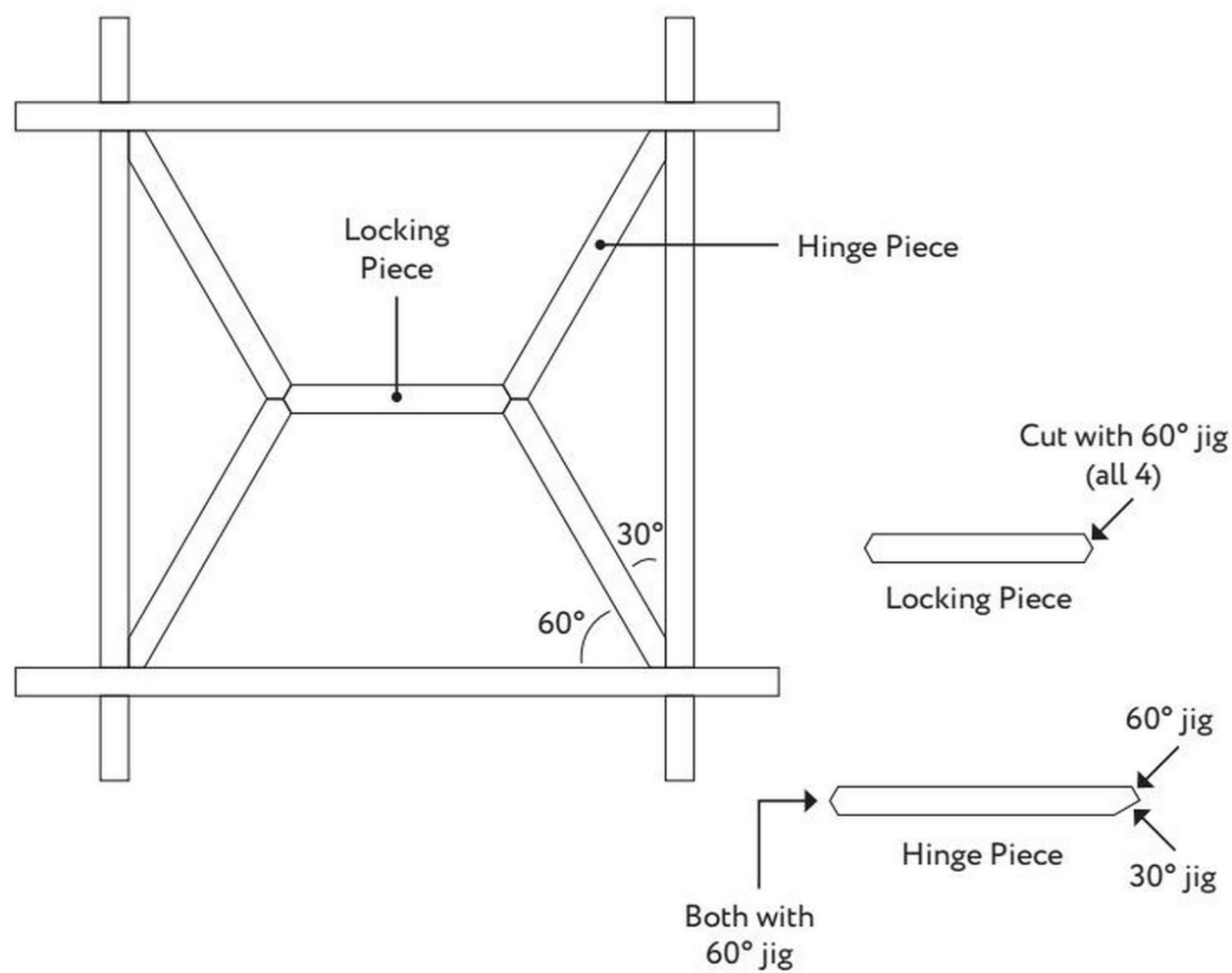
FRAME DRAWING



FRAME PARTS

(12) Frame Pieces

PATTERN DRAWING



PATTERN PARTS

(4) Hinge Pieces

(1) Locking Piece

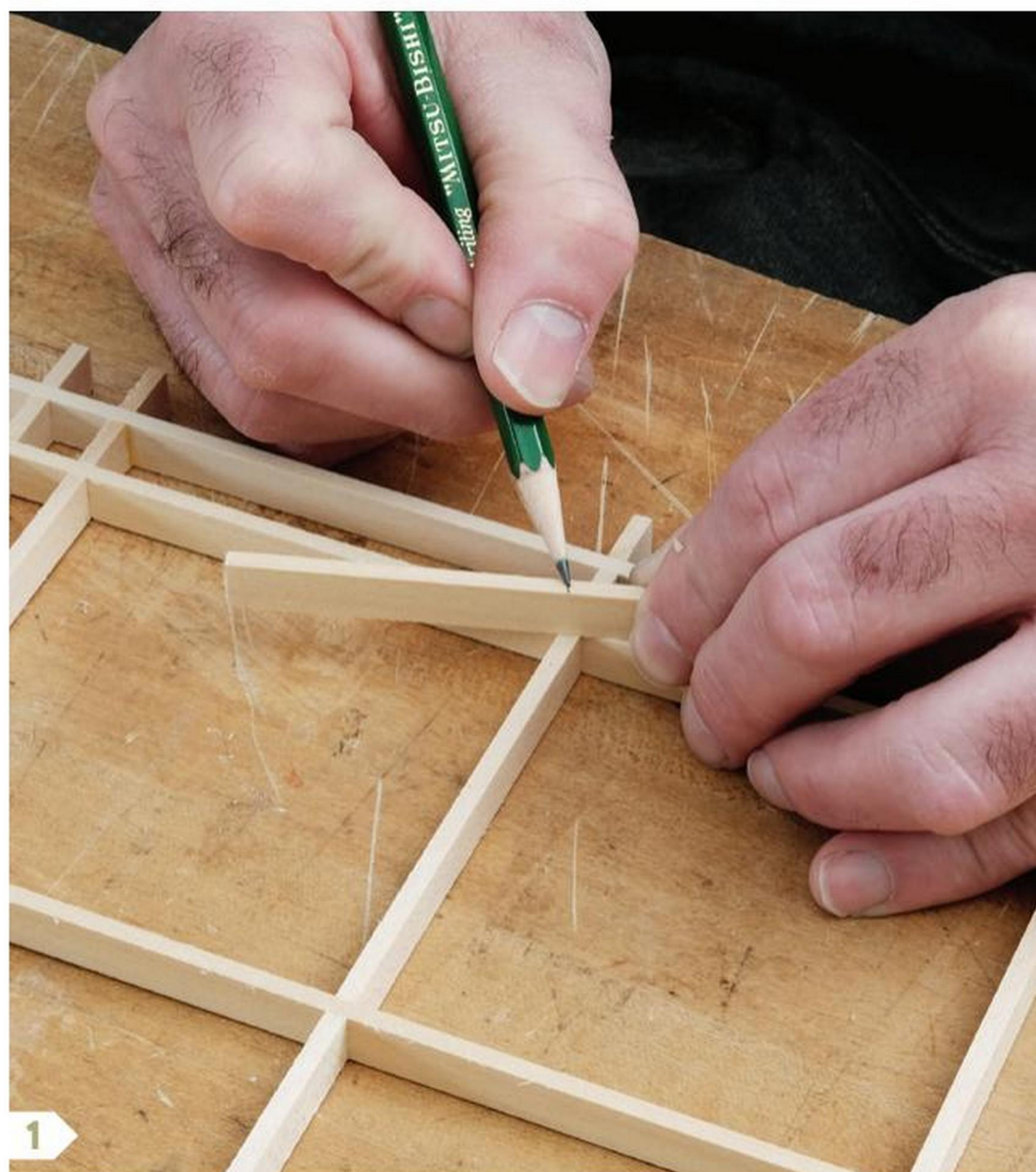
GUIDE BLOCKS

30°

60°

START WITH THE 60°/30° END OF THE HINGE PIECE

Here's a bit of funkiness for you. This hinge piece jets out at a 60° (or 30°, depending on your perspective) angle from a 90° corner, so the bevels that tuck into the corner can't be 45°. Instead, they are 60° and 30°. Happily, they meet in the middle. It is also worth mentioning that only the frame parts of this design are notched.



1 Mark for length. Angle a strip out from the corner at roughly 60°, making sure that it extends past the middle of the square. Place a tic mark just outside the corner.

2 Make the parts. You need 36 hinge pieces for this panel, but make at least six extra. This gives you a few to use while dialing in their length. It can be dispiriting to cut a few too short and have to go back and replace them from the beginning.

3 Cut two 60° bevels. Because they are both cut with the same stop, they will meet in the middle. And you need to know where the middle is. The reason to start with the 60° is that it's steeper than the 30° bevel and will be removed when you cut the 30° bevel.

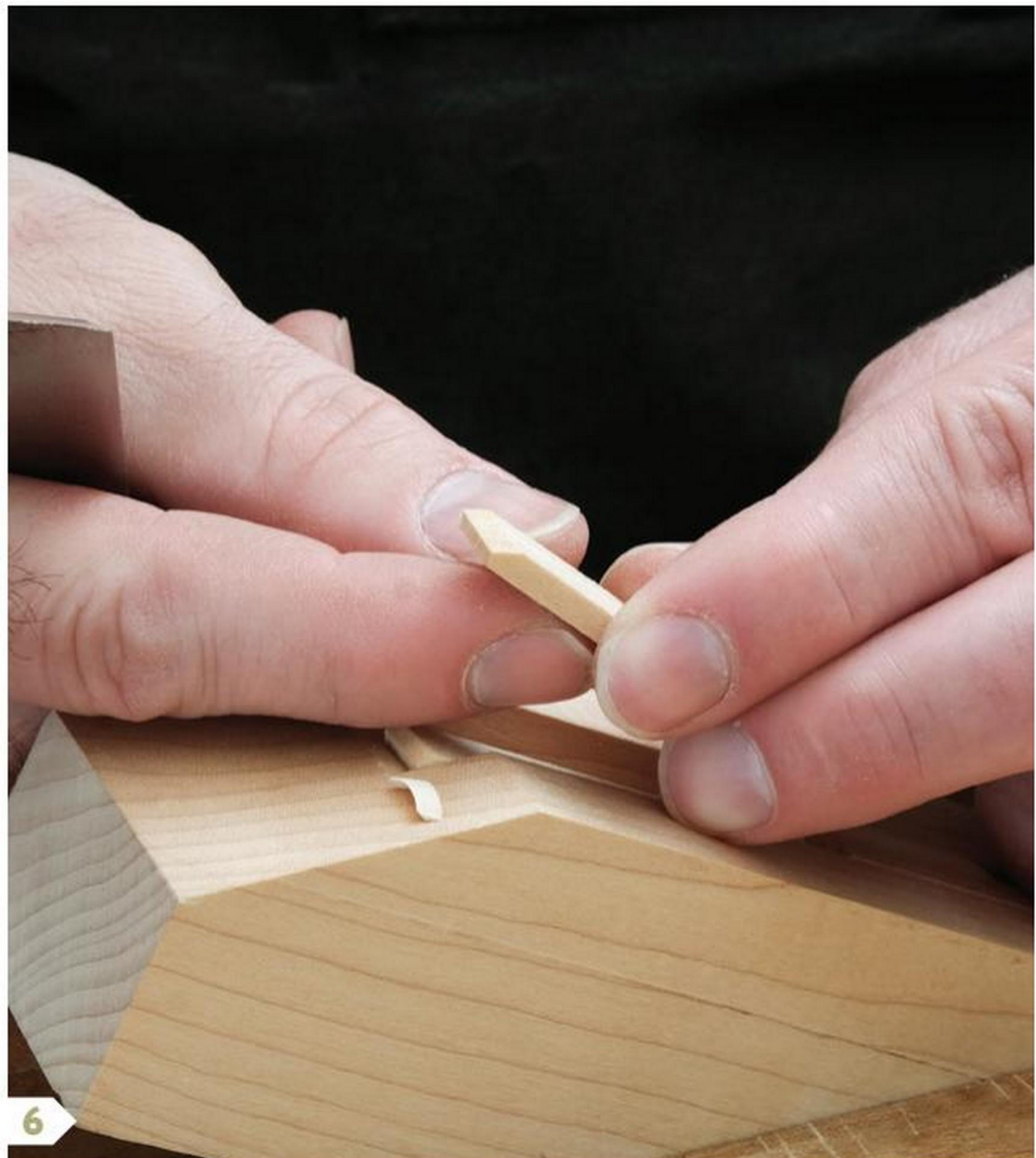


START WITH THE 60°/30° END OF THE HINGE PIECE *(continued)*

4 Set up the 30° block. Be cautious here. The stop should be set so that when you pare the 30° bevel, you remove the entire 60° bevel, and cut right to the middle point (the point where the two 60° bevels meet) without going beyond it. This is definitely a case where it's best to sneak up to the final setting.

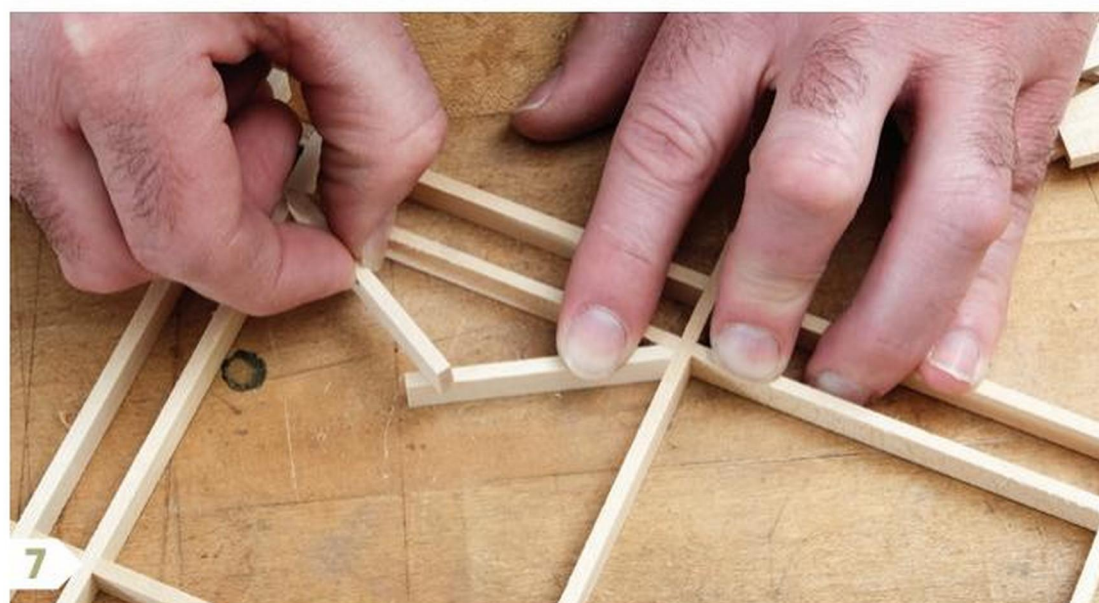
5 Pare the bevel. Take the final pass with the chisel firmly and flatly on the guide surface.

6 Meet in the middle. Check to see where the two bevels meet. They should come to a crisp point. If it's not crisp, then you need to adjust the stop up and take another pass with the chisel. A truly sharp chisel can remove a rumor of a shaving, and you can fine-tune the 30° bevel to perfection.



TRIM THEM TO LENGTH

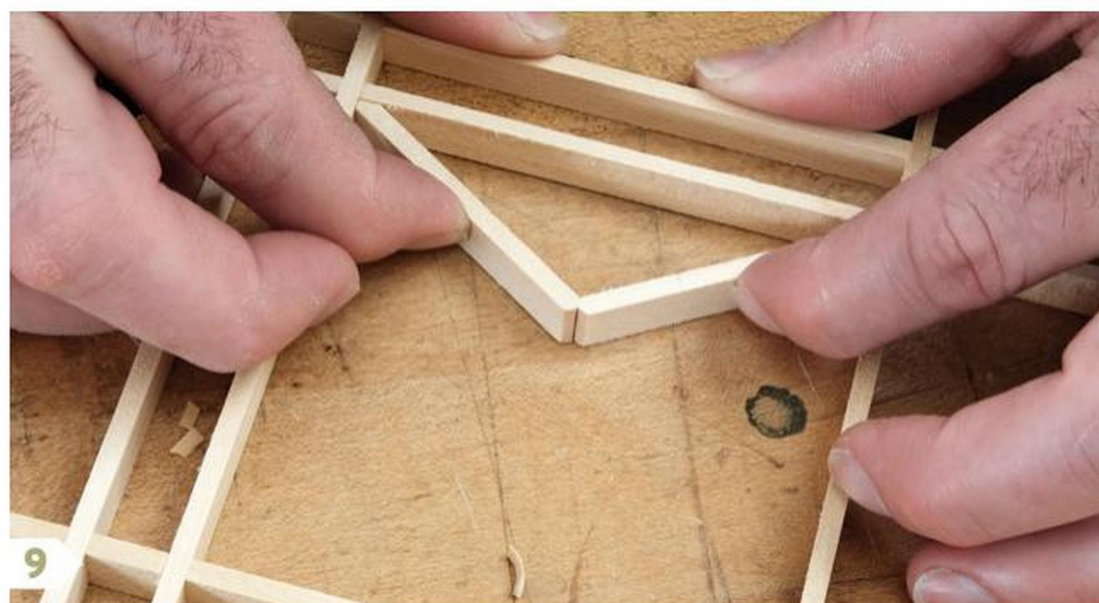
The opposite end of the hinge piece has two 60° bevels that meet in the middle. This makes it easy to sneak up on the part's length. Set the stop, cut both bevels and test. Too long? Adjust the stop closer to the guide surface and try again.



7 Eyeball the length. Place two hinge pieces into the corners, overlapping them in the center. Looking down from above, mark the top one just past the point where they meet.



8 Start paring. Set the stop on the 60° jig a bit long, then work your way up to your layout mark. After the stop is set, cut the bevels into a second hinge piece.



9 Test the fit. The two pieces should meet in the middle without any gaps. Take a look at the corners. There should be no gaps there either. If there's a gap on the bottom side of the hinge pieces, they are too long. If the gap is on the top side, they are too short. And if there are no gaps in the corner, but you must press them together in the center, they are too short.

THE LOCKING PIECE HAS FOUR 60° BEVELS

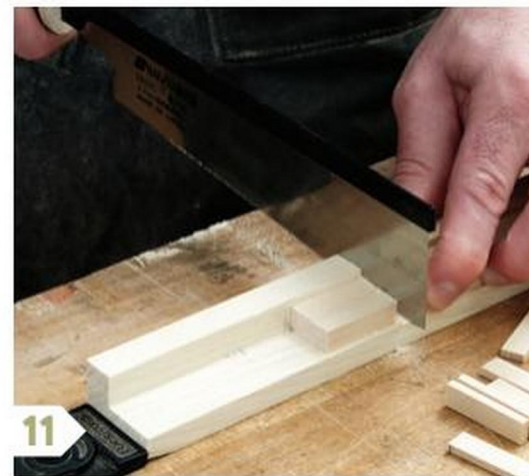
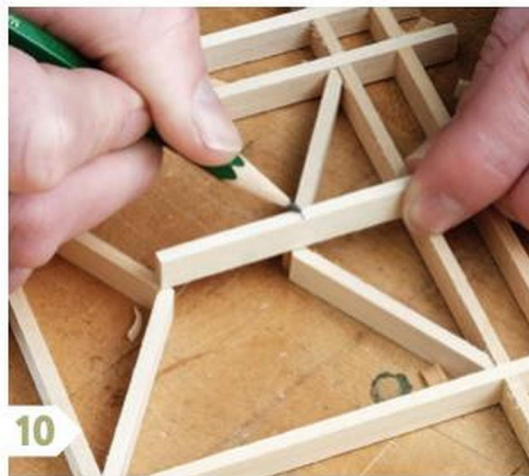
The hinge pieces meet and form a 120° birdsmouth joint. The point that fits into the joint needs to be 120°, or, have two 60° bevels. So, this is similar to the hemp leaf pattern's locking piece. It's just that the angle is different.

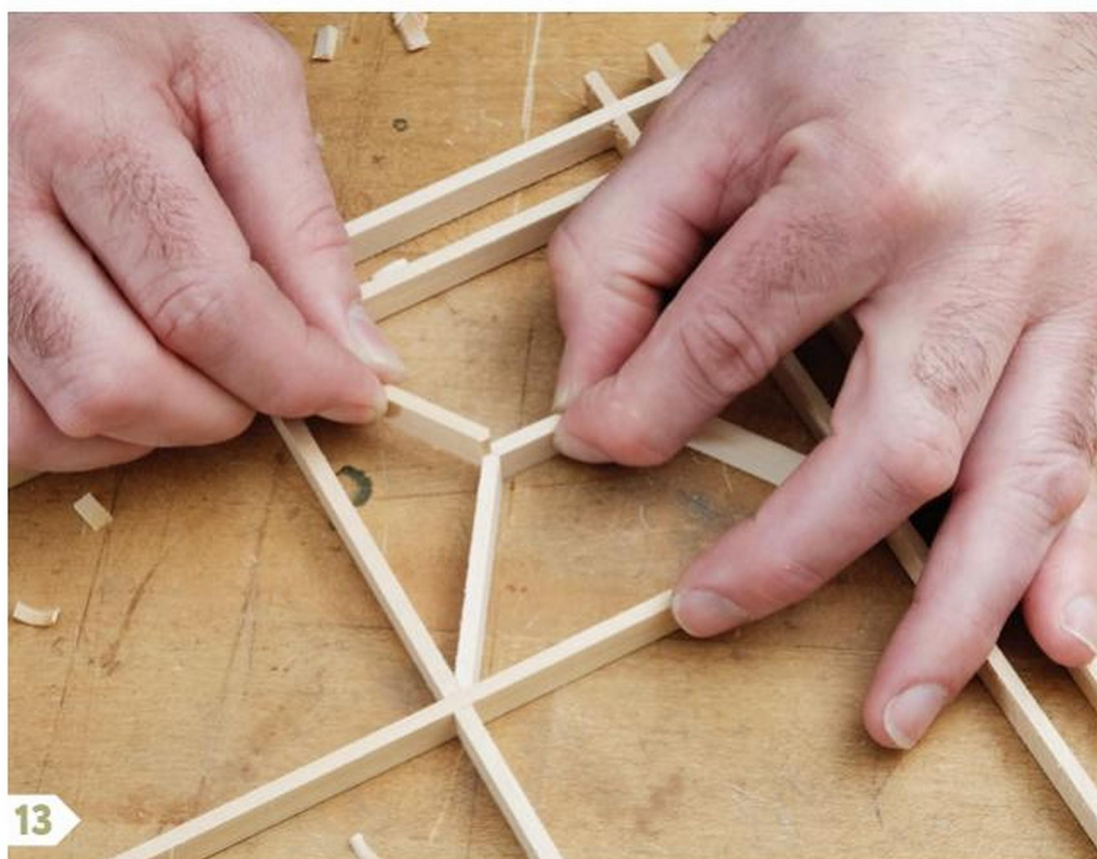
10 Determine the rough length.

Place four hinge pieces in the frame and lay a strip across the middle of the square. Mark it long.

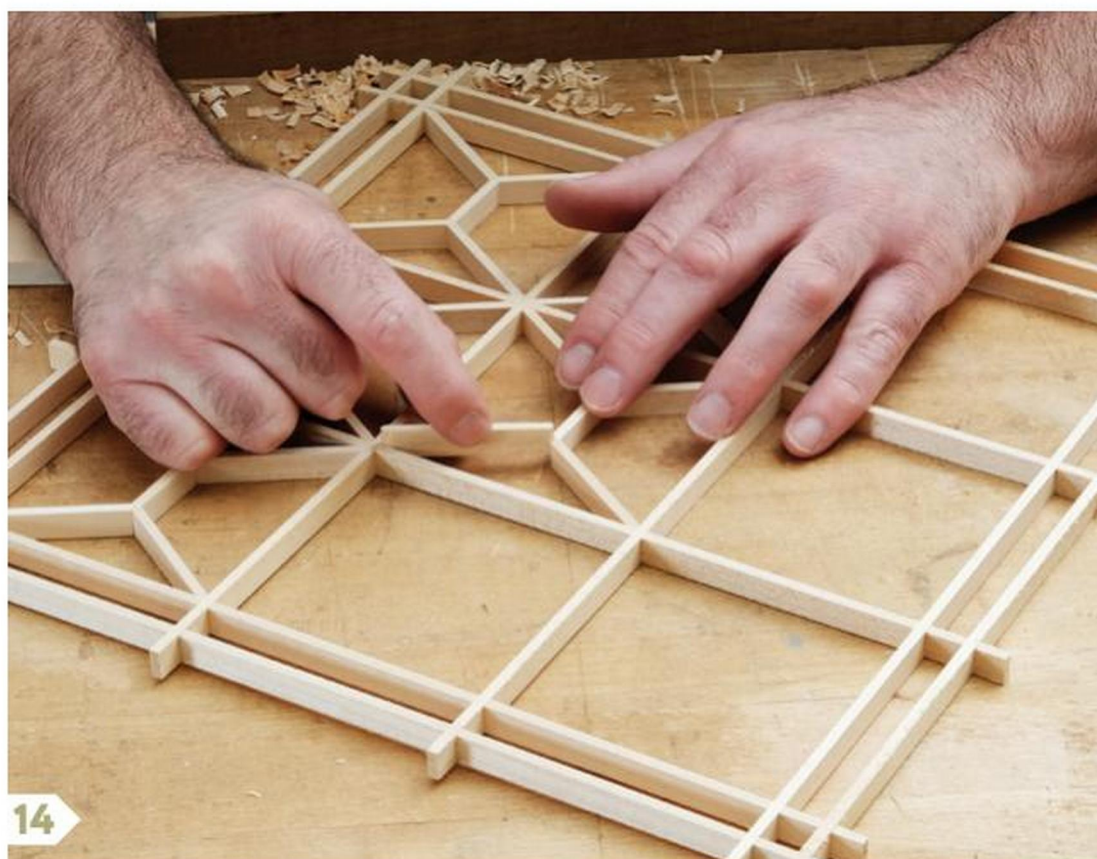
11 Make a few extra. Cut at least 12 pieces for this panel, so that you have three you can sacrifice while dialing in the jig's stop.

12 Create the bevels. Cut both at one end, flip the locking piece, and pare the opposite end.

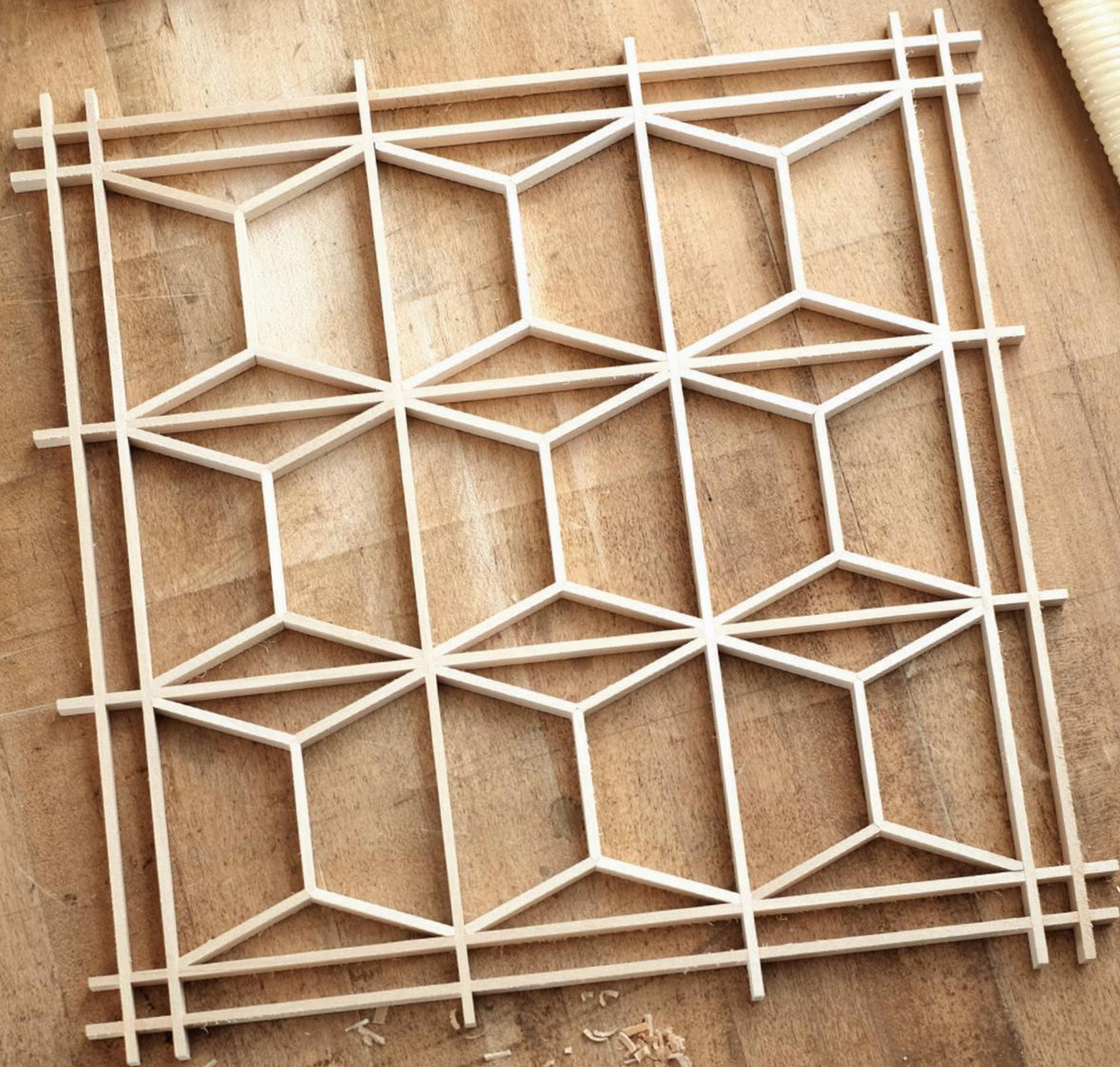


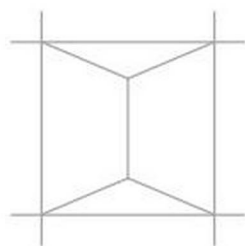


13 Check the fit. It should be snug. Look to see if the frame bows out anywhere. Are there gaps in the corners that weren't there before? If there are or if the frame bows out, the locking piece is too long. If you pick up the frame and the pieces fall out, well, you can guess what that means (too short!).



14 Finish out the pattern. After getting the locking piece's length perfect, make the nine you need and fill in the squares.

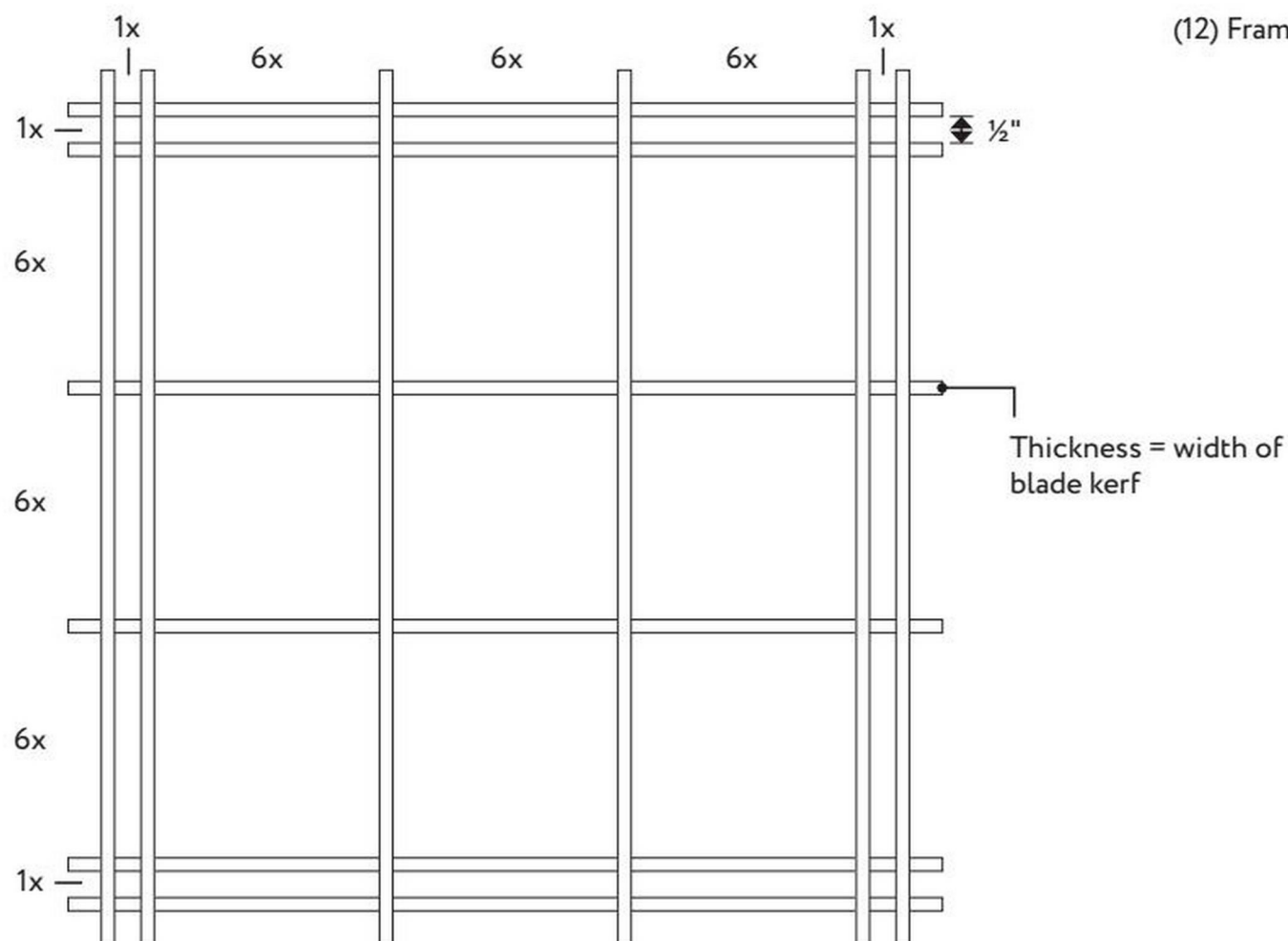




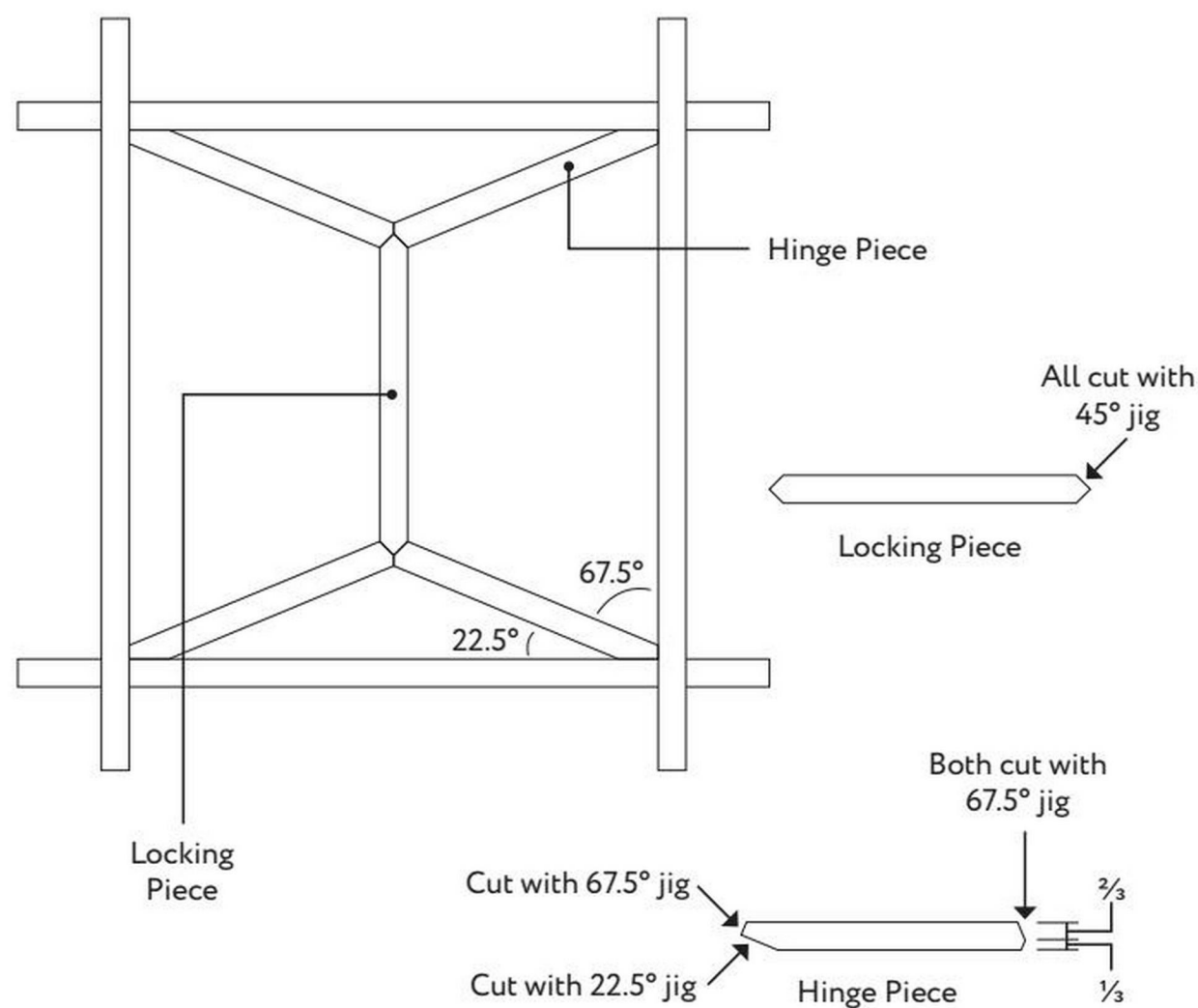
CHAPTER 6

TORTOISE SHELL

This pattern looks like the abacus bead pattern (p. 70) rotated 90°, but the hinge pieces lean out from the corner at a different angle, so the pattern's hexagonal shape is wider. It looks more like a tortoise shell than an abacus bead, and its Japanese name (kikkō-nishiki) means tortoise brocade. It's a beautiful pattern, and one of my favorites. I love the interplay between the smaller hexagons that bridge two frame squares and the larger ones that span across three and contain two of the smaller ones. And there is a wonderful balance between the positive and negative spaces in the pattern.

FRAME DRAWING**FRAME PARTS**

(12) Frame Pieces

PATTERN DRAWING**PATTERN PARTS**

(4) Hinge Pieces

(1) Locking Piece

GUIDE BLOCKS

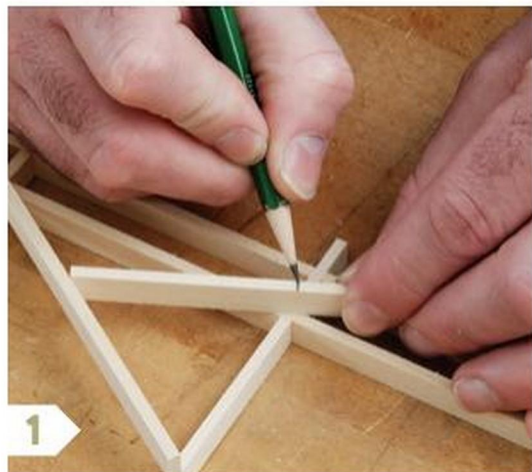
45°

22.5°

67.5°

CUT THE HINGE PIECES TO LENGTH

There are four hinge pieces per square, so you need 36 for the panel here. Make sure to cut several extra (let's say eight), as the bevels on both ends are offset from center, and more challenging to get correct.



1 Get the rough length. Lay two strips across the frame, running out from the corner as close as you can get to 22.5°. I rest both ends of one on the frame, and hold the other end in place so that I can mark it.

2 Cut. Cut. Cut. Keep the ends as square as you can. Even a slight angle can affect your ability to cut precise bevels into the ends.

THE FIRST END HAS A 67.5° AND 22.5° BEVEL

This is a tricky piece, because the bevels at both ends are offset. One facet is $\frac{2}{3}$ the piece's thickness and the other $\frac{1}{3}$. You've seen this before: the hemp leaf pattern's hinge piece. However, in this pattern, the bevels are different angles at this end. The 67.5° bevel is the bigger one, so make it first.



3 Pare a single 67.5° bevel. Set the stop so that the bottom edge of the piece is aligned with the intersection of the groove and guide surface. Cut a bevel across the entire thickness, so the piece looks like a chisel.

4 Flip and cut the 22.5° bevel. This bevel is just $\frac{1}{3}$ of the hinge piece's thickness. How do you tell when you get there? The ol' eyeball, that's how. What I do is visually double the smaller bevel to get a sense of whether it would then add up to three sections equal to the part's thickness. Trust your eyes.



5 Get to the point. Set an adjustable square so that the blade is in line with the point created by the two bevels. You'll use that to help get the $\frac{2}{3}$ to $\frac{1}{3}$ split correct at the opposite end.

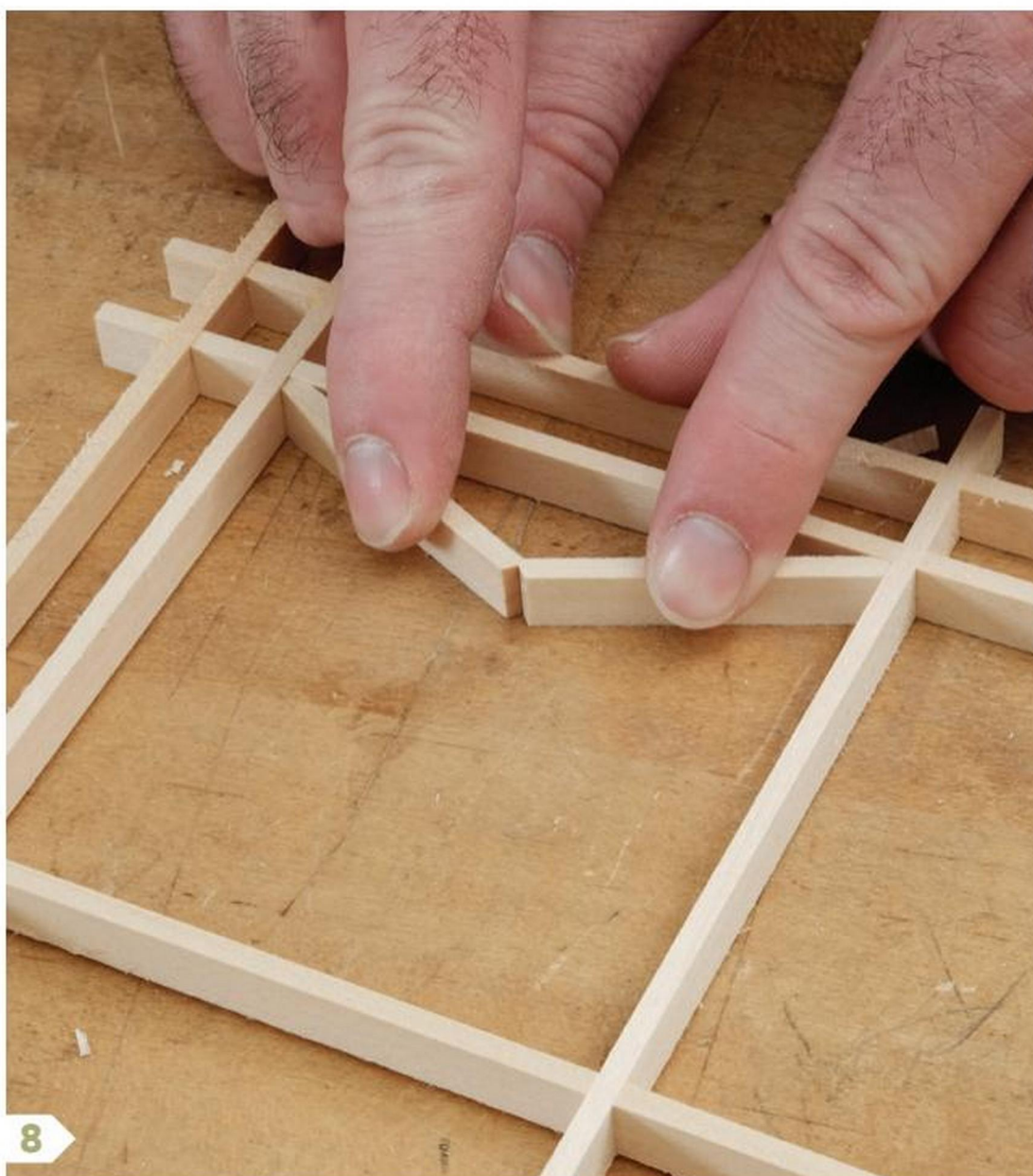
IT'S TWO 67.5° BEVELS AT THE OTHER END

Now it's time to trim the hinge pieces to length. But to get there you'll need to adjust two stops at once, because the bevels are offset. And at least it is the same angle on both bevels! Have a bit of patience and you'll get this right.

6 Cut the two bevels. Use two guide blocks. One to cut a single bevel through the part's entire thickness and the other to create the $\frac{1}{3}$ bevel.

7 Check the offset. Use the adjustable square you previously set to ensure that the offset matches the one at the other end of the hinge piece.

8 Look for gaps. If the pieces touch in the middle and there are no gaps in the corner, you're golden. If there is gap in the corner above the hinge pieces, they are too short. Beneath the pieces? They're too long. Have fun adjusting those two stops.



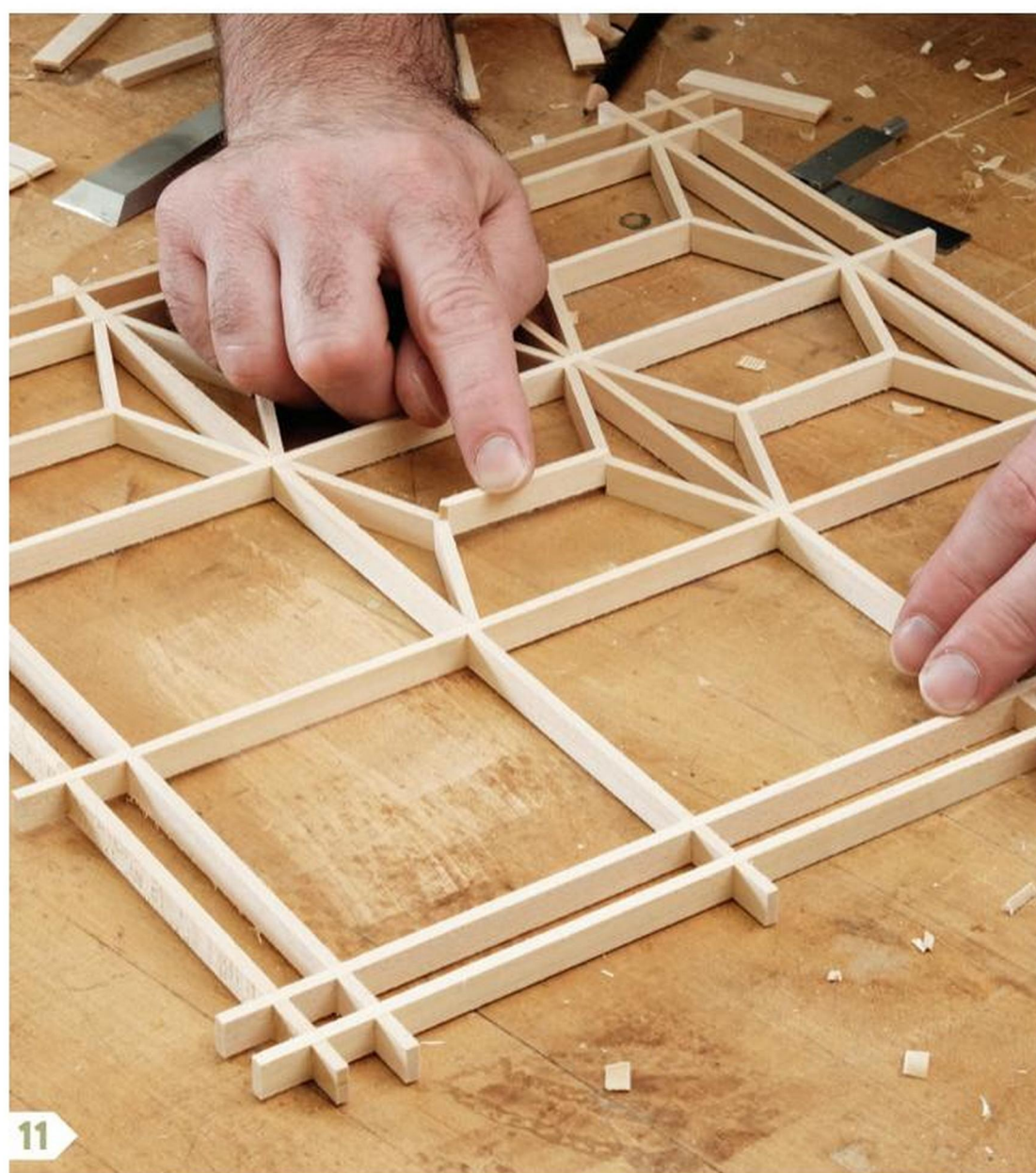
THE LOCKING PIECE IS ALL 45° BEVELS

Well, at least this one is simple. It's just like the locking piece in the hemp leaf pattern. Be sure to cut several extra pieces so that you can work to get the perfect fit without worrying about those that you cut too short.

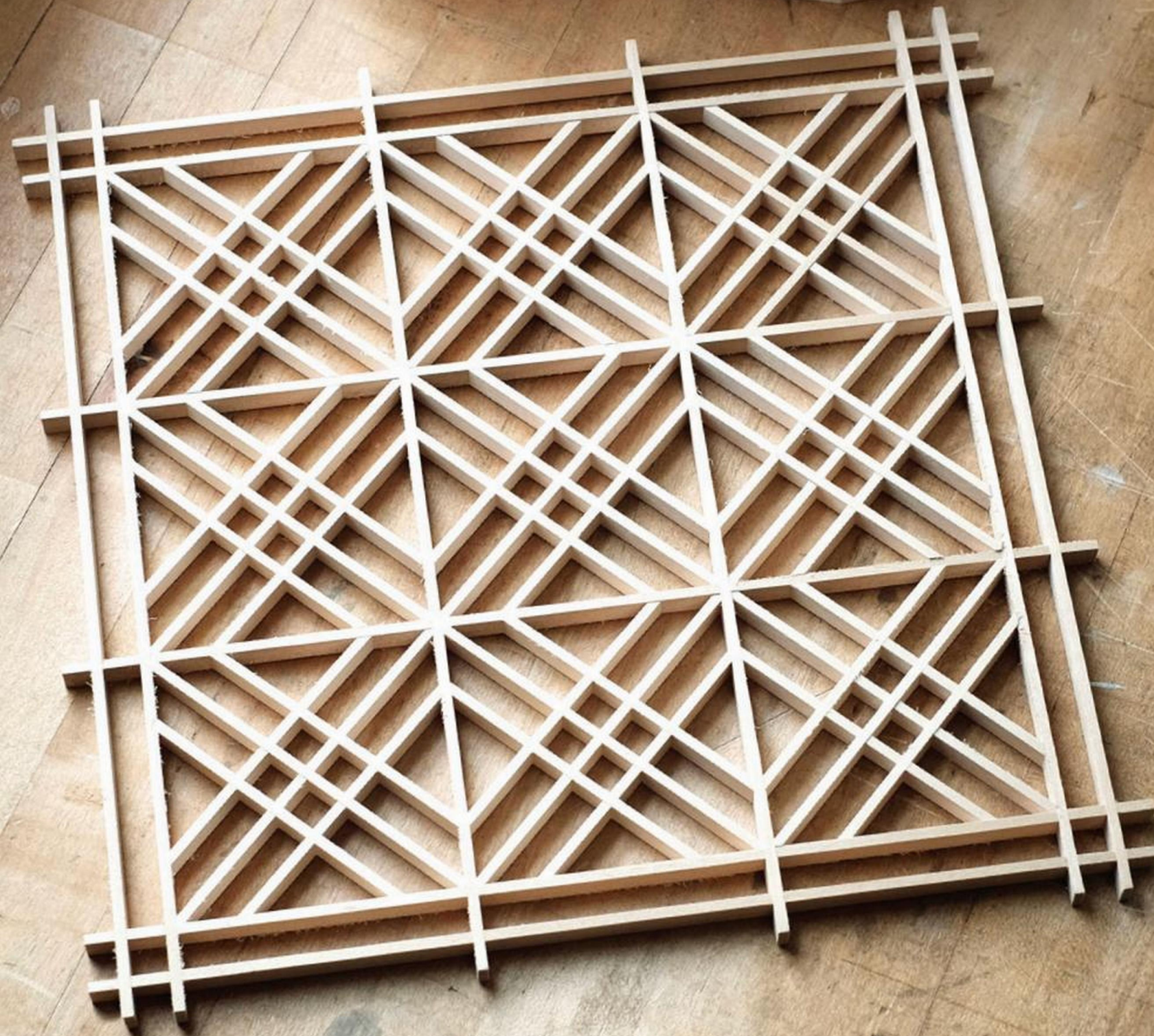


9 Dial in the jig. Remember to cut both bevels at one end and the two at the opposite end. If you cut one miter at one end and rotate it, the point can get under the stop and the bevels won't be centered on the part's thickness.

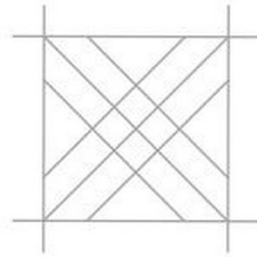
10 Check for a good fit. You shouldn't need to force it in, and it should stay in on its own. Sight down the frame to look at the frame joints. If they are bowed out, the locking piece is too long. If there are now gaps in the corners, the locking piece is too long.



11 Fill in the pattern. It can be tricky to get this one together. I hold two hinge pieces with one hand, leaving the other two together but just laying there, then lower the locking piece in place. After it's started you can let go of the hinge pieces and press the locking piece all the way down.



NAKAYA 耐付鋸
D210C 粗子用
0.2m 高規格鋸
MADE IN JAPAN

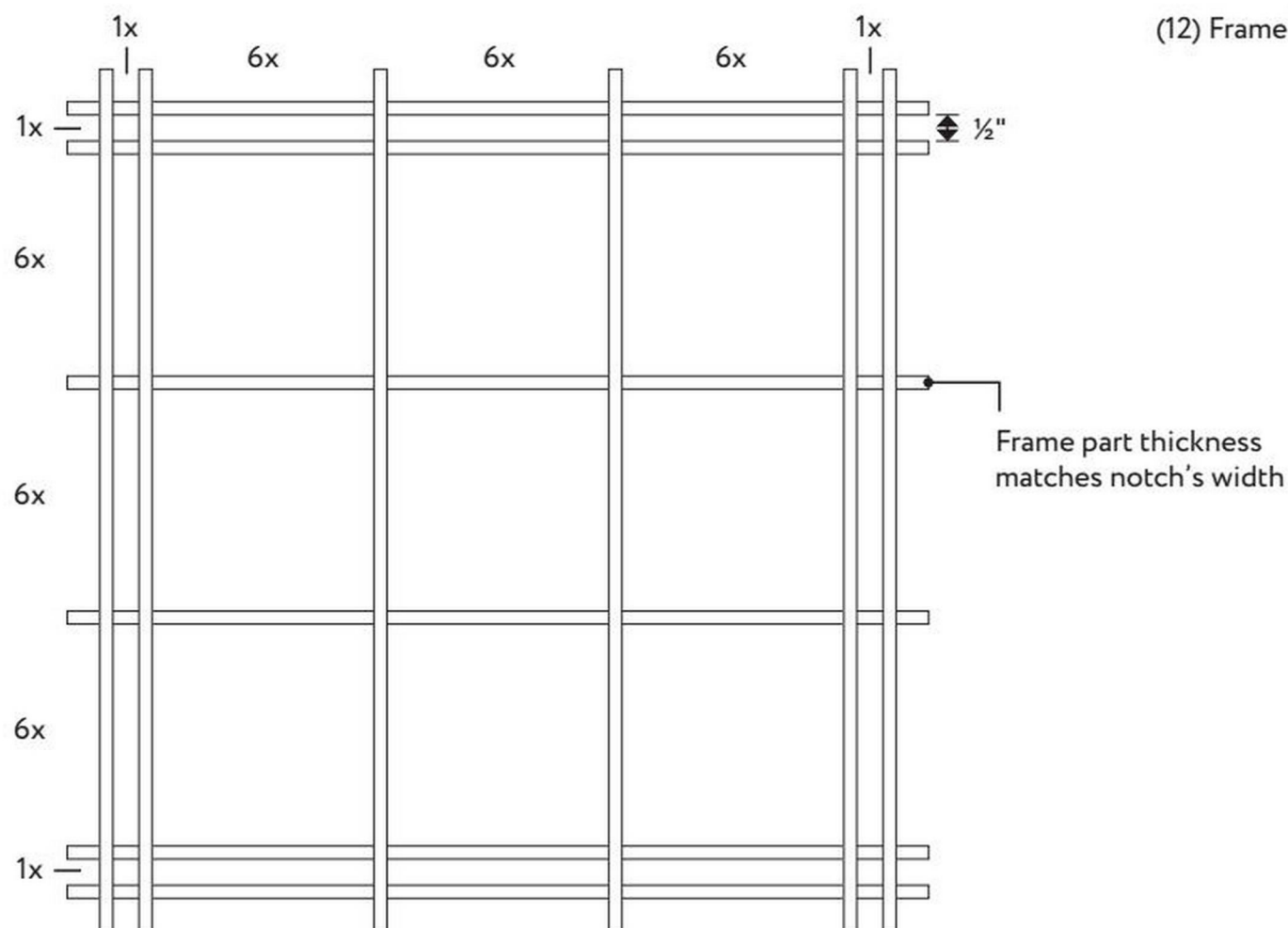


CHAPTER 7

SQUARE DANCE

I love this pattern. The interlocking squares seem to dance across the panel. It reminds me of square dancing during gym class in elementary school. An endless swirl of do-si-dos. No wonder it makes me smile. Like a good square dance, this pattern is intimidating at first, but I've tried to demystify the dance. Like any other pattern, it's a matter of setting up your jigs carefully and being patient. The twist that this pattern introduces is pattern pieces with beveled ends overlapping one another. The notches must remain centered between the beveled ends. I'll show you how to dance your way around that challenge.

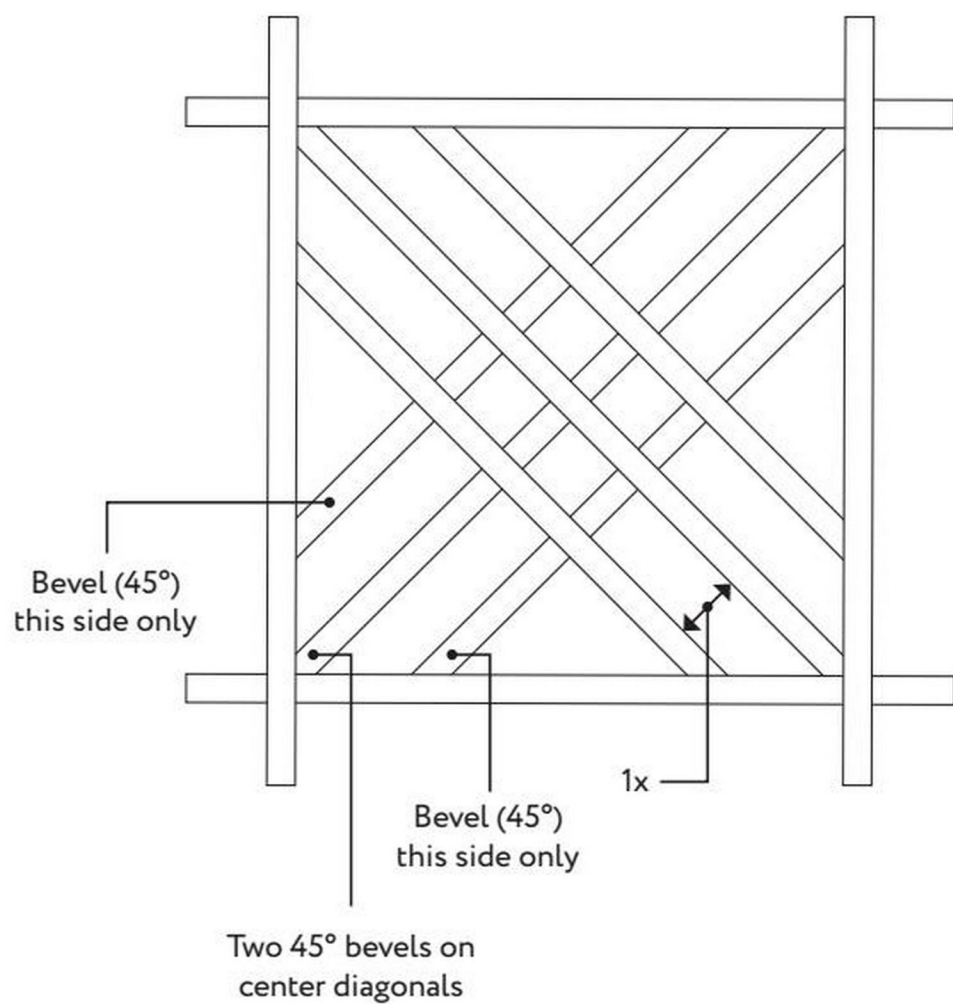
FRAME DRAWING



FRAME PARTS

(12) Frame Pieces

PATTERN DRAWING



PATTERN PARTS

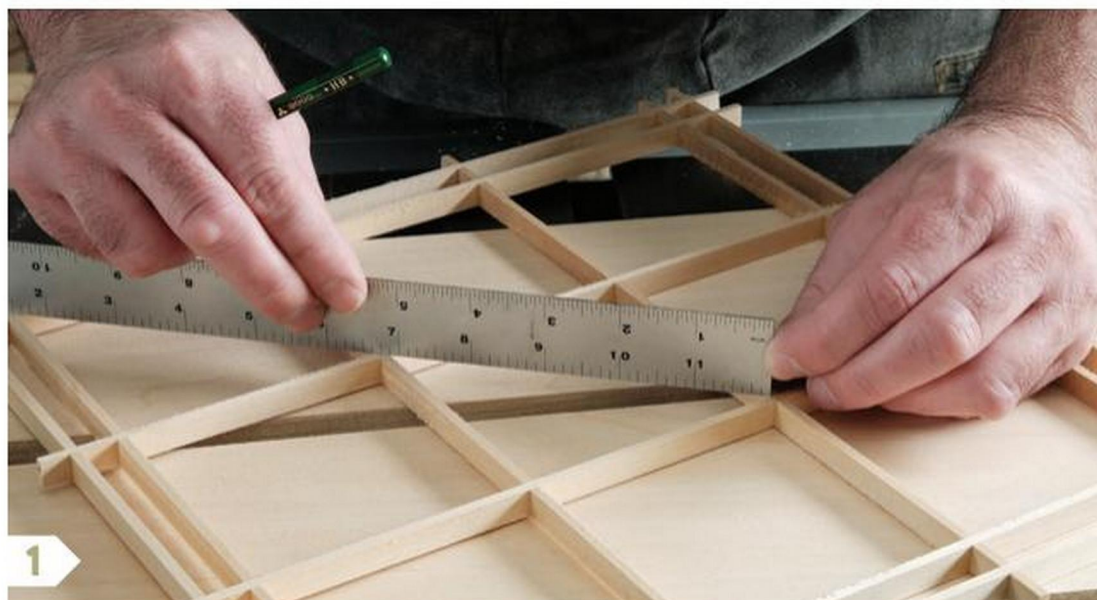
(6) Infill Pieces

GUIDE BLOCKS

45° (2 surfaces required)

START BY MAKING BLANKS FOR THE PATTERN

The strips that make up this pattern all have three notches in them, but there are strips of two different lengths. I find it easier to make them all the longer length at first, then trim them as needed for the shorter pieces. It's a little more work on the back end, but saves you time at the tablesaw.



1 Get the measure of things. You don't need to be spot on here, but in the ballpark. You'll use this measurement in a bit, when you cut the pattern pieces to length.

2 Cut some notches. Start with a long blank. The exact location of the notches doesn't matter, so long as they are spaced far enough apart. How far is that? Add an inch to the measurement you just took and you'll be fine.



3 Use the sled's finger joint jig. Place the notch over the registration pin and cut a notch to one side of it.

4 The notch needs two neighbors. Rotate the board end-for-end, put the original notch back on the pin and cut a third notch. The original is now sandwiched between the two you just cut.



START BY MAKING BLANKS FOR THE PATTERN *(continued)*

5 Repeat the process. Cut notches to both sides of the remaining notches you originally cut into the board.

6 Add an auxiliary jig. There is a “blank” jig between the fence and auxiliary jig. It has a notch that fits over the fence’s pin, but does not have its own pin. This allows you to slide the auxiliary jig side-to-side and locate the pin exactly where it needs to be: a little beyond half the distance you measured on the frame.

7 Screw it to the sled. Use a screw long enough to go through both the auxiliary jig and the blank jig between it and the fence. There are just too many jigs in play here not to secure them.

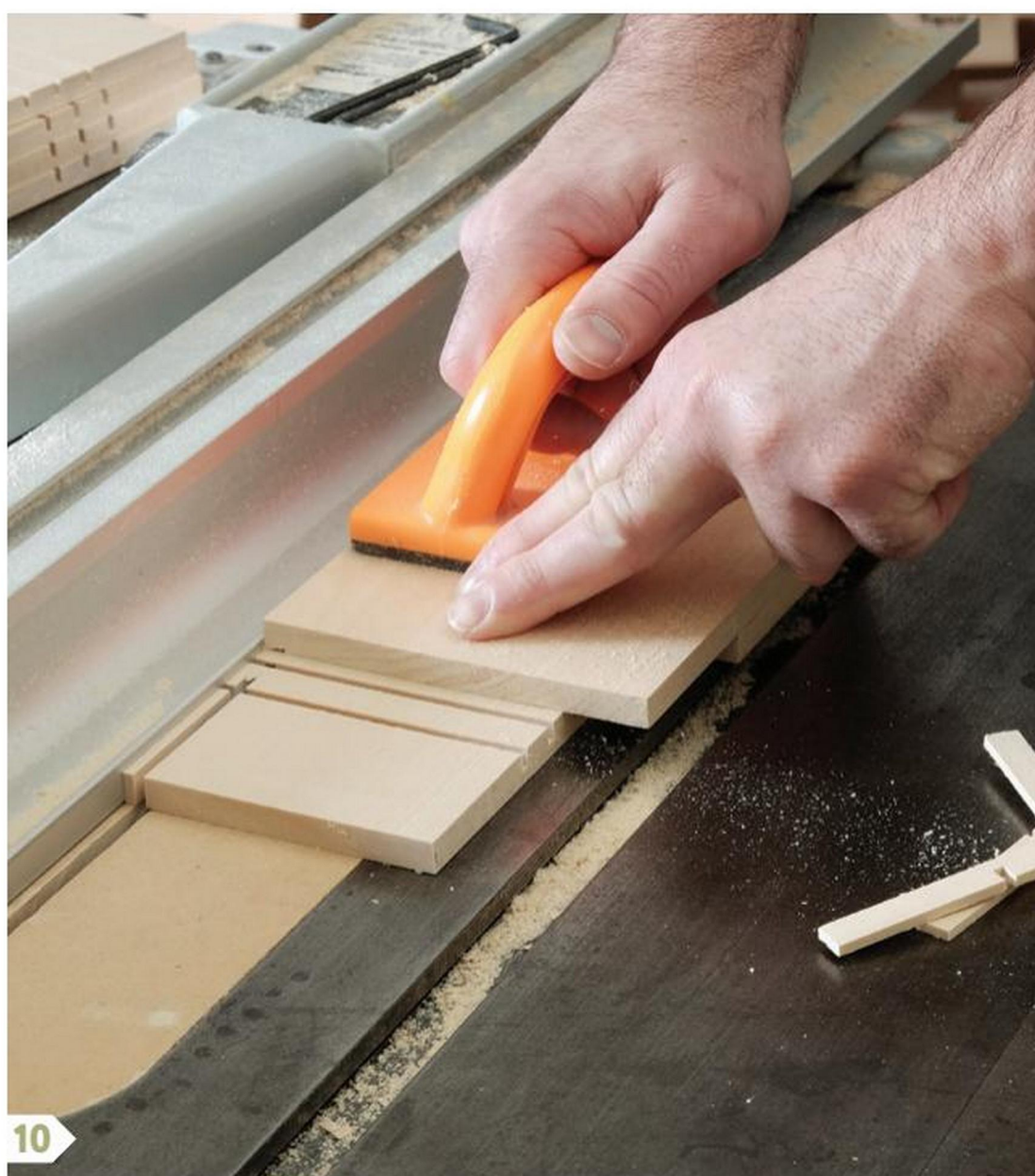




8 Trim one end to length. With the center notch on the registration pin of the auxiliary jig, cut one side of the blank.

9 Cut the blanks free. Rotate the board end-for-end, put the center notch back on the pin and cut through the board. The first blank is now cut to length with the notches centered.

10 Rip the strips. I make them the same thickness as the frame strips. Here again, use a push stick made from two layers, with the top one overhanging the workpiece and holding it down through the cut.



FIT THE CENTER DIAGONALS

The trick here is to keep the notches centered on the diagonal's length as you trim it to fit. If you don't, the pattern simply will not go together or fit into the frame. I use two 45° jigs to make the job easier. Confusing, right? Slow down, think, and move carefully. You'll be okay.

11 Set the stop. The end of the diagonal should land where the guide surface and groove meet. Butt the stop against the opposite end and tighten the screw.

12 Repeat the process. Set up a second jig as you did the first. Then, transfer the middle notch's location onto the bottom of the groove in the jig.

13 Pare the first end. There are two bevels here, one on each side, and they meet in the middle.

14 Move to the second jig. With the beveled end pointed toward the stop, align the middle notch with the mark on the bottom of the groove.

15 Secure the stop. Slide the stop up to the beveled end and lock it into place.





16



17

16 Bevel the second end. It's the same as the first one: two 45° bevels that meet in the middle.

17 Test the fit. Drop the diagonal into the frame. If it's too long, you need to trim both ends.



18

18 Here's how to shorten the diagonals. After making all the diagonals with the original settings, set the stop on one of the jigs so that one end is just a hair past the guide surface. Transfer the middle notch to the groove. Trim the end (inset).

19 Flip it end for end. Align the middle notch with the mark and adjust the stop. Trim the second end. Test the fit again, and repeat until the middle diagonal fits (inset).



19

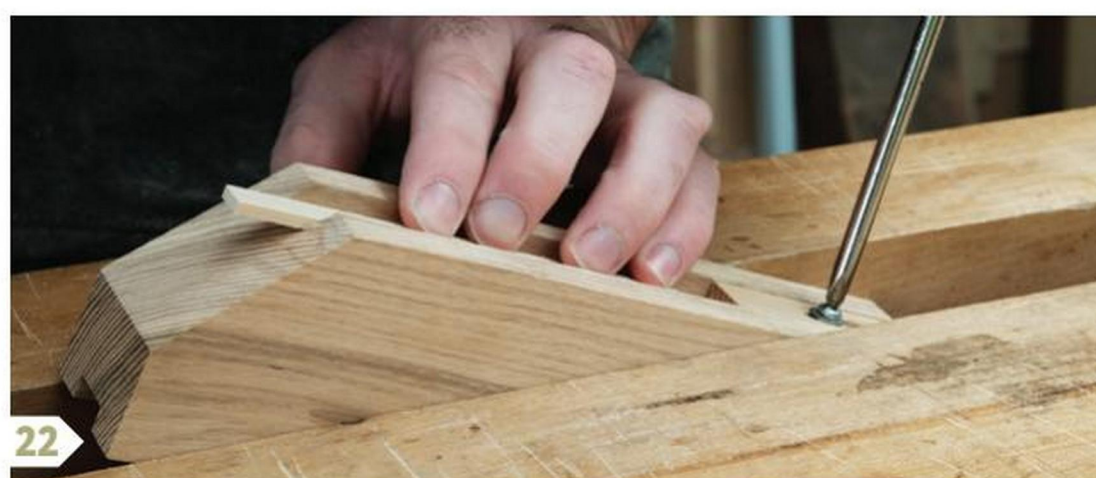
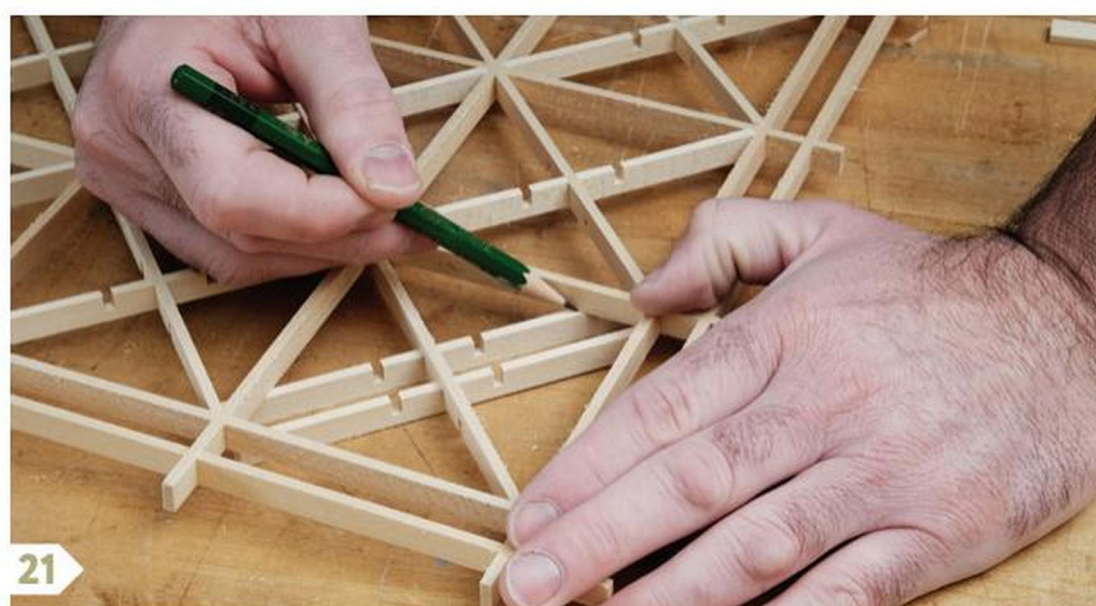
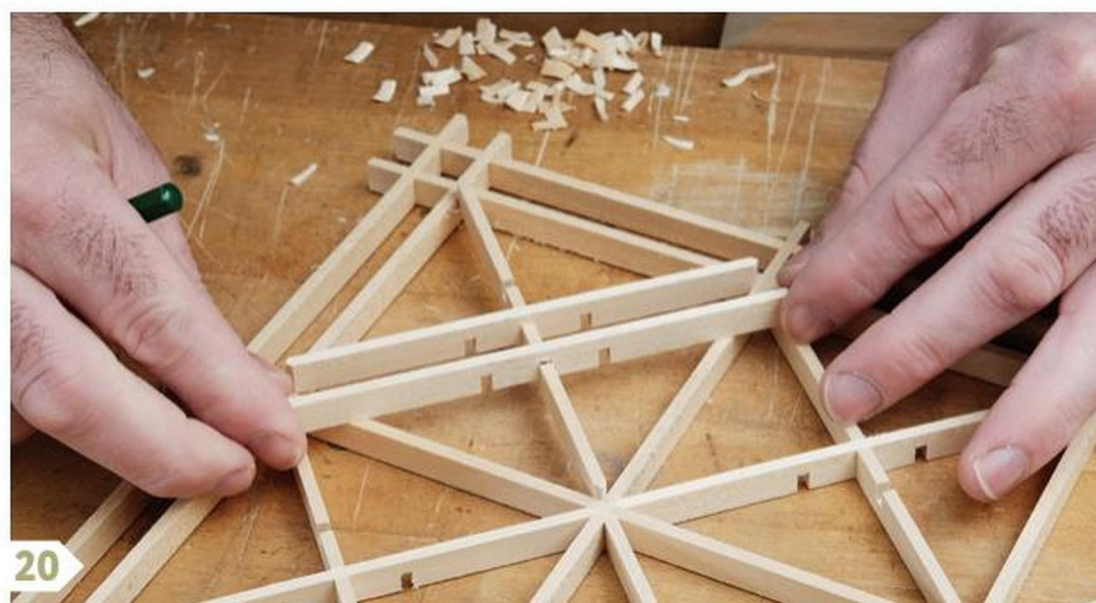
COMPLETE THE PATTERN

The pieces that fit on either side of the diagonal have just a single bevel at each end, and the notches need to remain centered in the length. However, the process for making them is different than for the first two diagonals. You'll fit one end on all the pieces, then the second end on all of them.

20 Set a strip in place. After setting two crossed center diagonals partially into the frame, lower a third strip into one of the open notches until it rests on the frame.

21 Mark its length. Flip the frame over and trace the frame onto the pattern piece. When you pull the pattern piece off, you'll see that there is a 45° bevel (in pencil) across the end.

22 Lock down the stop. Align the pencil line on the pattern piece with the 45° guide surface, and slide the stop up to the piece's back end. Tighten the screw.





23 Transfer the notch's spot. Which notch doesn't matter, but I use the front one. This transfer is necessary when you relocate the stop to cut the second end of the pattern pieces.



24 Rough out the bevel. There is a lot of material to get rid of, and it's much quicker and cleaner to do it with a dozuki.



25 Trim to length. With the square end against the stop, pare a 45° bevel into the piece's end.



26 Check the fit. Put the piece's middle notch in the outside notch of one of the center diagonals. Make sure they are square to one another. If the piece is long, adjust the stop and try again. If it's short, start over.

26

COMPLETE THE PATTERN (continued)

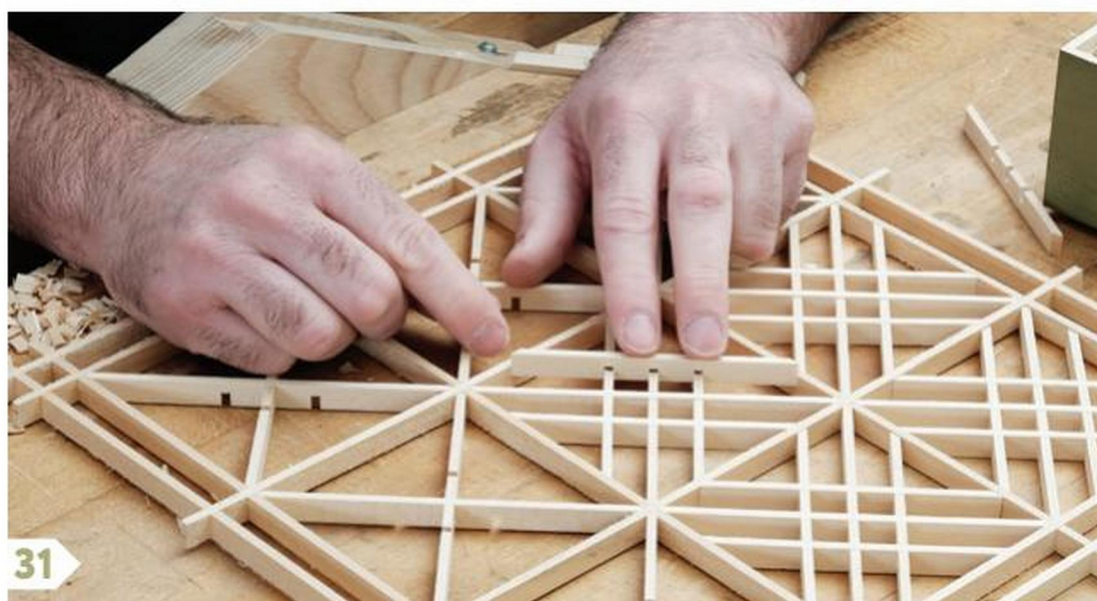
27 Adjust the stop for the second end. Align the outer notch on the opposite side of the middle notch with the mark in the groove, then move the stop up to the beveled end. Be careful here. You don't want the tip of the bevel to slide under the stop, so go easy on the screw. Make it too tight and the stop can lift up at the end.

28 Pare the bevel. After cutting away the waste, trim the end to 45°. Check the fit and adjust the stop as needed.

29 Drop the piece into place. Check it in any square. If both ends don't fit, try it in another. Flip it around and try it in another notch. It should fit somewhere!

30 Make one and find its place. I've found it easiest to work on one piece at a time, placing it into the frame before moving on to another one. If you find a spot where the piece is too short, leave that spot open for now.





31

31 Check around before moving on. Look for a spot for each piece as you make it. You should be able to fill in most of the pattern. After you've tried a piece in every spot, any empties will need a slightly longer piece, so adjust the stop back and give it another go.



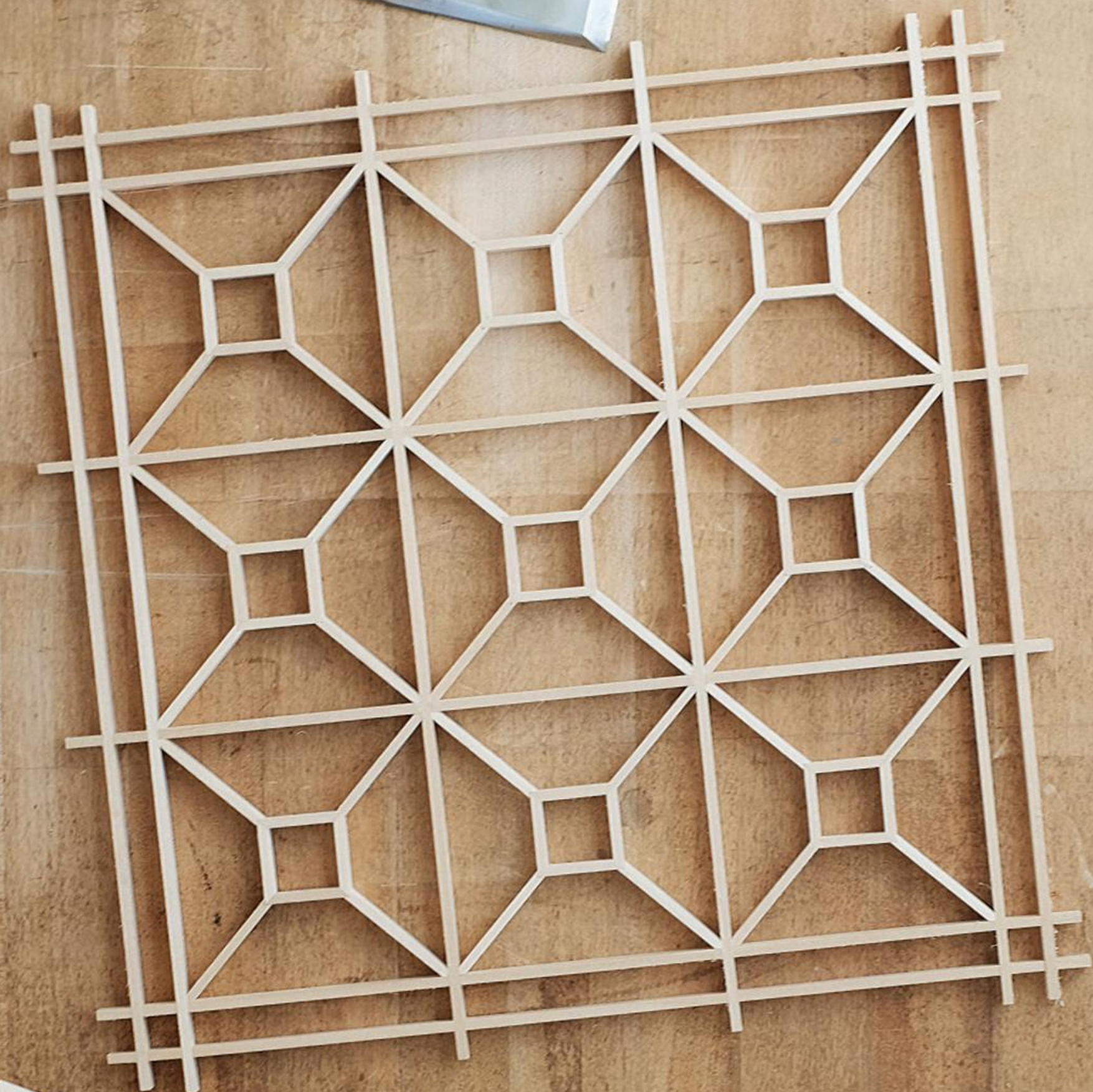
32

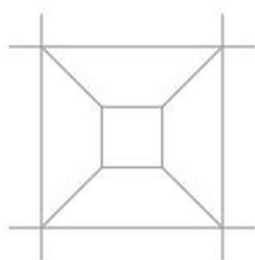
32 Keep at it. With each adjustment to the stop, try a piece in every open spot before adjusting the stop again.



33

33 Complete the pattern. It won't take too long, because the frame is uniform, but there can be slight variations in the thickness of the frame parts, and this means you'll need one side of a piece a bit longer than the other side.



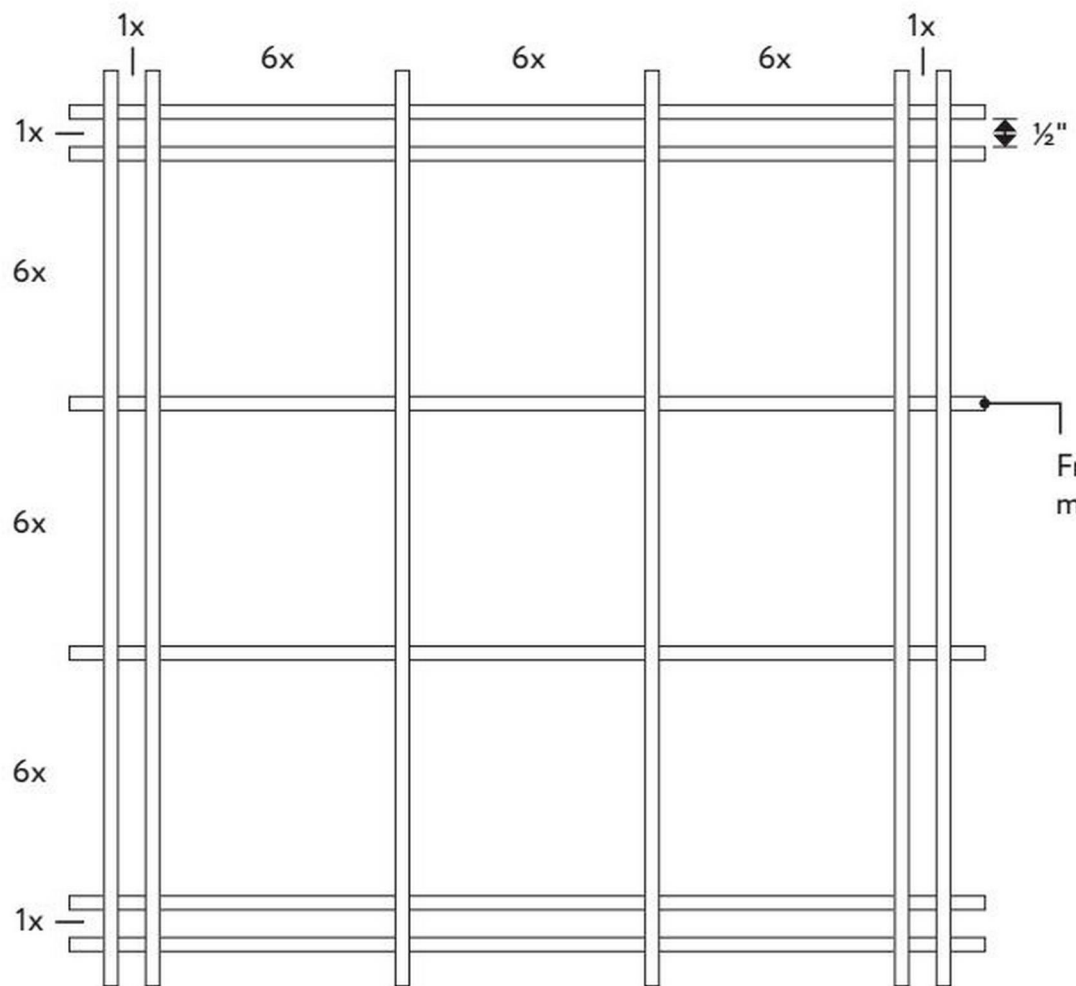


CHAPTER 8

MITER SQUARE

The minimalist design of this pattern gives it a truly modern feel, and it's a great introduction to the birdsmouth joint as it's used in kumiko. Here, the mitered corners of each square are captured in the birdsmouth cut into the ends of the locking pieces. The pattern also provides a good lesson about the relationship between simplicity and complexity. The pattern is simple: a small square held in place by four pieces of kumiko, but the joint required to capture the square is fairly challenging to make well. As is often the case, the simplest things are the most challenging to do well.

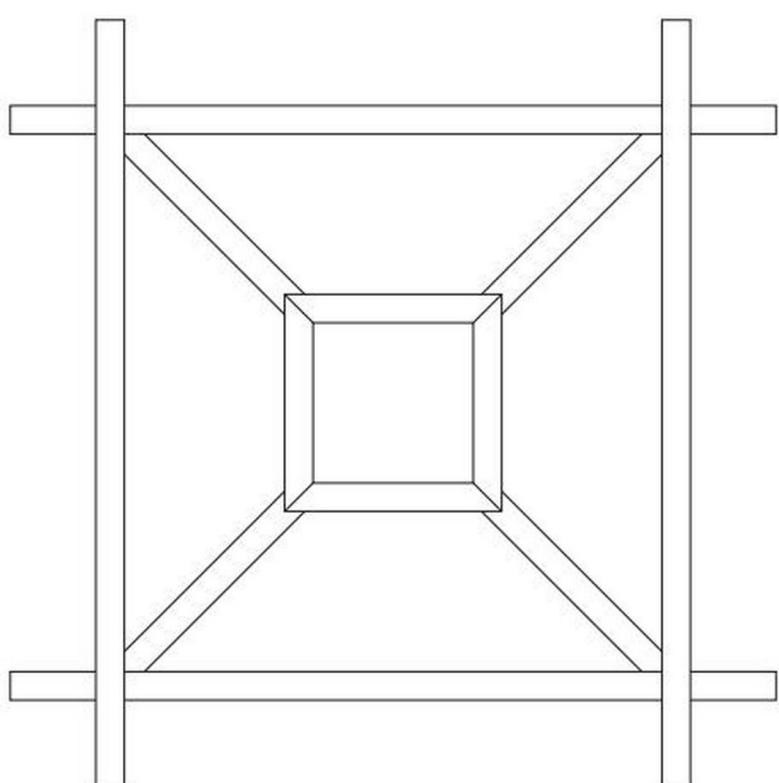
FRAME DRAWING



FRAME PARTS

(12) Frame Pieces

PATTERN DRAWING



PATTERN PARTS

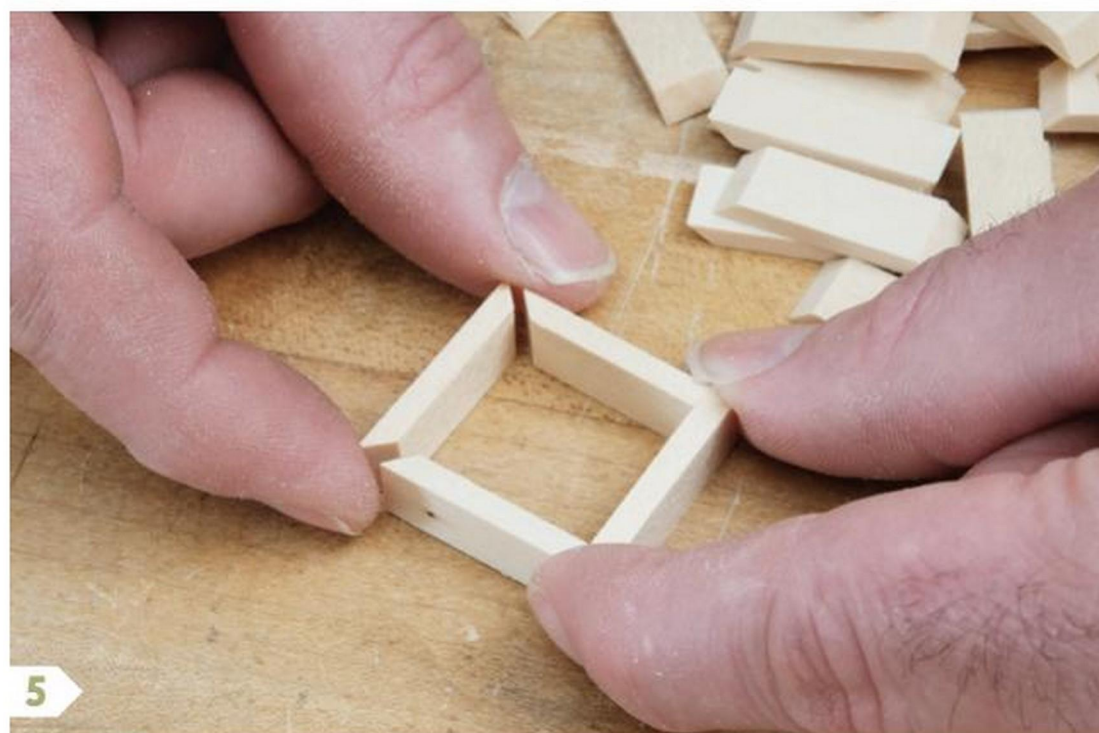
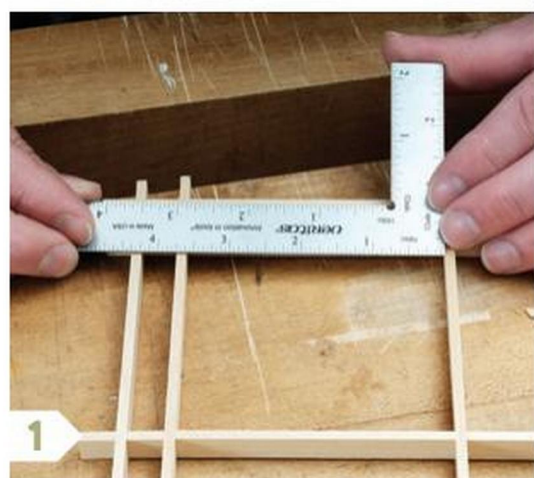
(4) Square Sides
(4) Locking Pieces

GUIDE BLOCKS

45°
90° Birdsmouth Jig

MAKE THE SQUARES

I generally avoid glue when making kumiko. I like that the pieces fit together and hold one another in place, but here is one place where glue is unavoidable. It would be far too tedious and frustrating to hold the mitered square together as you attempt to fit the locking pieces together. So, don't. Glue them up like little boxes.



1 Figure out the square's size. The length of its sides should be about $\frac{1}{3}$ the length of the frame section that it fits into. Measure the frame, divide by three, round away any odd fractions or decimals and you've got your answer.

2 Set the jig's stop. Because you know the length of the sides already, use a rule to locate the stop, then lock it place.

3 Rough out the sides. To account for the possibility that you'll cut slightly out of square, make them about $\frac{1}{16}$ in. longer than their final length.

4 Miter the ends. Remove the bulk of the waste by taking a few passes using the 45° guide block. Then press the chisel firmly onto the guide surface for the final paring cut. Remember: There is just one bevel at each end and they both face the same direction.

5 Take a dry run. Hold four pieces together to get a sense of the square's size, and to check that the square is, in fact, square.

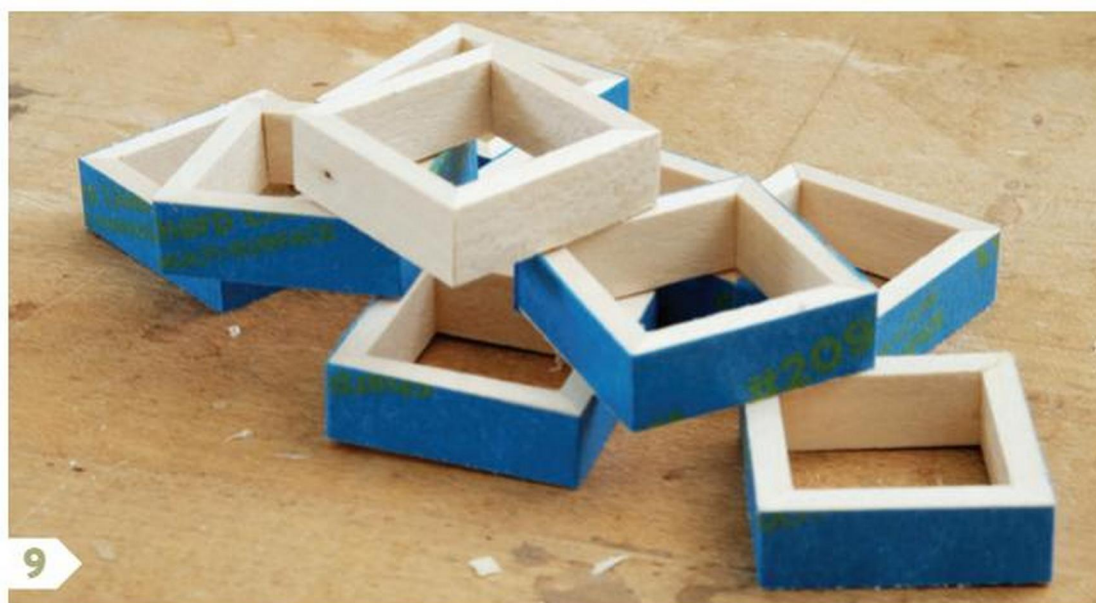
MAKE THE SQUARES *(continued)*

6 Lay the sides on tape. Hold one side of the joint up a bit and press its miter tight against its mating miter. Lower the piece onto the tape and press it down firmly. Cut away the extra tape.

7 Give the joints some glue. It doesn't take much, because all you really are doing is tacking the joints together so that it's easier to fit the locking pieces and assemble the pattern. After that, the birdsmouth joint will keep the miters tight.

8 Roll up the square. There should be some resistance as you bring the last joint together. Pull the tape tight and press it down, then rub your finger over it a few times to ensure that it won't slip or come free.

9 Make a stack of them. It's best to let the glue dry for 20-30 minutes before removing the tape, but after you do pull it off, you can handle the squares and complete the pattern.

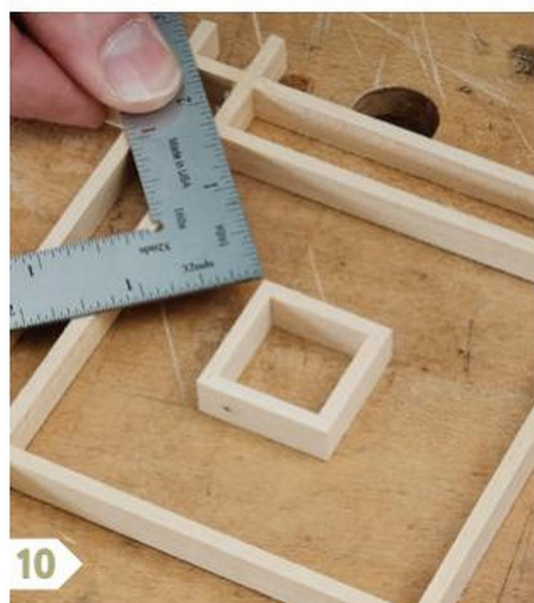


DIAGONALS LOCK THE SQUARES IN PLACE

One end of these locking pieces fit into a 90° corner, so use the 45° jig for that end and cut two bevels. The other end fits around a 90° corner, so instead of pointing out it needs to point inward. It looks like an open bird's beak. That's why it's called a birdsmouth joint.

Start with the birdsmouth joint

This is a challenging joint to cut, because the pointy tips of the mouth are delicate, and they should meet in the dead center of the piece's thickness. You've got to work slowly and cautiously so that you don't cut past the middle and into the other side of the joint.



10



11



12



13



14



15

10 Get a starting length. Place the square in the middle of the frame section. Eyeball accuracy is fine here. Measure the distance from the corner of the mitered square to the corner of the frame. Add $\frac{1}{16}$ in. for the sake of safety.

11 Place one piece in the jig. The square end of the locking piece aligns with the intersection of the angled guide surface and the faces of the jig (see p. 102).

12 Make the fence sticky. Put a strip of double-stick tape on a short length of kumiko stock. Peel the protective cover from the exposed side of the tape.

13 Attach it to the jig. Butt the stop against the back end of the locking piece and press it down, but not too firmly. You want to be able to adjust it square.

14 Check for square. Reference off the fence that's built into the jig. When the stop is square to the fence, press it down firmly.

15 Load up the jig. You need at least four locking pieces in here, but I put in as many as will fit to speed up this step.

DIAGONALS LOCK THE SQUARES IN PLACE *(continued)*

16 Add the second side. This side of the jig acts like a clamp when you put the jig in your vise, and the locking pieces won't squirm about as you cut the birdsmouth.

17 Cut into the end grain. You cannot cut all the way to the center in a single push. Instead, use light pressure and work your way back and forth across the jig a few times.

18 Work from the opposite side. Repeat the process on the second side of the jig. Then go back and forth from one side to the other until you reach the middle from both sides.

19 Hungry birds. Cut properly, the joint looks like a bird's open beak, with the two sides meeting in the middle of the piece's thickness.



16



17

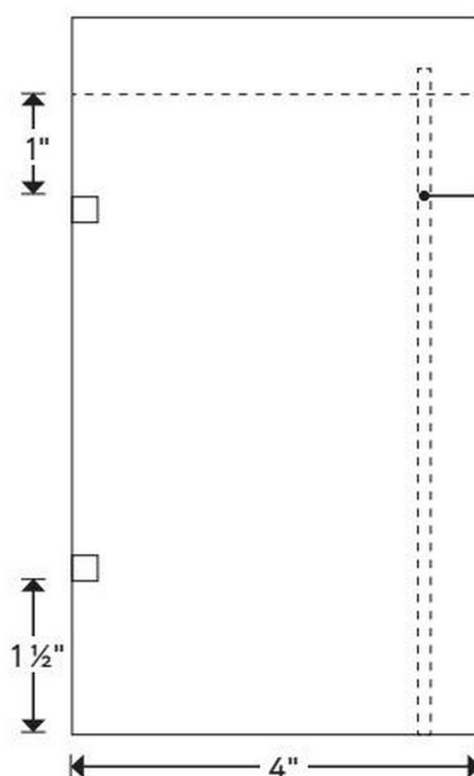
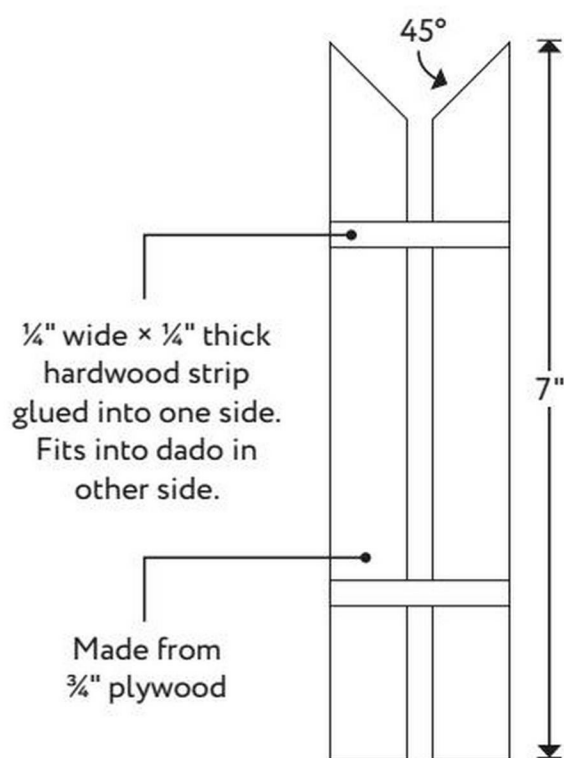


18



19

90° BIRDSMOUTH JIG



Both side of jig have a 1/8" wide by 3/16" deep groove. Hardwood strip glued into one side. Strip is 1/8" thick by 5/16" wide/tall.

> **DIAGONALS LOCK THE SQUARES IN PLACE** *(continued)*

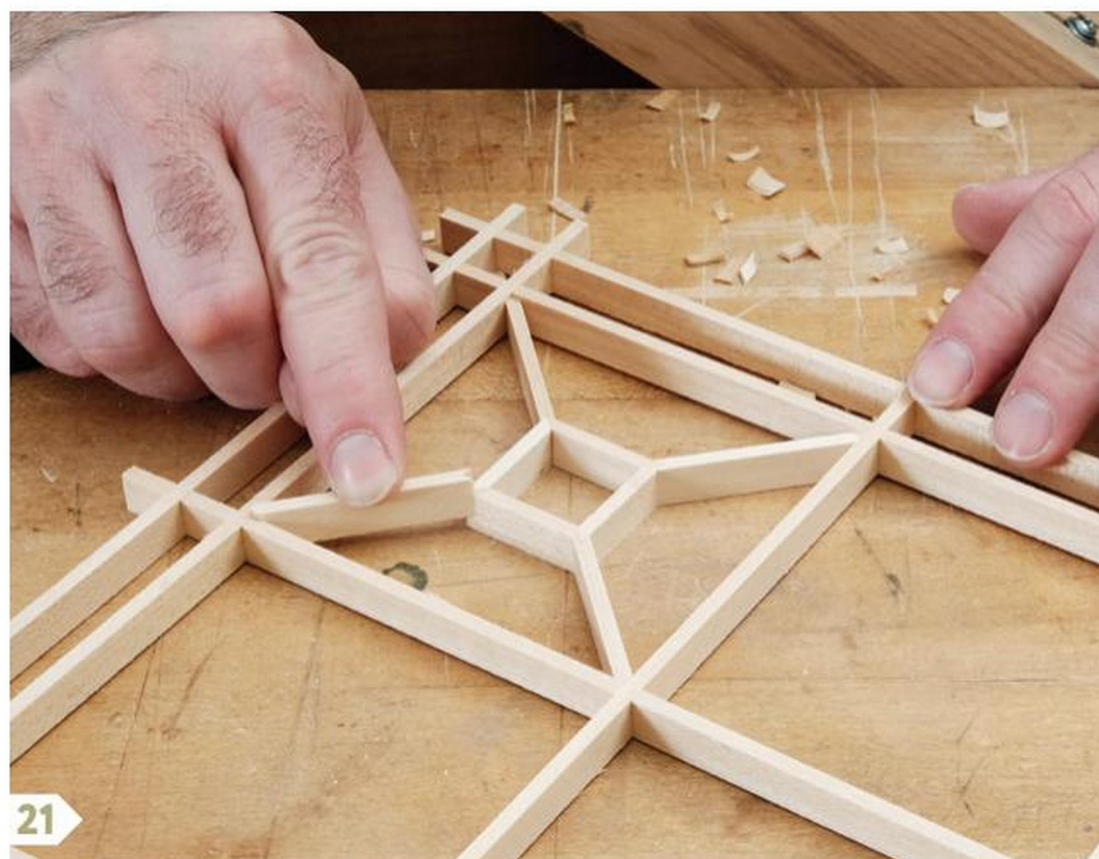
Trim to length at the other end

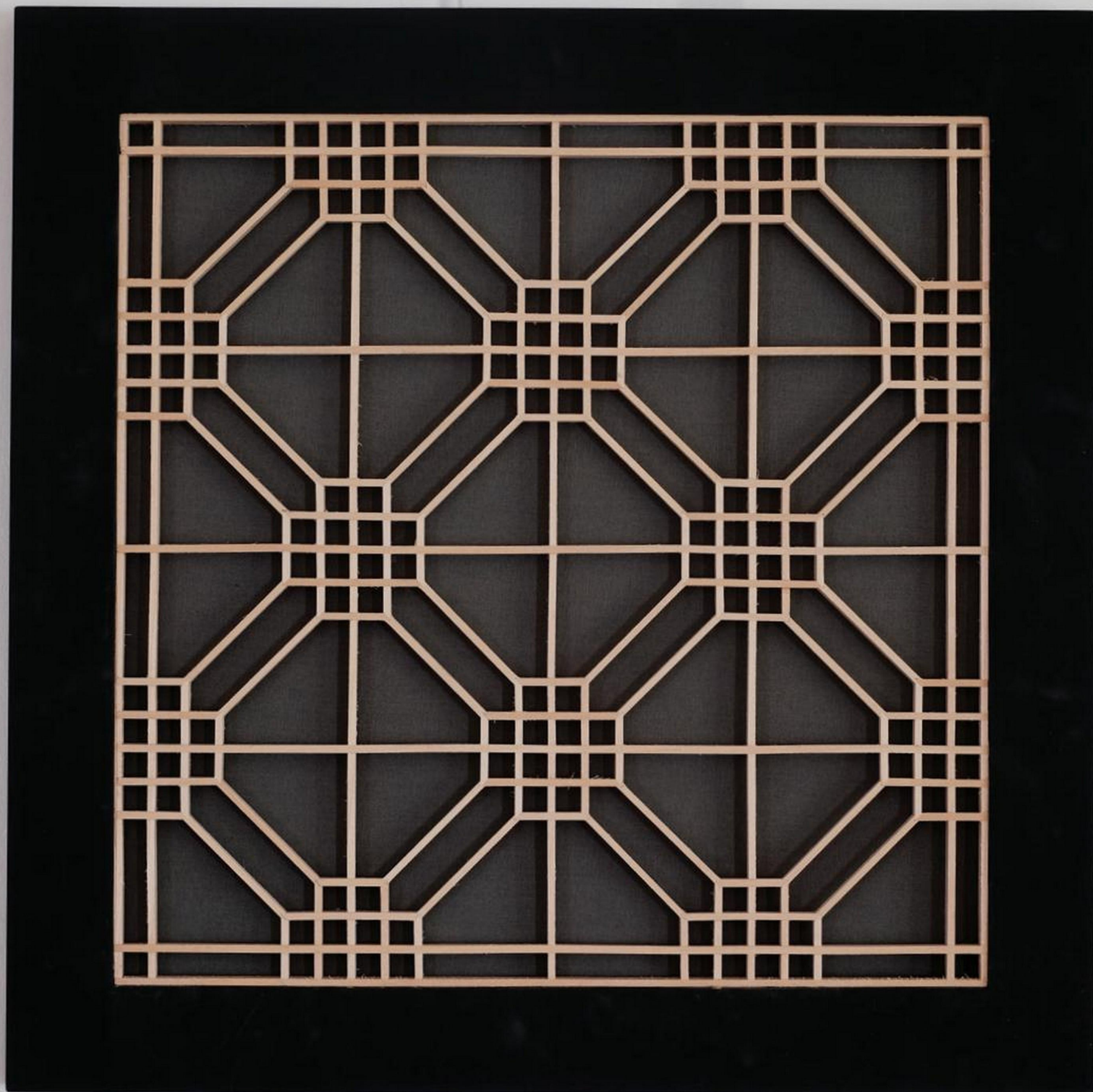
Relax. The tough bit is over. Plus, you've already fit many other pieces just like you'll fit this one. Start long and slowly adjust the stop until the locking pieces are the right length. But take care when putting them against the stop so that you don't dent the sharp points of the birdsmouth.

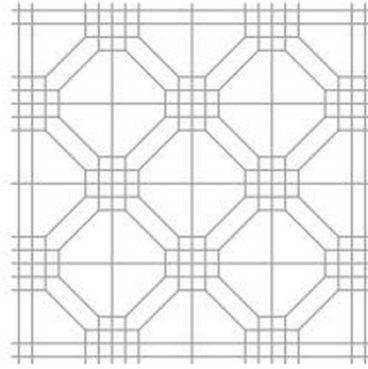


20 Break out the 45° jig. The two bevels meet in the middle then fit into the frame's 90° corner.

21 Fit four pieces at once. The small square must be centered in the frame, so you've got to work on four at once. If the squares are not centered, then they won't be aligned with one another and the panel will be visually unsettling.





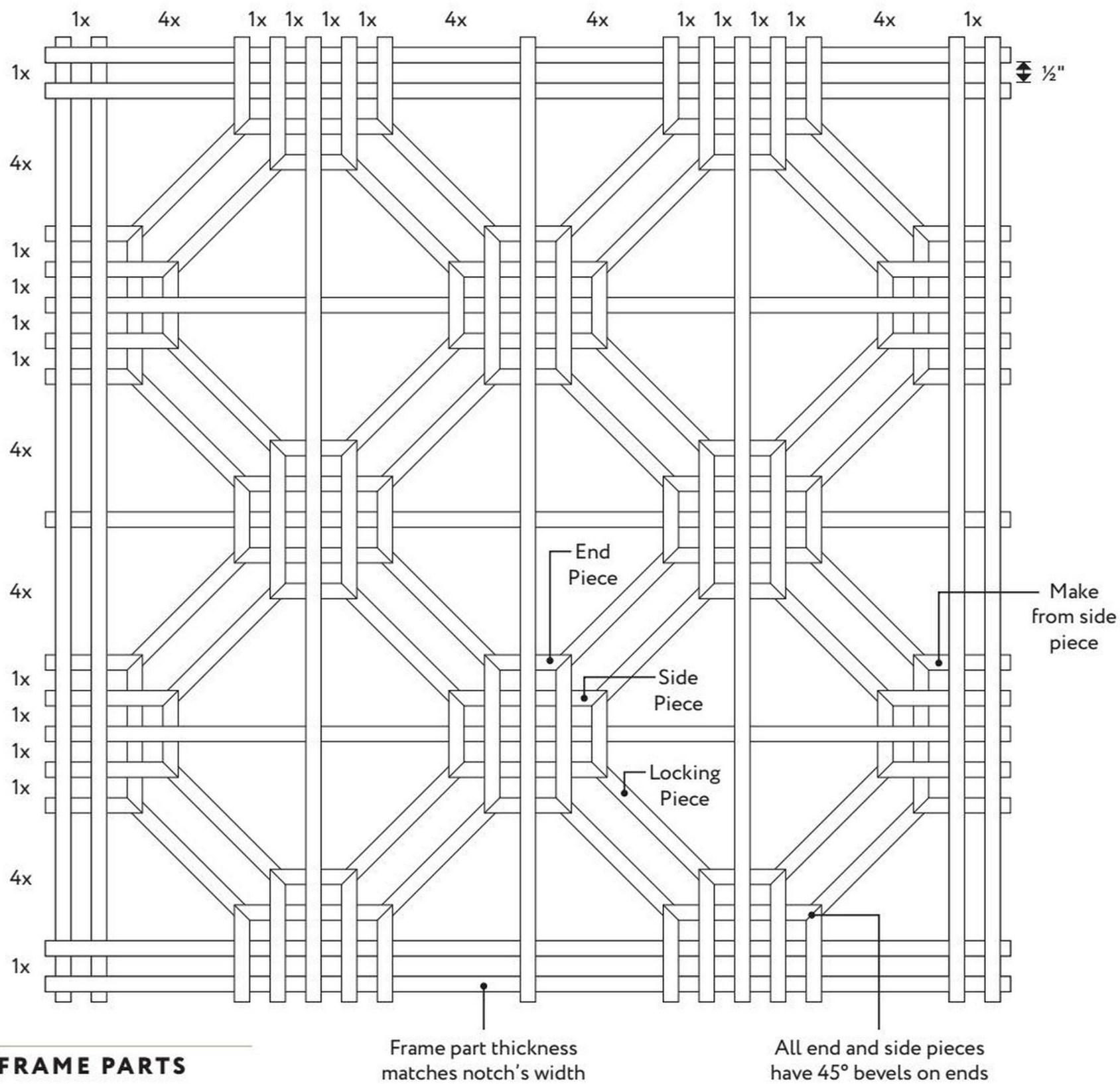


CHAPTER 9

DOUBLE OCTAGON

There's a nice balance between the positive and negative spaces in this pattern. The overlapping rectangles create a cluster of squares that give a sense of density, while the strips give shape to the negative space surrounding them. It reminds me of a bunch of farmhouses seen from above, with stone walls running from one to another to enclose the fields. That gives the pattern a sense of calm, despite all that's happening in it. As you make this panel, keep two things in mind: The frame parts must be just the right thickness or it will curl up. And the diagonals need to fit tightly enough to keep the rectangles' corners closed, but not so tight as to deform the panel.

PATTERN DRAWING



FRAME PARTS

(14) Frame Pieces

PATTERN PARTS

(24) End Pieces

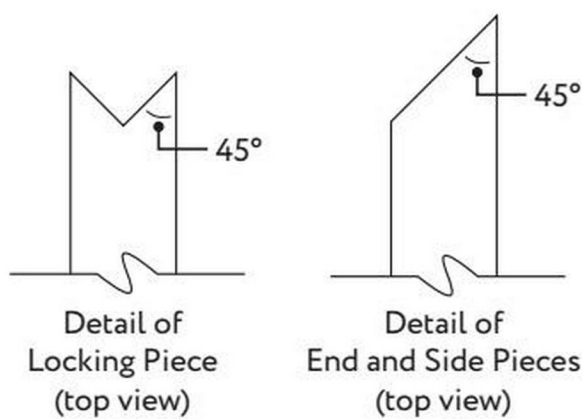
(48) Side Pieces

(32) Locking Pieces

GUIDE BLOCKS

 45°

90° Birdsmouth Jig



TRIM THE RECTANGULAR STRIPS TO LENGTH

Here's how I figured out how to do this. The short side has a single notch and the ends are mitered. Imagine a second notch next to the one in the middle of the side. The miter's point falls in line with the other side of this second notch. So, cut the strips so that they extend just past where the next notch in line would be.



1 Jig sets the distance. Notice that the jig's pin is just to the right of the fence's pin. This means that cut will be made just past where a notch would be if it had been cut into the workpiece, leaving you just enough length to miter the ends.

2 Cut both ends. Set the notch over the pin and cut. Flip the board around, set the notch over the pin again, and make another cut. Now you've got a blank with lots of sides ready to be ripped free. Do that next.



MITER THE SHORT SIDES

This is a snap with the help of a set-up strip. It has a notch in the middle. To one side is another notch. The distance on the other side is the same as it is on the pieces you'll use to make the rectangles. I'll show you how to set up the two 45° jigs you need. After that, cutting the miters is a snap.

3 Second notch sets the stop. Align the outer side of the notch with the intersection of the groove and the surface of the jig. Lock the stop against the opposite end.

4 Get rid of the waste. This doesn't need to be a perfect cut, but make sure you leave enough material for paring, which you can do after making the cut.

5 Flip the piece. In the second jig, you'll set the mitered end against the stop.





6 Set up a second jig. Start with the side's corner just touching the guide surface, and the stop against the miter on the other end. Do not tighten the stop too much, or it will lift up and the miter will sneak under it.



7 Bevel the opposite end. This side will be a smidge too long. Move the stop up just a little. Trim again. Now test the fit against a second short side that's been mitered in the first jig only. Put them back-to-back and put a strip in their notches. The points of the two miters should be aligned.

DO THE SAME FOR THE LONG SIDES

The process here is exactly like what you just did for the short sides, except that the set-up piece is longer. Take your time setting up the jigs accurately, and the pieces will fit perfectly without any fiddling. Again, this all works because the distance between the notches is uniform, and that's the beauty of the finger joint jig.

8 Use the notch to set up the first jig. This is a strip that has one extra notch cut into it, and the outer edge of the notch is exactly where the point of the miter must be. So, use that edge to get the jig's stop in the right place.

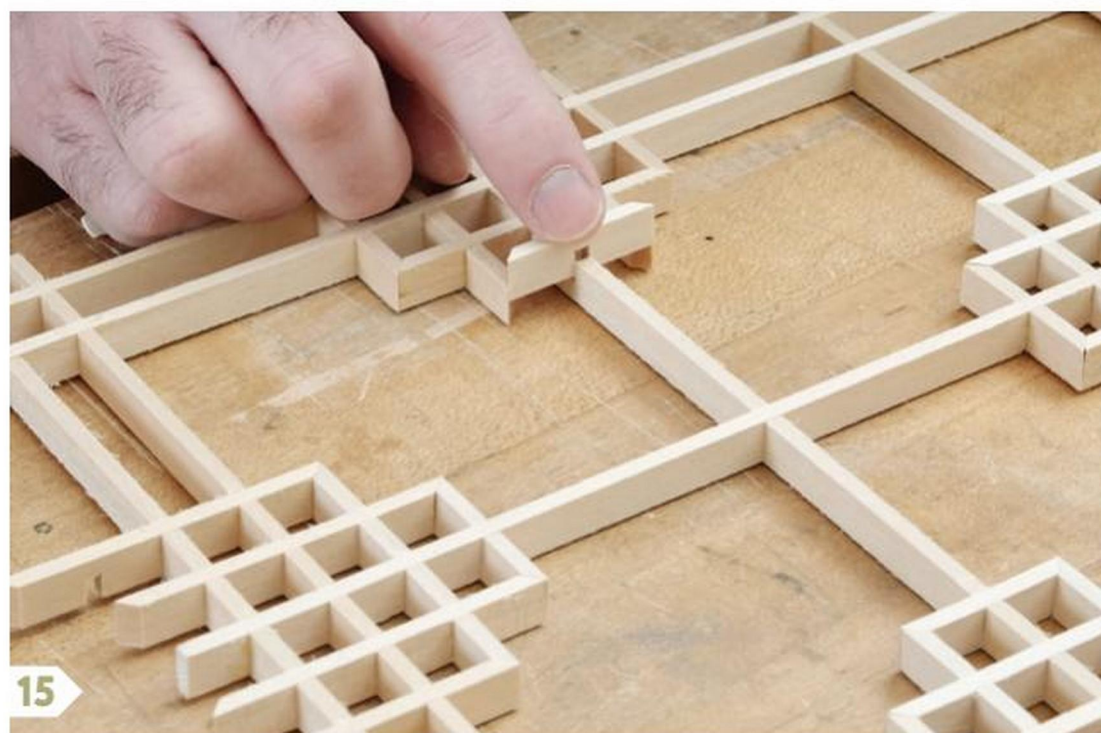
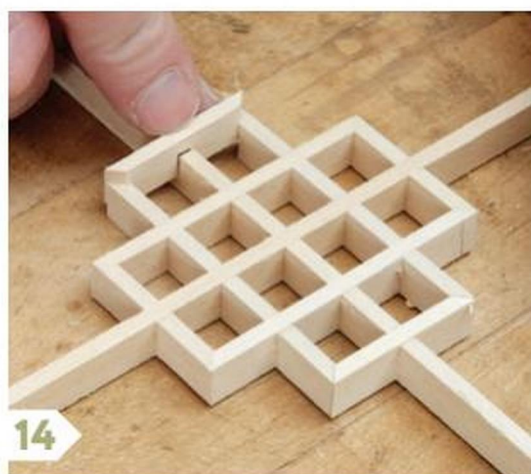
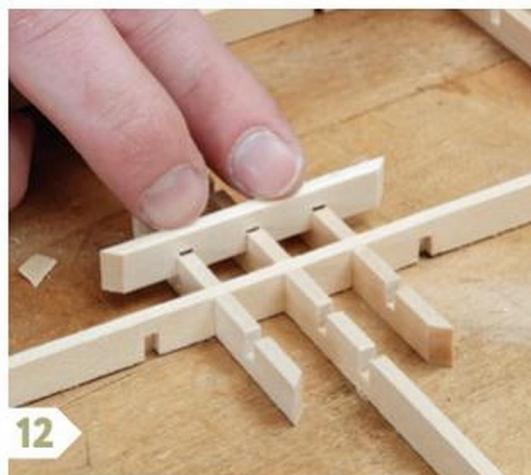
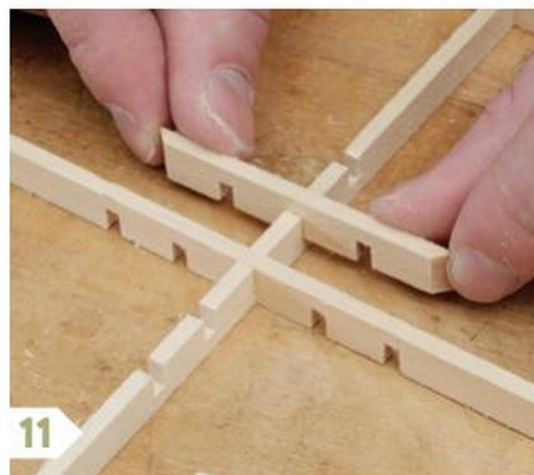
9 Then dial in the second one. After mitering the first end, place the miter against the stop and move the stop up until the opposite end just kisses the guide surface.

10 Cut the miters. After both jigs are dialed in, go ahead and miter all the long sides.



PUT THE RECTANGLES TOGETHER

In theory, you'll drop in these pieces and the miters are tight. In practice, that might not be so. A very small gap isn't a problem, because the pieces that run between the rectangle clusters will pull them tight. But if you cut one side or the other too short, you'll need to start over.



11 Start with the long sides. Because there are several notches in these, they are self-squaring as you go. Drop in two parallel sides first.

12 Add the crossing pieces. Press directly over the notches and make sure that all three joints are seating equally, so that you don't break the side.

13 Check the short side. Rubber, meet road. Ideally the piece drops in and things are tight. If a side is too long or a bit too short, you need to figure out if it was cut with the first jig or the second, then adjust that jig.

14 Complete the pattern. I cut all of the short sides with the same jig setups. If there is a spot where one doesn't fit correctly, I wait until I've fit as many as I can and then adjust the jigs.

15 Use the same pieces around the border. Glue the joints around the perimeter. After the glue is dry you can either cut away the waste entirely, or cut all the horns to the same length.

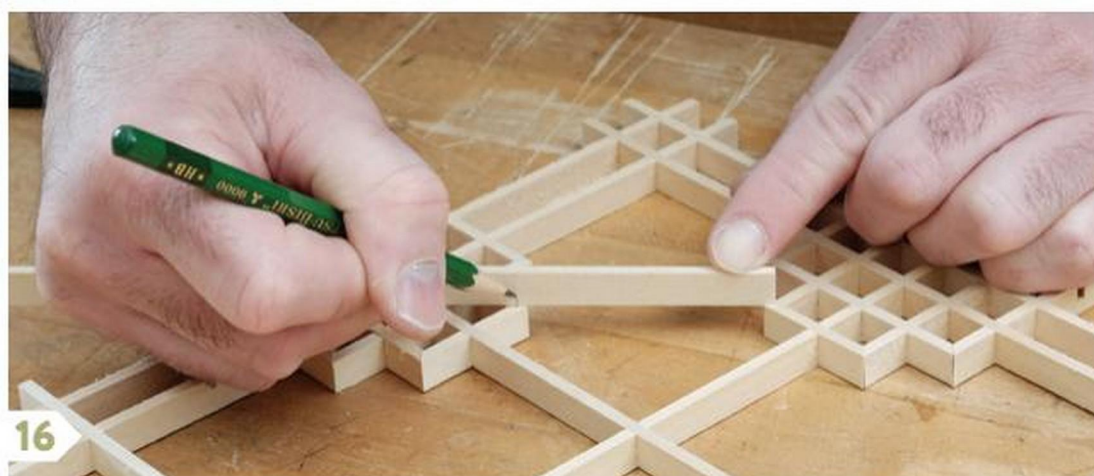
BIRDSMOUTH JOINT CONNECTS THE RECTANGLES

This time around, both ends of the piece get the birdsmouth joint. The overall process is the same, but you will need to dial in the length of the connecting pieces. Don't try to move the jig's stop. Instead, make use of the woodworker's duct tape: blue tape.

16 Start long. Lay a strip from corner to corner and mark it a heavy $\frac{1}{32}$ in. long.

17 Cut the joint. Use the same technique and birdsmouth jig used when making the miter square pattern (pp. 101-102).

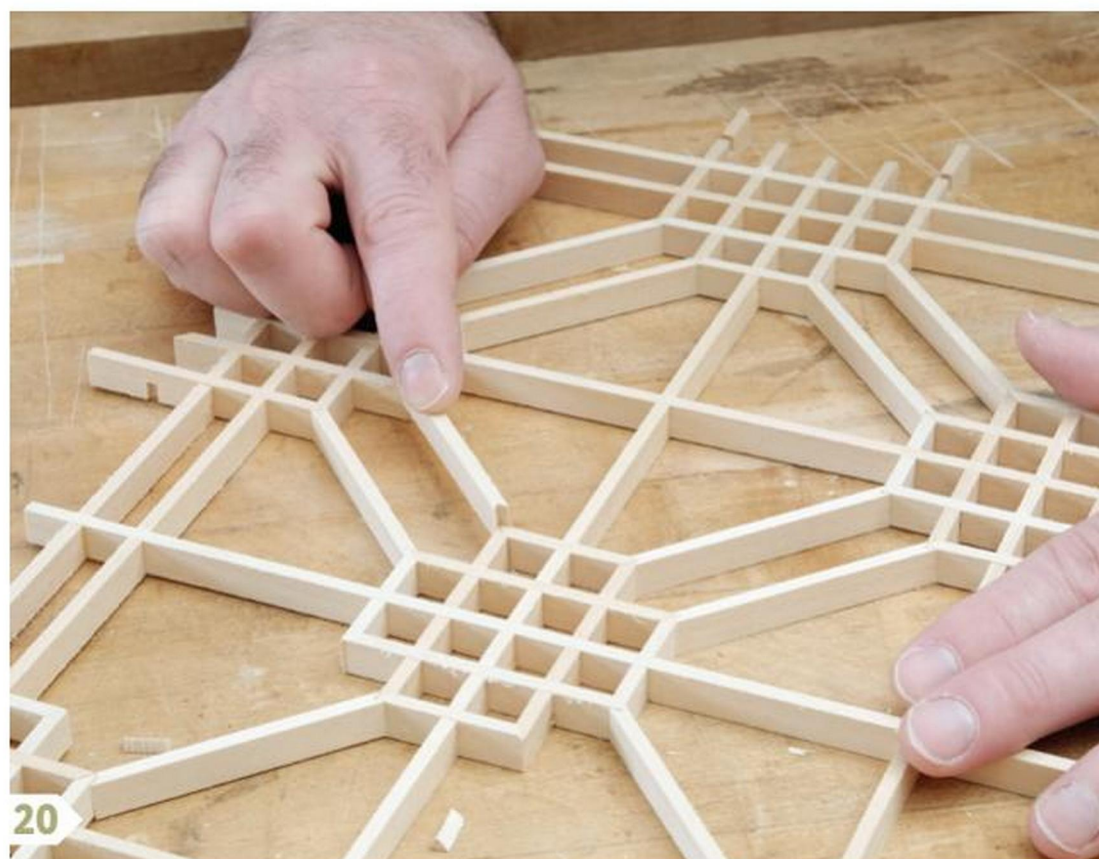
18 Blue tape shim. The pieces should be too long. The safest way to adjust their length is to add one strip of blue tape at a time, recut one end, then test the fit again.





19 Load up the jig. After the jig is dialed in so that the pieces are snug, but don't deform the frame or rectangles, make the rest of the connecting pieces. Cut as many as you can at once, so that you don't lose your mind.

20 All the pieces are the same length. At first you might think that the inner and outer connecting pieces are different lengths, but they aren't, thankfully. This makes the pattern a bit less difficult.



USING KUMIKO IN FURNITURE

Most of the kumiko I make is intended to be hung on the wall as decorative art, but I do sometimes incorporate it into the boxes and furniture I make. When I first began to do this, I would make the box, for example, then make and fit the kumiko to it. But that's the wrong way to do it, because often you are left planing the kumiko frame down to fit the opening you have. That's undesirable for a few reasons. First, it weakens the frame. Second, you end up with the outer frame pieces thinner than the interior ones and the infill pieces. The panel begins to look unbalanced. Finally, it's just plain tedious and difficult to plane the outer frame parts of a kumiko panel. So, I now make the kumiko panel first, then build the box around it. This isn't as difficult as it sounds.

MARK, DON'T MEASURE

I actually learned this from making frames for decorative panels, but I should have known it from years of making furniture. Measuring introduces far more errors than marking does. So, when I am making a box or piece of furniture with kumiko in it, I make the kumiko panel, cut off the horns, then use the panel itself to determine the length of things like box sides, door rails, etc. Exactly how you do this depends on the joinery involved. For example, to use kumiko in the lid of a mitered box, I miter one end of the side, lay the kumiko down, align it with the top of the miter, then mark the other end. To determine the length of a door rail, I'd cut a tenon at one end, align the kumiko with the tenon's shoulder then mark the opposite end. Hmm...I think I see a pattern here. Cut the joint at one end, mark the other.

BUILD AROUND THE PANEL

This follows from marking rather than measuring. The best example of this from my own work is box 51 of the 52 boxes I made during the course of 52 weeks. There is kumiko in the plinth of the tea cabinet. The first time I made box 51, I made the plinth first then made the kumiko to fit. That was frustrating and difficult. Every time I've made box 51 since, I've made the kumiko first then the plinth. Now it goes together without a hitch. You can do the same for doors by sizing the rail length directly from the kumiko panel, then using the panel to help locate mortises for the rail tenons. Or, just use stub tenons on the lower rail and simply slide it up to the bottom of the panel.

(continued on page 116)



Tea Cabinet by Matt Kenney



Tall Cabinet by Michael Pekovich



Stereo Cabinet by Michael Pekovich

USING KUMIKO IN FURNITURE *(continued)*

MAKE THE OUTER FRAME THICKER

For large pieces of furniture with large panels, it's a good idea to make the four outer frame pieces thicker than the rest of the pieces in the panel. This makes the panel stronger, but also provides some visual weight, so that you don't jump from the wide parts of a door frame to the thin parts of the kumiko. Think of the outer frame as a transition, in other words. An alternative is to make the frame pieces all the same thickness, but surround the kumiko frame with a intermediary and thicker "frame" to make the transition.

DON'T GO BIG

Here's a bit of advice that might be more personal preference than solid design principle. I think that as the size of the furniture grows, the size of the kumiko should not. Certainly, you can make larger panels, but keep the size of the infill patterns relatively small. A bunch of small hemp leaf patterns repeated in a large panel looks better than a large panel with just a few patterns, at least to my eye. Also, don't go too thick with the parts. Even in full-size furniture, kumiko that is $\frac{1}{8}$ in. thick will look great. If you do go thicker, don't take it beyond $\frac{1}{4}$ in. Personally, I'd keep it at $\frac{3}{16}$ in. thick at the most. Still, I'm sure that someone out there will make a stunning piece with really thick kumiko and really big patterns.



Wall Cabinet by Matt Kenney

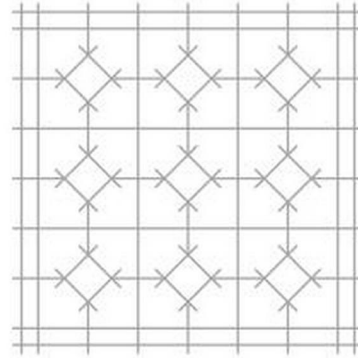


Donna Cabinet by John Reed Fox



Lueders Cabinet by John Reed Fox



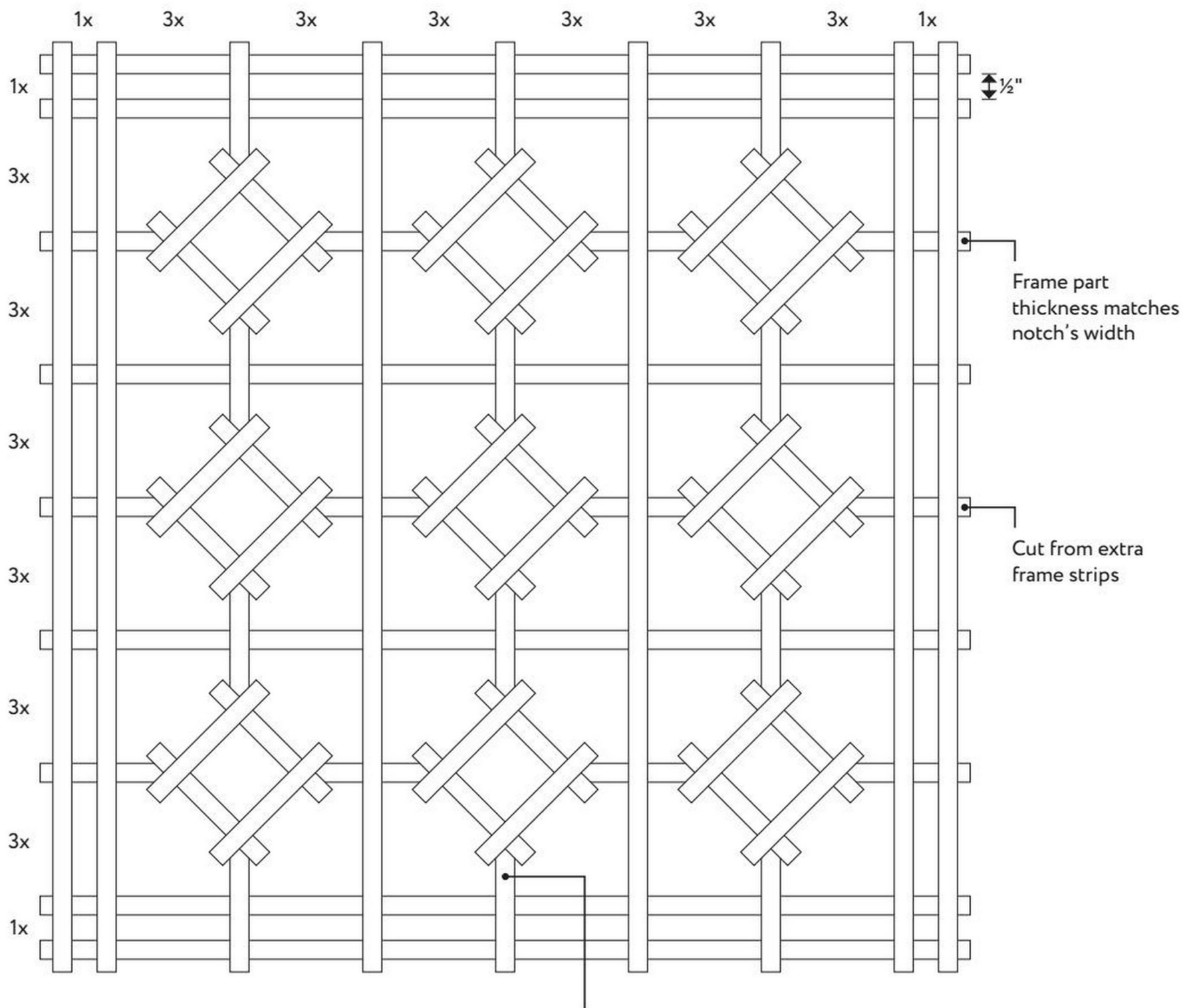


CHAPTER 10

KALEIDOSCOPE

This is a funky pattern, because looking at it, you see octagons, but a small change in your perspective reveals squares, rotated 45° to look like diamonds, suspended in the frame. It's a bit disorienting, and reminds me of the tumbling changes you see in a kaleidoscope. The hardest part about making it is beveling the pieces that hold the squares in place, because they are notched in the middle to fit together with the frame. The notch must remain centered if the four pieces working together to suspend the square are to hold the square centered in the frame. I'll show you how to do it.

PATTERN DRAWING



FRAME PARTS

(12) Frame Pieces

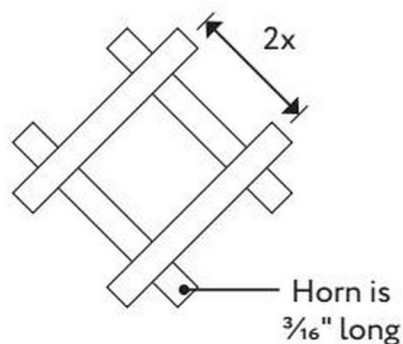
PATTERN PARTS

(36) Square Sides

(24) Locking Pieces

GUIDE BLOCKS

45°

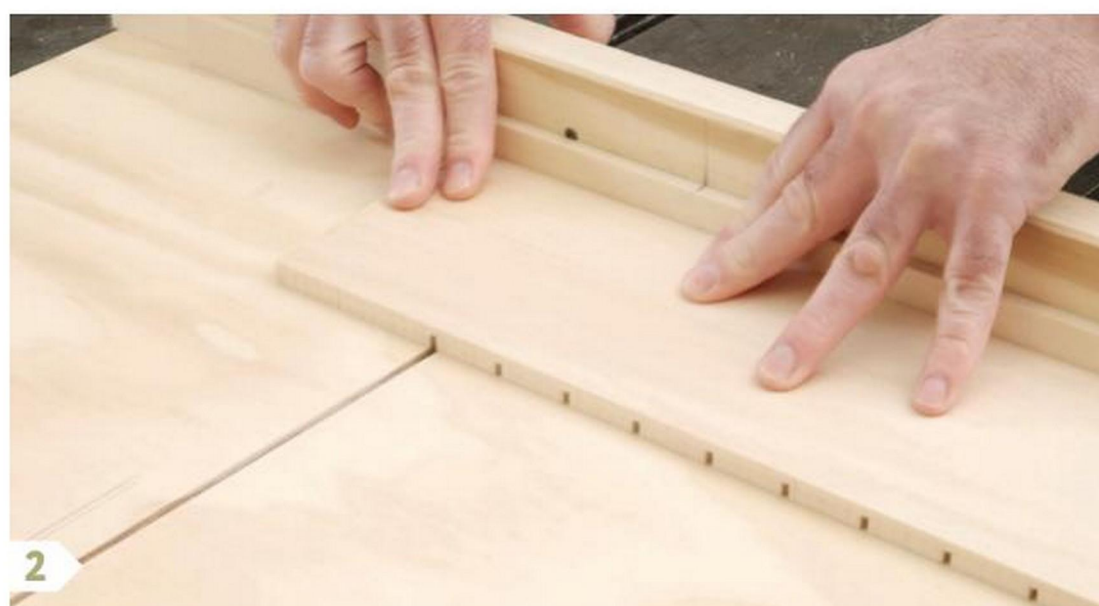


NOTCHES HOLD THE SQUARES TOGETHER

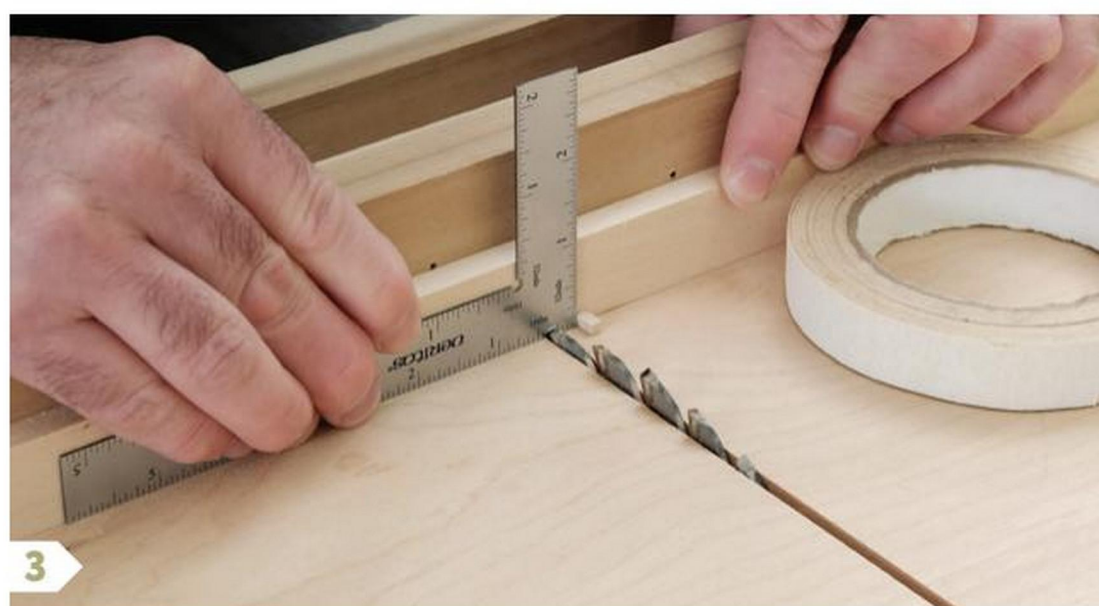
These squares are similar to the ones featured in the hashtag pattern (p. 48), and they're made the same way. They are larger, however, because the frame squares they fit into are larger.



1 Two spaces between notches. The square sections of the frame are six spaces across. Suspended squares that are two spaces across have enough negative space around them to create a balanced pattern.



2 You need a bunch. Keep in mind that the distance between the pairs of notches should be more than double the length of the horns.



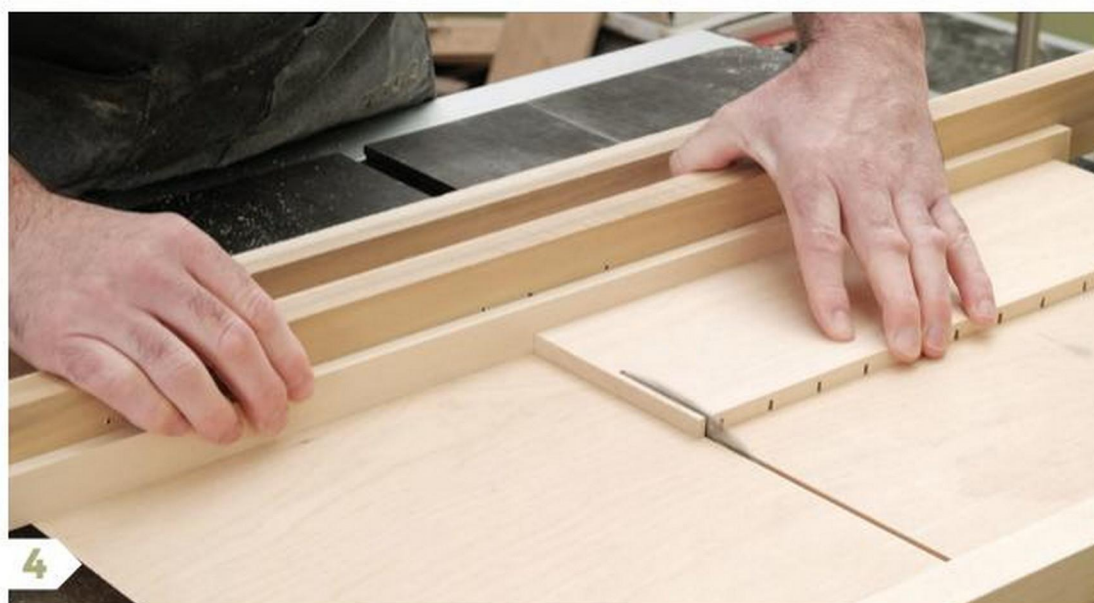
3 Set the length of the horns. Tape a finger joint jig to a standard crosscut sled, locating the pin $\frac{3}{16}$ in. from the kerf.

> NOTCHES HOLD THE SQUARES TOGETHER *(continued)*

4 Trim the end. Raise the blade about $\frac{1}{16}$ in. above the thickness of the board, place the first notch over the jig's pin, and cut through the board.

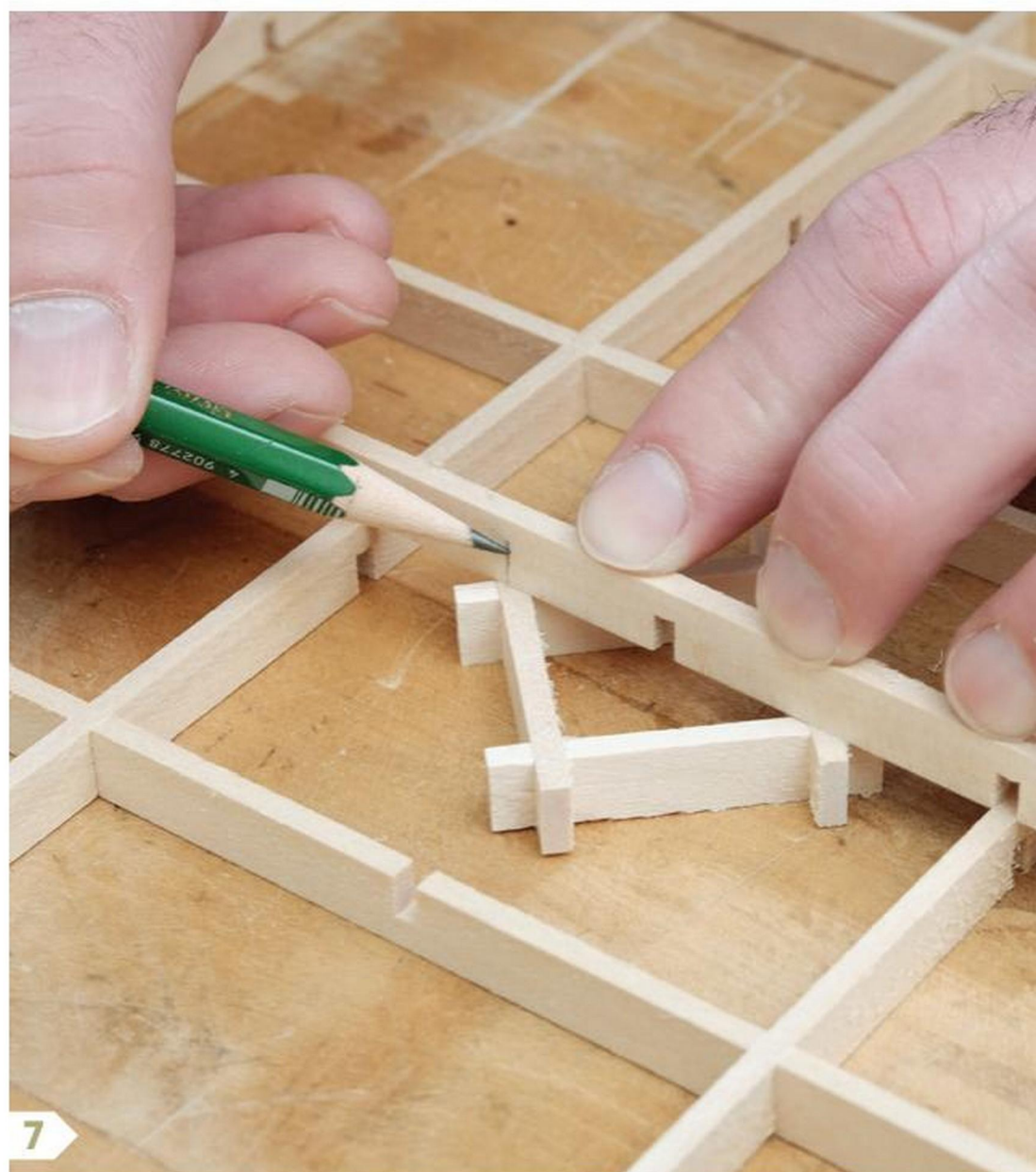
5 Cut a set free. Rotate the board 180° and make another cut. This one trims the opposite side of the piece to length and cuts off a batch of sides from the longer board.

6 No glue needed. These horns are not cut off, so you can just push the joints together.



MAKE THE LOCKING PIECES

Here's where things get challenging. The distance from the notch to the point at the end of the piece should be identical on both sides, and for every locking piece. I've found the easiest way to make it happen is by working to suspend one square, and then another in an adjoining section of the frame.



7 Mark up a frame strip. Lay it over the assembled frame, with the notches seated over the frame's strips. After locating the small square in the center (eyeball accuracy is okay), use a sharp pencil and mark them a bit long.

8 Cut the pieces to length. It's very important here that you cut in batches, and that your cuts are accurate, so that either side of the notch can be placed against the jig's stop when paring the bevels. I draw a line on the saw hook's bed to align one of the pieces as I cut the other end.

9 Work four at once. You'll know that the distance from the notch to the point made by the bevels is correct when you can fit a square between them without gaps. This also ensures that the square is centered in the frame.

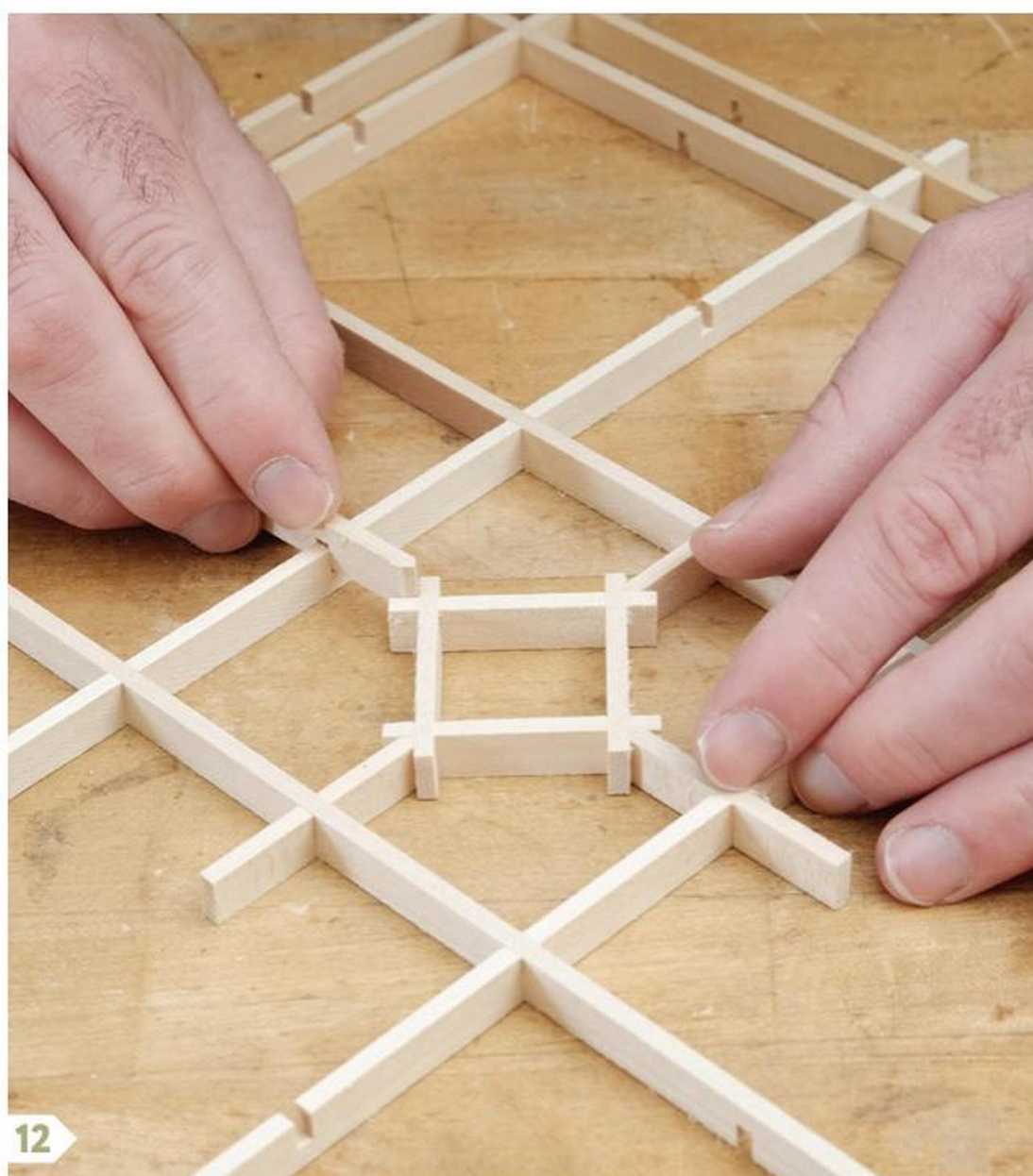


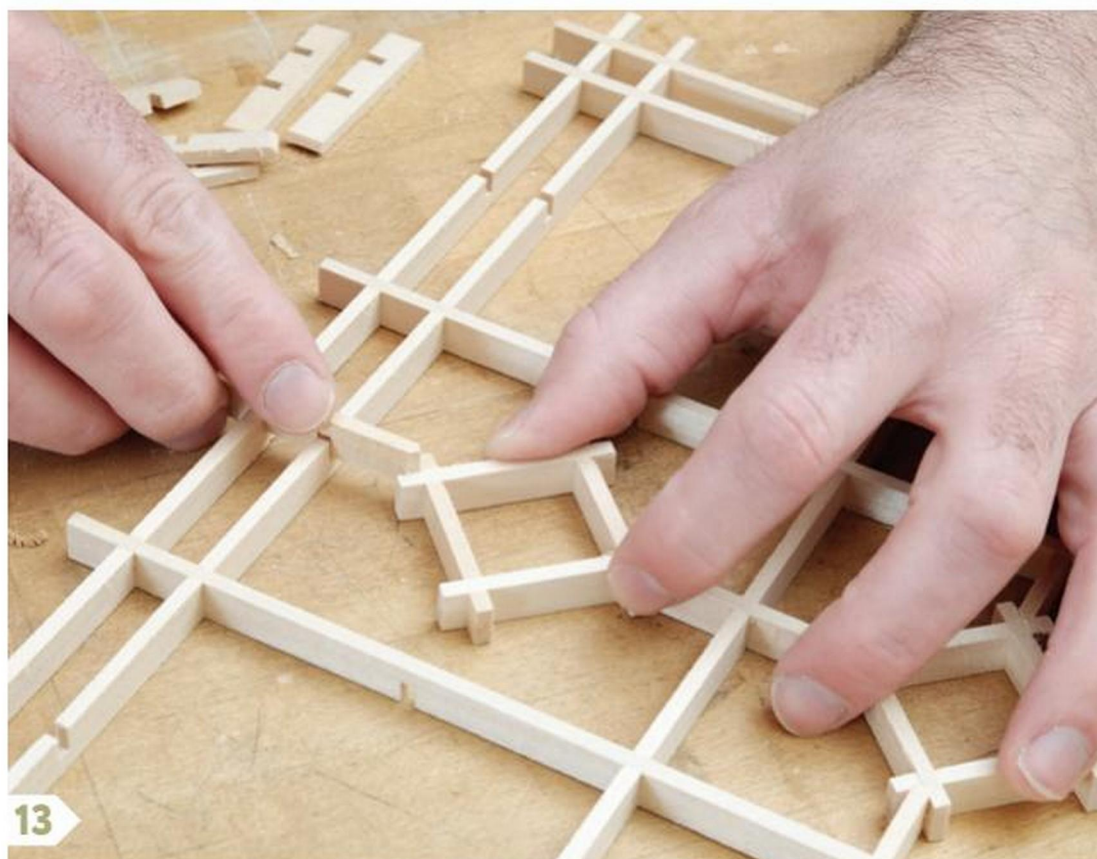
MAKE THE LOCKING PIECES *(continued)*

10 Pare one end. It gets two 45° bevels. Right now, don't worry about the other end.

11 Test two pieces. If you can get the square pinched between two locking pieces, then you are not only in the ballpark, you playing on the infield.

12 Add the third and fourth. Here's where you know for sure. The second pair of locking pieces should go in without too much force, but still press firmly into the corner created by the square's horns.

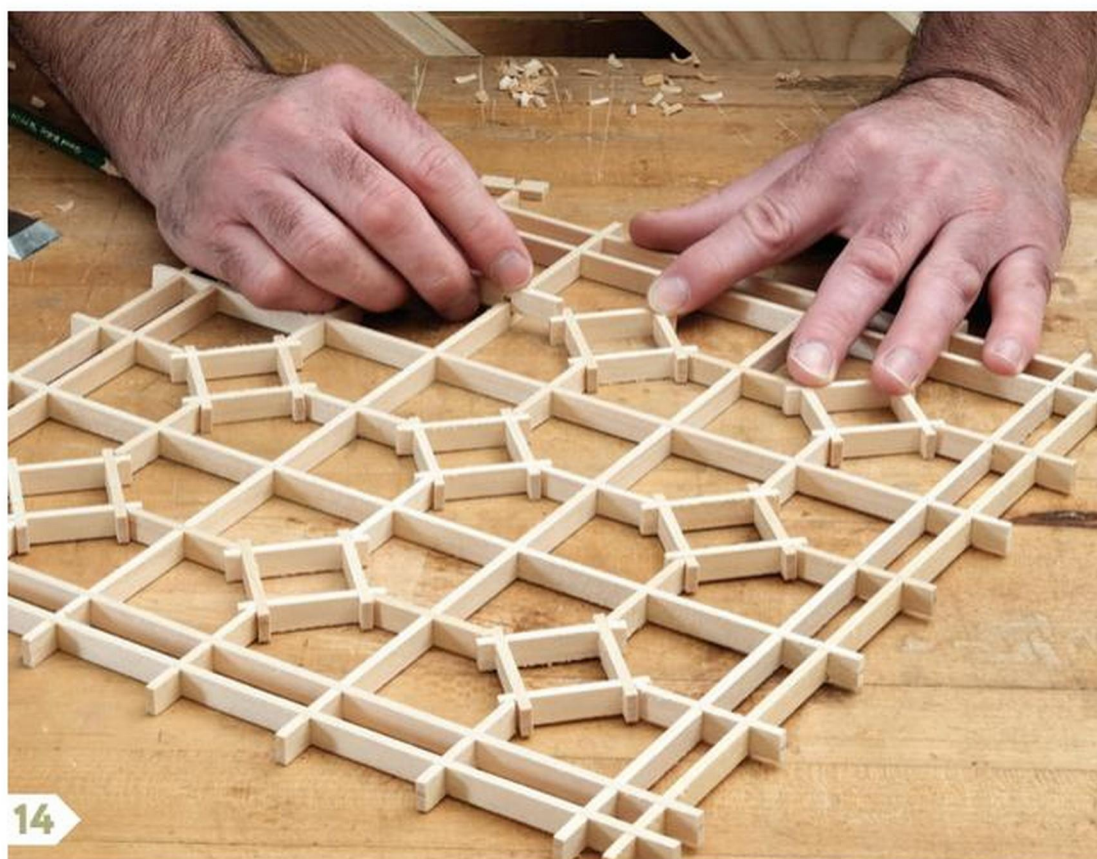




13

13 Confirm the fit with a second square. Set up a second 45° the same way you did when making the center diagonals of the square dance pattern (pp. 90-91). After cutting bevels into the second end, fit another square in the frame. If you can get two adjoining sections of the pattern to work, then you're golden.

14 Build out the pattern. Cut the first end of all the locking pieces, then the second. If you encounter any that are too short, set them aside and complete the pattern. Then, go back and make longer locking pieces for those spots.



14

DESIGNING PANELS

If you've made it all the way to this point, and have tried out at least most of the patterns covered, then you've certainly developed some mad skills and are ready to branch out, make some panels of your own design, and truly experience the beauty, joy, and satisfaction that creating art brings. I know that venturing into original design can be intimidating. It was for me. So, here are the things that I think about when designing decorative kumiko panels. Think of them as launching points for your own work. Oh...there is one bit of advice that I'd give you that's not directly related to kumiko: Have fun and don't be afraid to fail. Everyone does. Successful folk just keep trying again and again until they get it right.

EMPHASIZE ONE PATTERN

All kumiko patterns are striking, even the subtle ones, so in a panel that features more than one pattern, you've got to figure out a way to let one of them take center stage. Your panel should make a strong, visual statement, and it can't do that if all of the patterns are on equal footing. There are several ways you can do this. You could locate one pattern in the center of the panel, with a second pattern enclosing it on all four sides. Or, make the secondary pattern smaller than the primary one. This allows you to mix the two together in the panel while giving emphasis to one over the other. Here's another way: Use far more of one pattern than the other. This pulls the eye to the one that's used the least, giving it emphasis.

PICK PATTERNS THAT COMPLEMENT EACH OTHER

There are some patterns that just don't work well together. The kaleidoscope and double octagon, for example. They would just end up fighting one another, because they both contain octagons. The hemp leaf and holding hands pattern, however, work great together. The horizontal and vertical lines of the latter balance well against the angled lines of the hemp leaf. For similar reasons, the hashtag and miter square patterns would look good together. There are not infallible guidelines for deciding which patterns look nice together, but take a look at the 10 panels I've designed using the patterns in this book (pp. 141-156), and take a look at the work of others to see which patterns they use together. Think about which combinations you like and why, then make some panels.

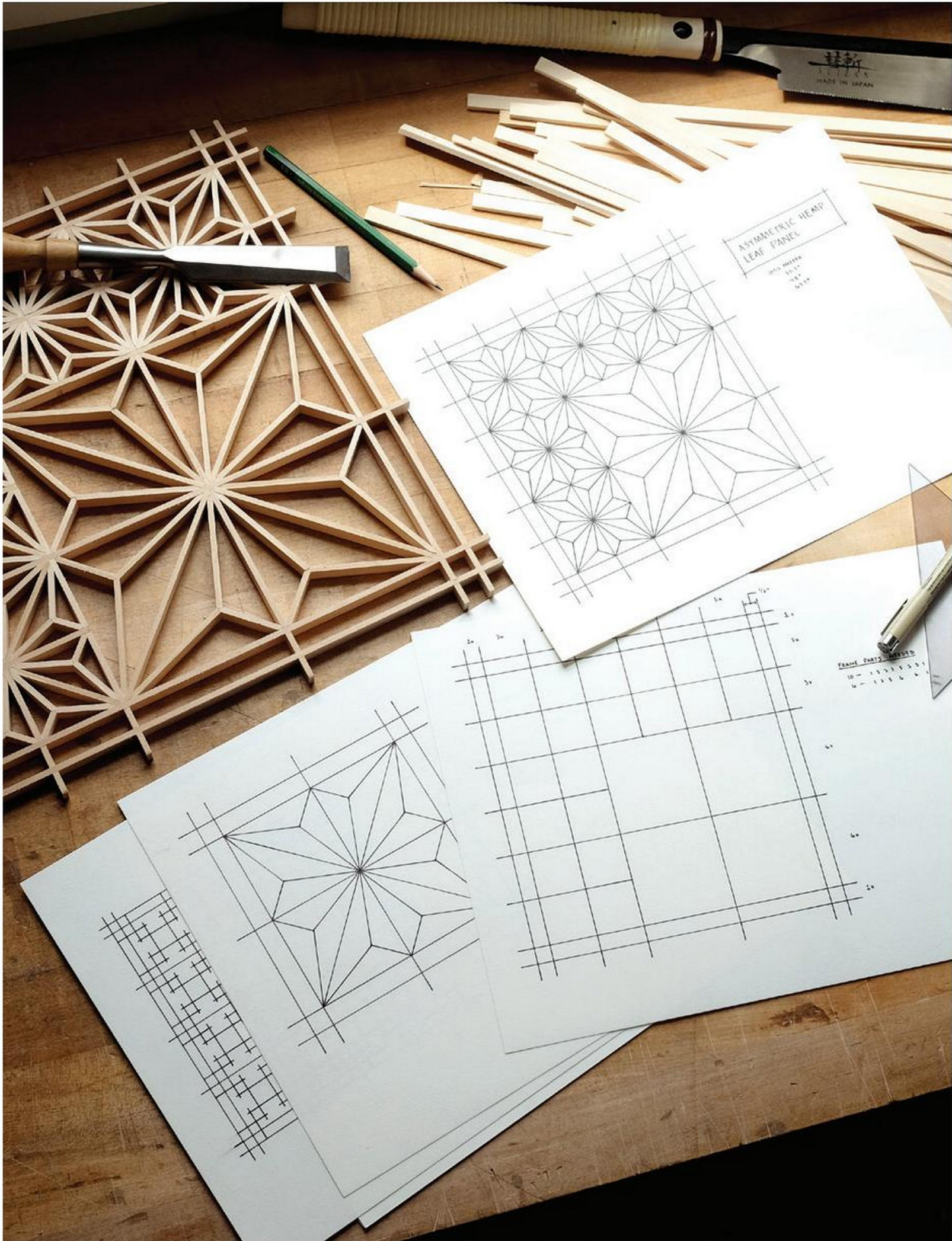
DETERMINE THE ARRANGEMENT

Four hemp leaf patterns huddled together in a cluster looks quite different than four that are separated from one another by a narrow border. So, think about whether you should abut individual instances of a pattern against one another, or space them out. Some patterns, like the hashtag, work well when they are small and repeated over and over. These can be used as a decorative border around another pattern. The holding hands pattern could be used in a similar way, like a path that runs in and out amongst "beds" of another pattern (think of a formal garden). Or consider how different a panel would be if you arranged one large hemp leaf on the right, and eight smaller ones adjoining it to the left rather than having the smaller ones enclose the large one on all four sides. There is not a right answer here, but there certainly are some that are better than others, so give it some thought.

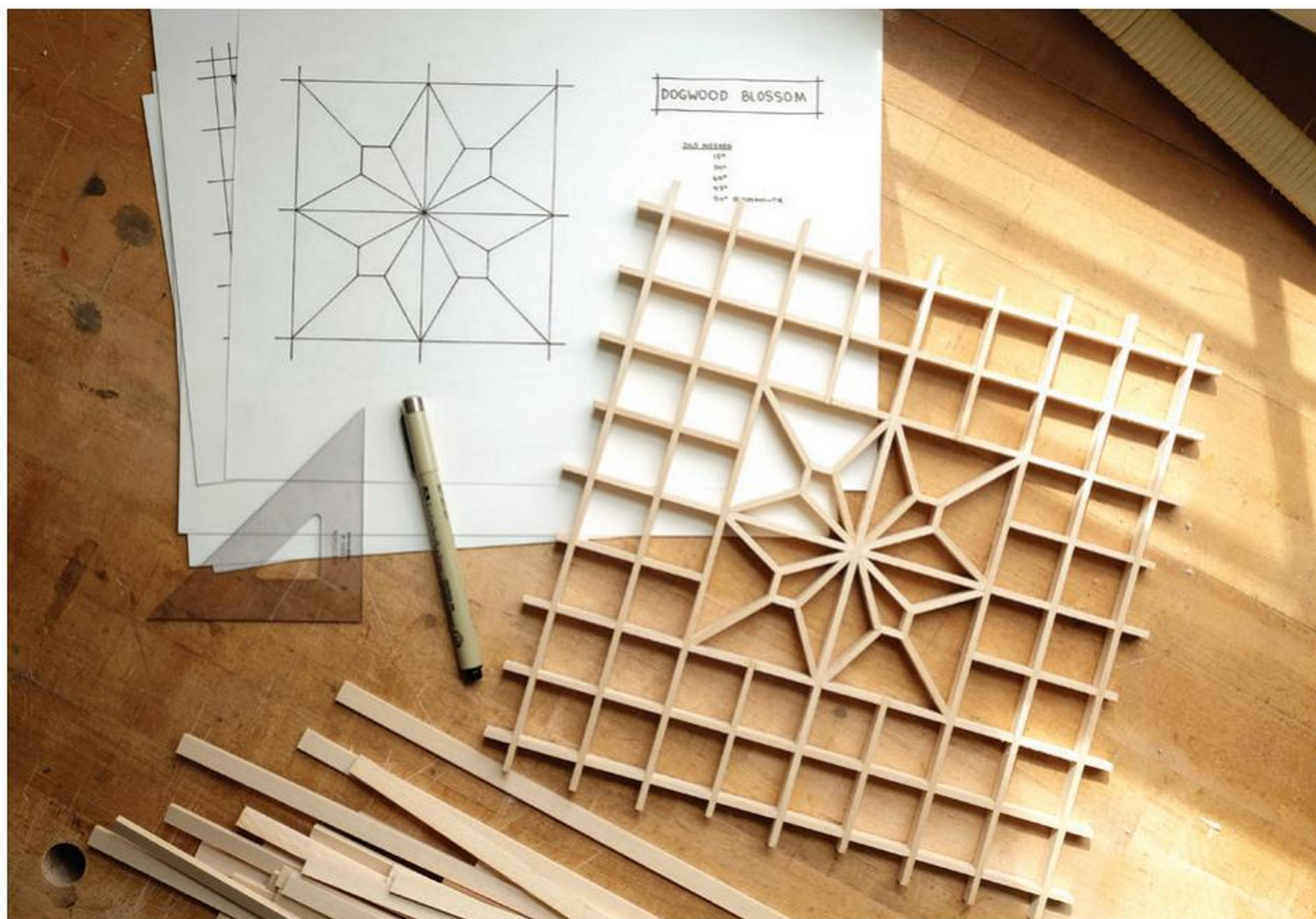
ASYMMETRY IS POWERFUL

The hemp leaf is probably my favorite pattern, and when I first began to make panels, I would use it in two different sizes in the same panel. I especially like having a large one in a lower corner, bordered by smaller ones to the left and above. Because of how square frames work—squares increase in size by doubling—the larger one is typically four times the size of the smaller one. So, you end up with a panel that is visually heavy in one corner. It's a strong statement. And it works.

(continued on page 128)



DESIGNING PANELS *(continued)*



PAY ATTENTION TO NEGATIVE SPACE

Some patterns, the kaleidoscope comes to mind (pp. 119-125), are as much about the spaces between the strips of wood as they are about the strips of wood, because the negative space is itself a beautiful pattern. But you should be aware of the negative space even when using patterns like the hemp leaf. In my experience, patterns need space to breathe in order to achieve their full beauty. Cramped together, patterns become a chaotic jumble and lose their geometric power. If made too small, a hemp leaf becomes almost a solid block of wood because the spaces between the pattern pieces are no longer able to help define the pattern's shape. So, make sure to include enough space in your panels.

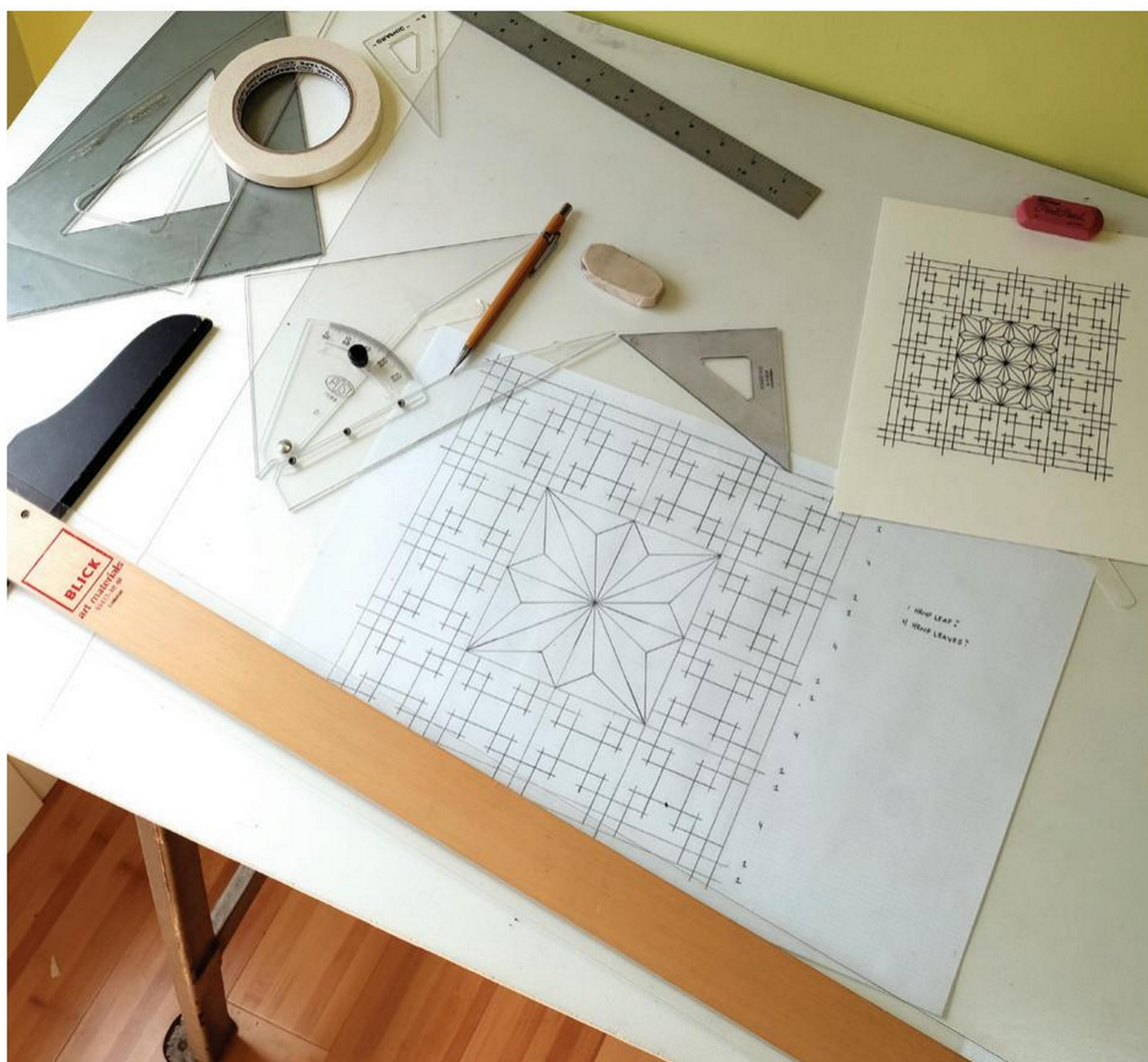
FIGURE OUT THE FRAME SPACING

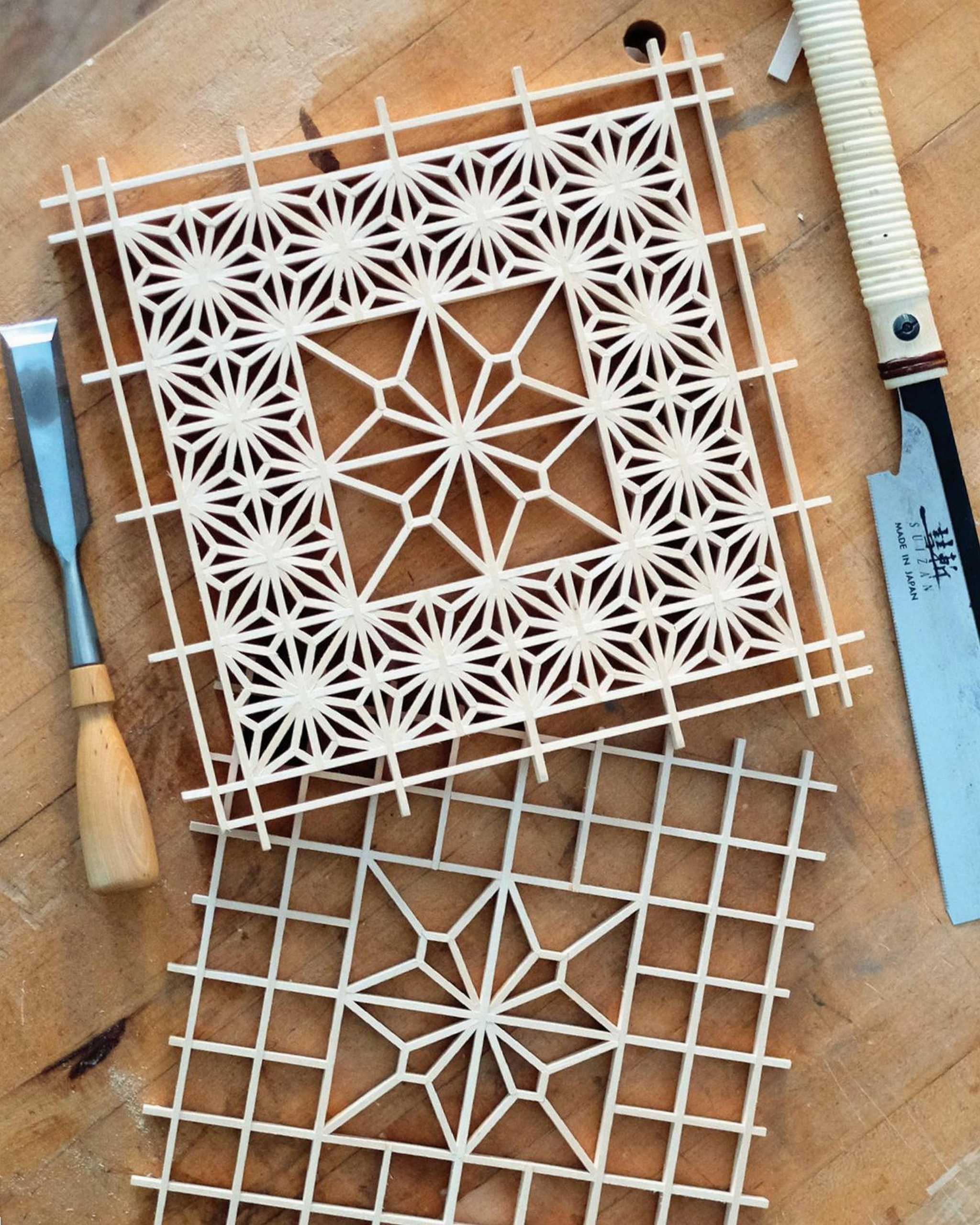
I know from experience that attempting to make a kumiko panel before you've thoroughly considered how to make the frame is a bad idea. Actually, it's a really bad idea. I miscut frame spacing too many times to count before I began to do something quite simple that has since eliminated mistakes at the tablesaw. I carefully draw the frame and patterns on graph paper before I get to work. They're simple line drawings, but they give me a chance to space the frame parts accurately, and to determine how many finger joint jigs I'll need in order to make the frame. The completed drawing also gives me a sense of whether or not I got the design right, and serves as a reference when I'm in the shop.

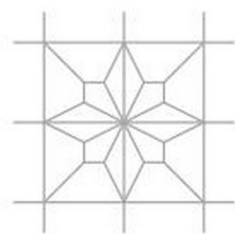
THIN-KERF OPENS IT UP

I like to make small, delicate panels, but they become too crowded when the frame and pattern pieces are $\frac{1}{8}$ in. thick (this matches the width of the kerf cut by a standard-kerf tablesaw blade). To open them up I switch to a thin-kerf blade to cut the frame notches and rip the frame and pattern pieces to match the $\frac{3}{32}$ in.-wide kerf. The thinner parts allow me to maintain the right balance between the panel's positive and

negative space. I also use a thin-kerf blade when a pattern would otherwise be too crowded in the panel, even if it is large (see p. 156). I have a dedicated sled for the thin-kerf blade, and the distance from the blade to the fence's registration pin is $\frac{3}{8}$ in. rather than $\frac{1}{2}$ in. as it is on my standard-kerf sled (see p. 18). Otherwise, there's no difference between making kumiko with the two different blades.





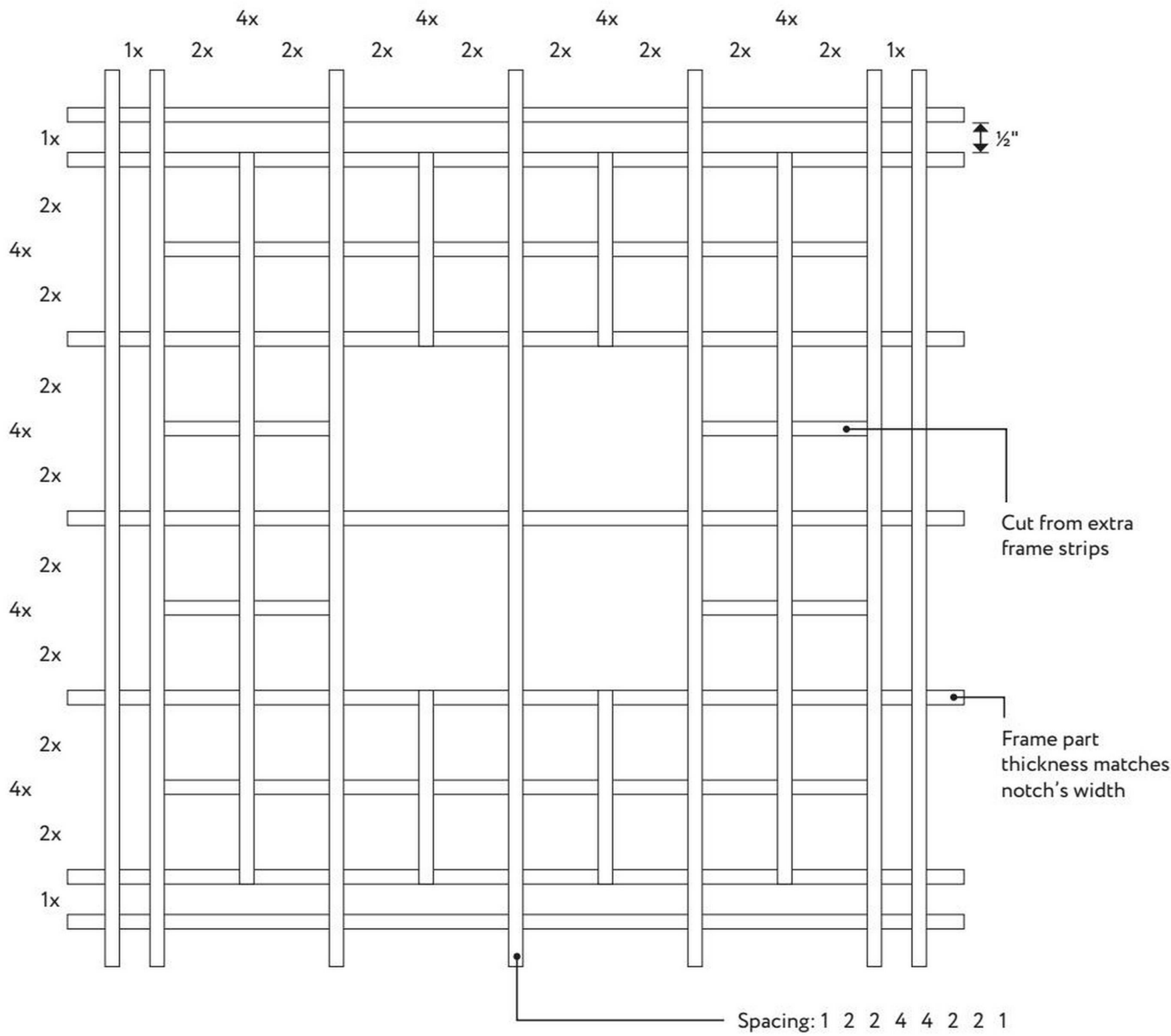


CHAPTER 11

DOGWOOD BLOSSOM

The pattern at the center of this panel is taken from a larger, elaborate pattern called kiri that's used in shoji screens. Or, rather, half of the pattern I'll show you is used in the kiri pattern. I saw it and thought it would look amazing if I mirrored it to create a symmetric pattern. It reminds me of a dogwood blossom, so that's what I call it. It's a challenging pattern to make, and requires a new jig (15°), but it's well worth the effort. However, I think that it's so distinctive that an entire panel containing the dogwood blossom repeated over and over would be too much, so I surrounded it with hemp leaves.

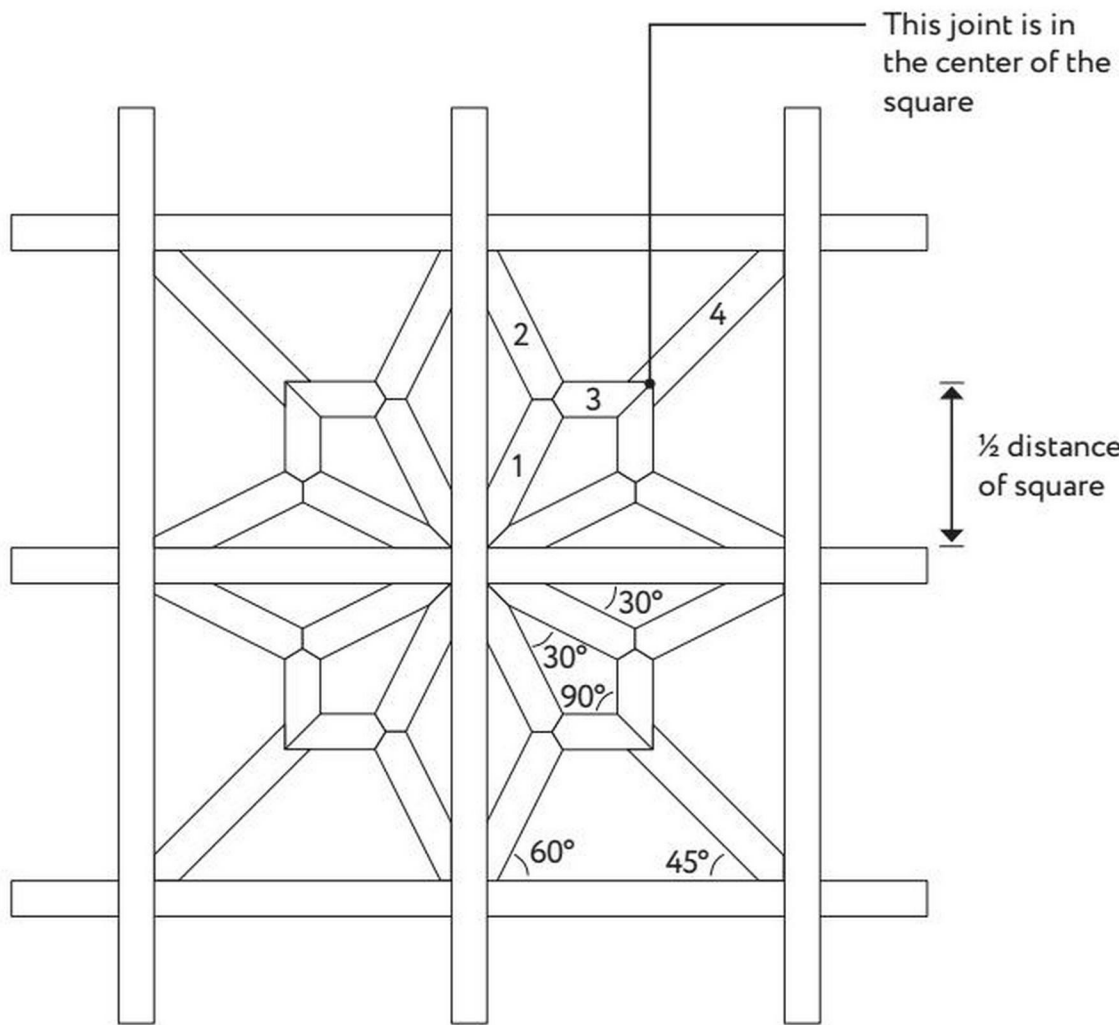
FRAME DRAWING



FRAME PARTS

(22) Frame Pieces

PATTERN DRAWING

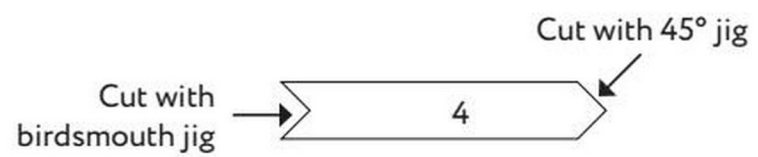
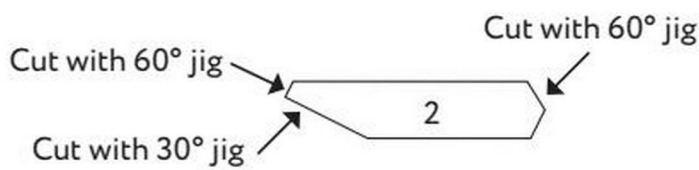
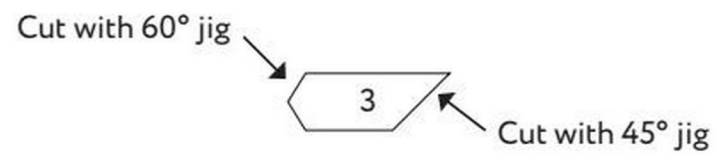
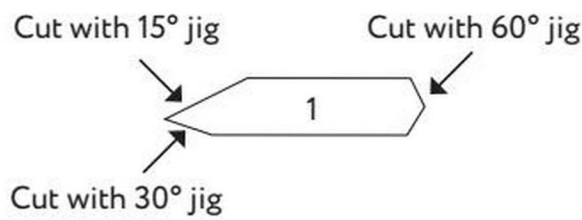


PATTERN PARTS

- (8) Hinge Piece 1
- (8) Hinge Piece 2
- (8) Hinge Piece 3
- (4) Locking Pieces

GUIDE BLOCKS

- 15°
- 30°
- 45°
- 60°
- Birdsmouth Jig



Detail of blossom pieces
(not to scale)

TACKLE BOTH HINGE PIECES AT ONCE

There are two sets of hinge pieces in this pattern. One forms a V and tucks into the corner where the four squares meet. The other pair is split up, coming in from opposite corners to meet the two that make the V. Start by cutting the bevels for the end that fits into the corners. You need eight of each pair, but make 10 pairs of each.

The V hinges with 15° bevels

These two pieces meet in a 90° corner, so the two bevels on each one must total 45°, and they need to meet in the middle of the piece's thickness. Don't worry. It's not as hard as it sounds.

1 Cut two 30° bevels first. Because they are cut using the same stop location, they will meet in the middle.

2 Make one of them a 15° bevel. Set the stop so that last paring cut you make forms a crisp point where the two bevels meet. It's best to work up to this slowly. You'll see a steeper, small bevel—a remnant of the 30° bevel—and you can use it as a visual indicator (because it will be gone) to know when the 15° has struck the middle point.



TRIM HORNS IN THE CENTER SQUARES

The frame for this panel is different from the others you've made so far, because some of the strips do not run all the way through the frame. They stop when they reach the four large squares in the middle that are for the dogwood blossom pattern. Cut the short pieces you need from the ends of longer ones; glue them in at both ends. After the glue is dry, cut away the horns in the center squares. I pare them flush by bringing a chisel straight down. Orient the horn so that the notch is on the bottom of the frame. As you pare, the frame piece will be backed by your bench (naughty, I know), and won't tear out.

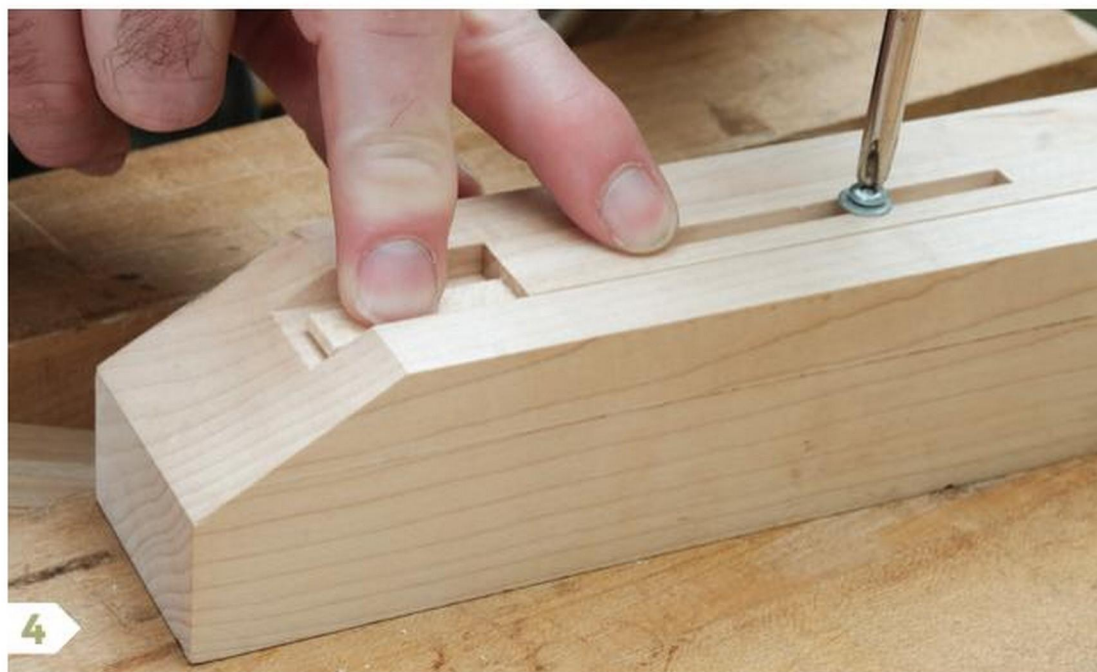


The second hinge piece has 60° and 30° bevels

Because the 60° bevel is the steeper of the two, cut it first, and cut one on each side of the piece. They will meet in the middle, and you can use that point to get the 30° bevel in the right spot.



3 Start with the 60° jig. Set the stop. Pare one side, flip the piece over and pare the second bevel.



4 Set the 30° jig to nail the middle. It's possible to get that center point right in line with the guide surface and cut this bevel dead on, but it's smarter to start just a hair back and adjust the stop forward.



5 Recut one of the 60° bevels. There should be a very small 60° bevel left after cutting the 30°, as if it were a chisel with a secondary bevel. Move the stop forward and take another pass. Repeat until the 30° bevel meets the other bevel at a crisp point.

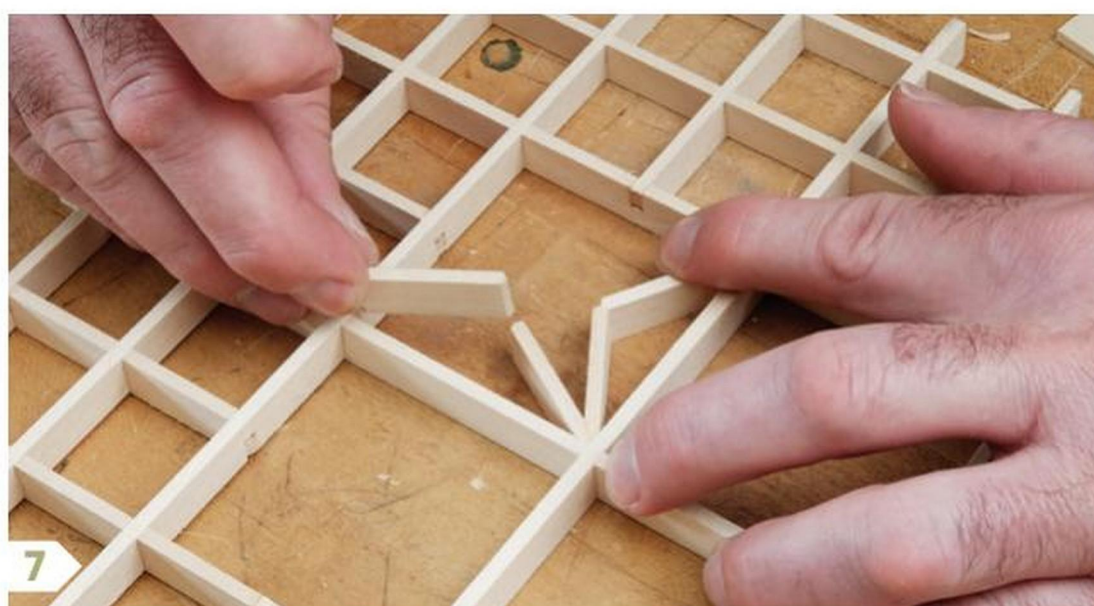
TRIM THEM TO LENGTH

All of the hinge pieces are the same length, which makes this step much easier. However, to figure out when they are the correct length, you need to work with a pair of each hinge piece. They should touch in the middle with no gaps in the corner.

6 This end has two 60° bevels. Cut one, flip the piece, and cut the other.

7 Test four pieces at once. This can be tricky to do, but I've found that setting the V in place first, then pinching it with one of the other hinge pieces works pretty well. It leaves you with a free hand to drop in the final hinge piece.

8 Glue the V together. After you've got the length dialed in, use some cyanoacrylate glue to tack the 15° bevels together. This makes assembling the complete pattern so much easier.



ADD THE POINT

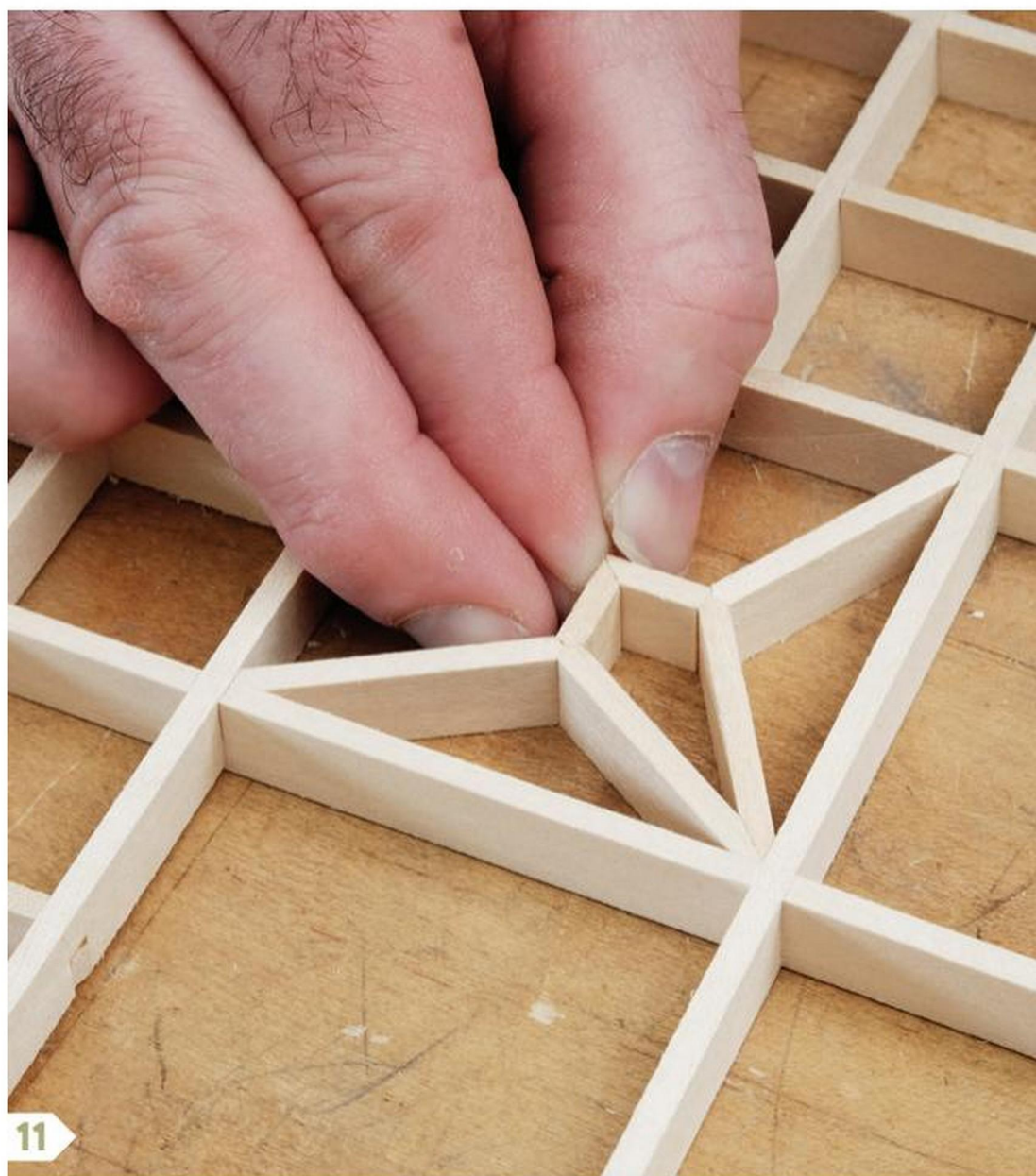
The hinge pieces form two 120° birdsmouth joints where they meet. You need two little pieces to fit into them. These two pieces come together and make a 90° point, or corner. Technically, this isn't a hard piece to make, but it is tiny, so it can be difficult to hold it in the jigs while you are cutting the bevels, at least if you have large hands with sausage fingers like I do.



9 One end has 60° bevels. This is the end that fits into the birdsmouth. The bevels meet in the middle.

10 It's a single 45° at the other end. Here you are making one half of a miter joint. It's best to cut it second, because the point could slip under the stop if you made it first and then cut the 60° bevels.

11 Keep it square. If the parts are too long, they'll form an acute angle when brought together, and there will be gaps in the birdsmouth. At the right length, they form a 90° corner. Your eye will know when they do, so trust it.



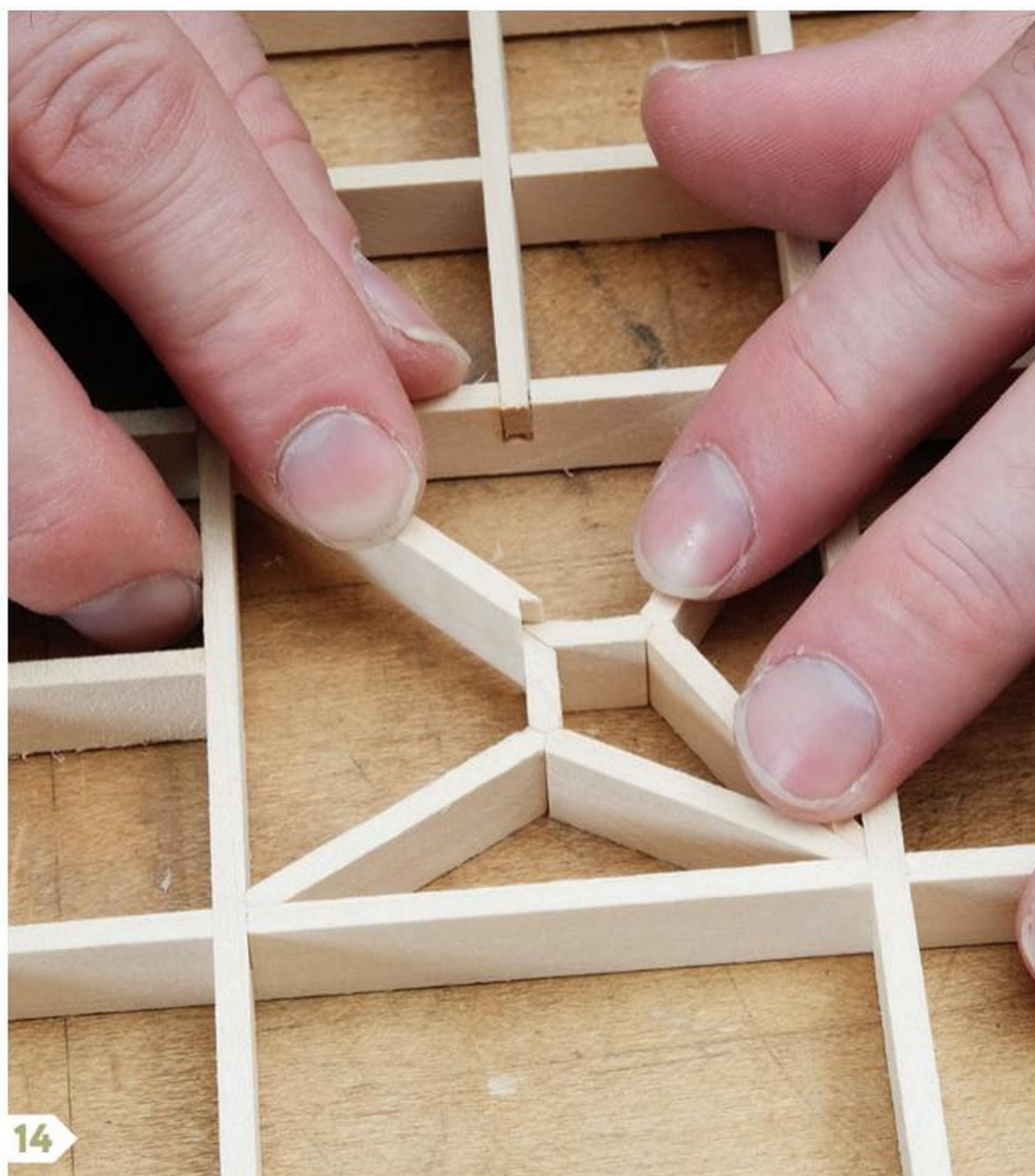
LOCK IT ALL TOGETHER

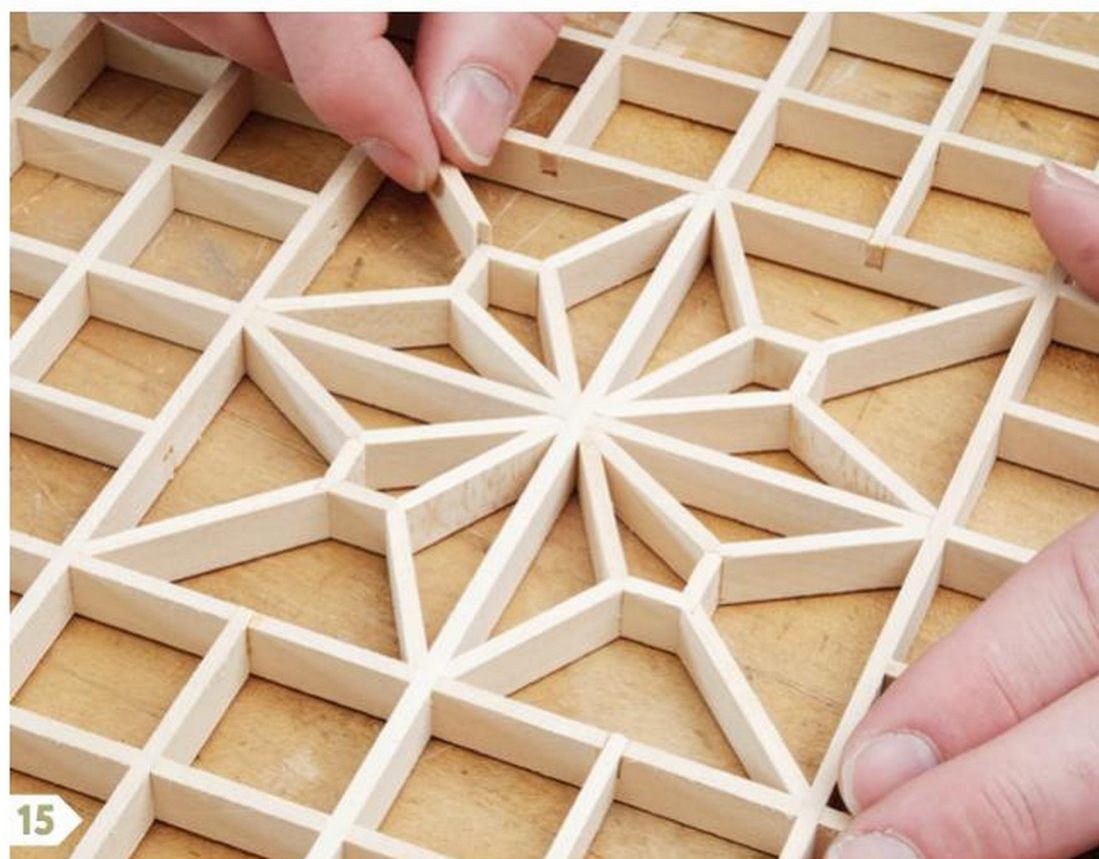
You're almost there. Fortunately, you can cut the birdsmouth joint first, then trim the parts to length with the 45° jig. I guess the hardest part of this step is holding all the other pieces in place so that you can judge the length of the locking piece. I'd love to give you the secret to this, but there isn't one. Try holding them all in various ways to figure out what works best for your hands.

12 Open wide. There are four locking pieces, and at this point their length isn't critical, at least if they are longer than they need to be. Cut the joints just as you did when making the square miter pattern (pp. 101-102).

13 Trim to length. Because the locking piece sits in a 90° corner, its two bevels are 45°. As usual, start long and work your way down to the final length.

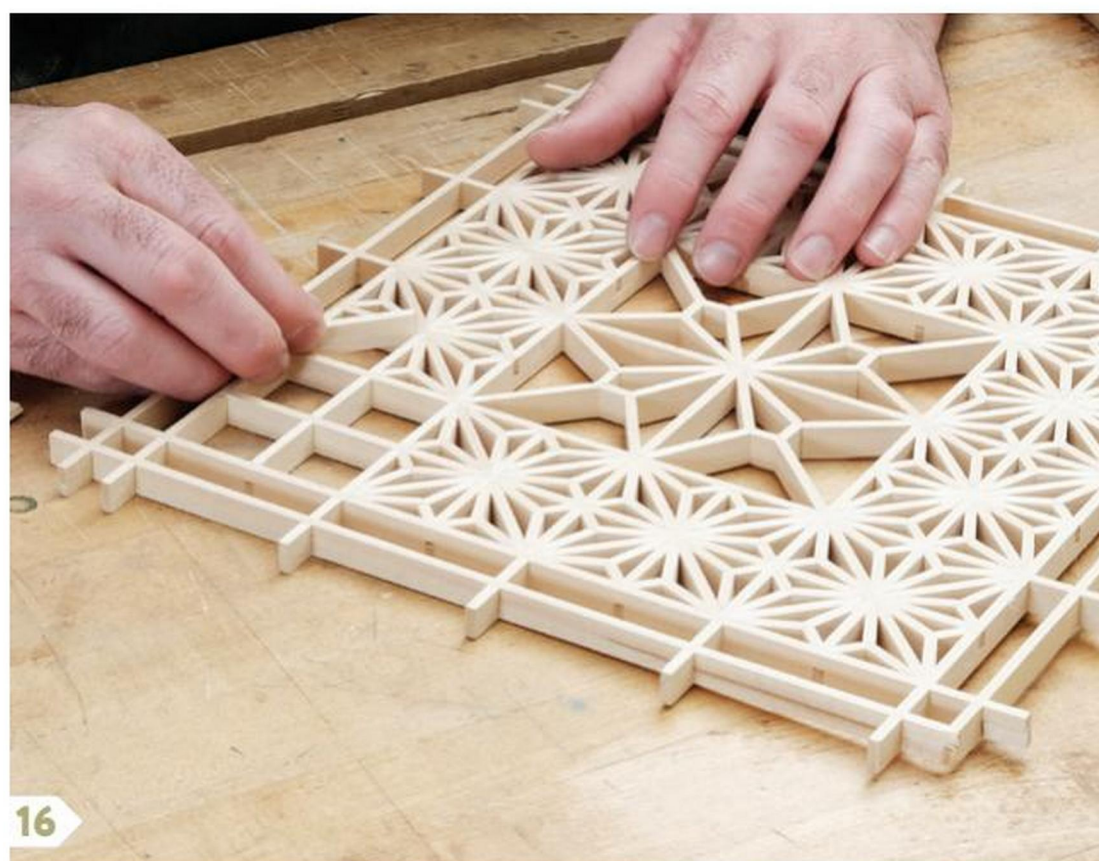
14 Keep it tight. I aim for a fit that requires some extra pressure to get together, because this is a pattern with too many moving parts for a "just right" fit. All of the bevels on all of the pieces need to be driven tight when you add the locking piece.

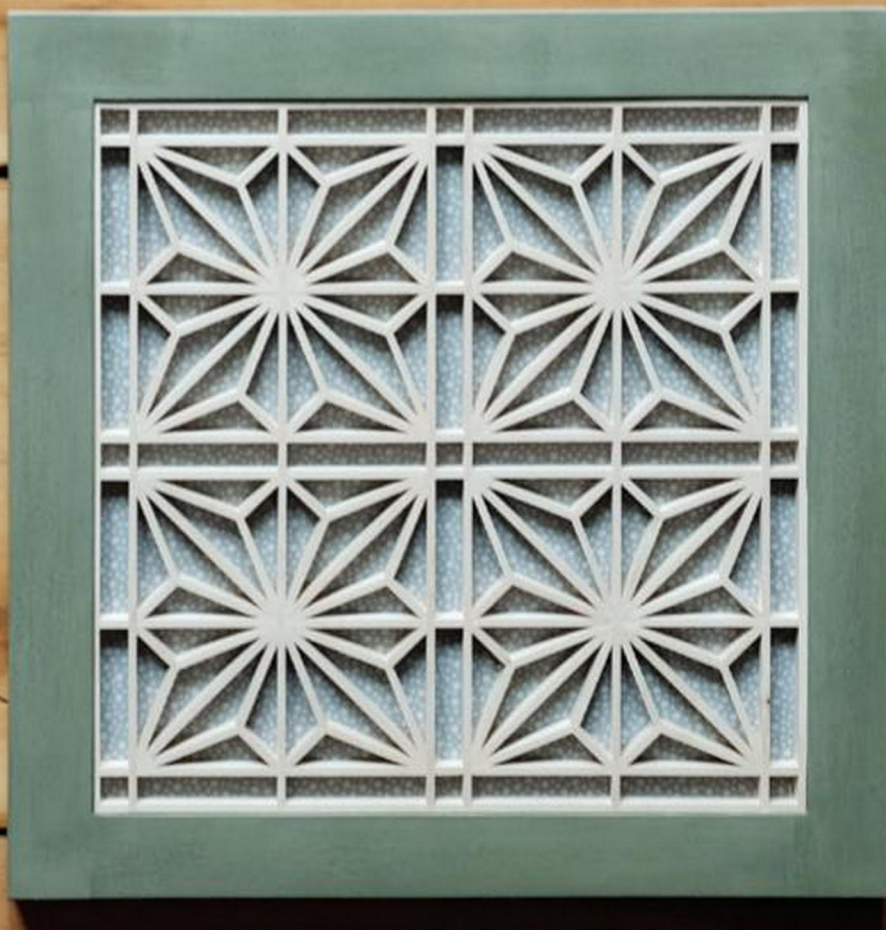
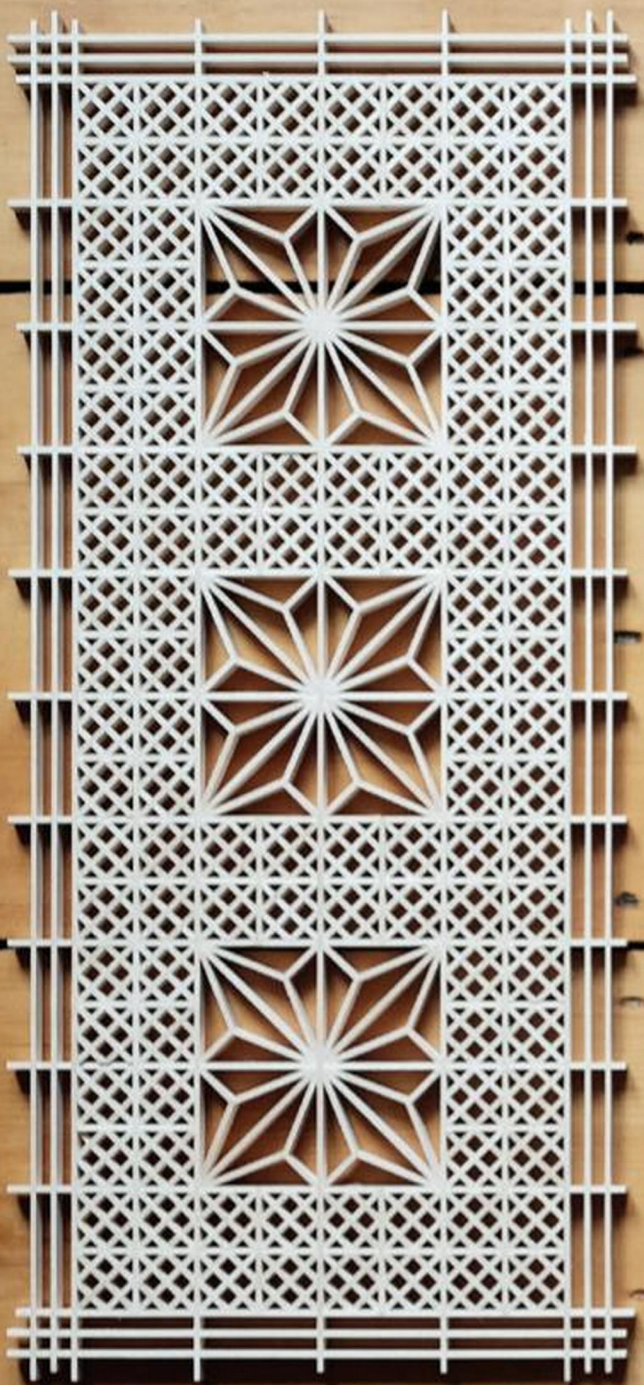




15 Mirror image. Each of the four squares has the same pattern in it. Taken together, they create a pattern that resembles a blossom or flower.

16 Surround it with hemp leaves. I love how a border of hemp leaves makes the dogwood blossom pop. It looks fantastic! Look back at the hemp leaf chapter for a refresher on how to make it.

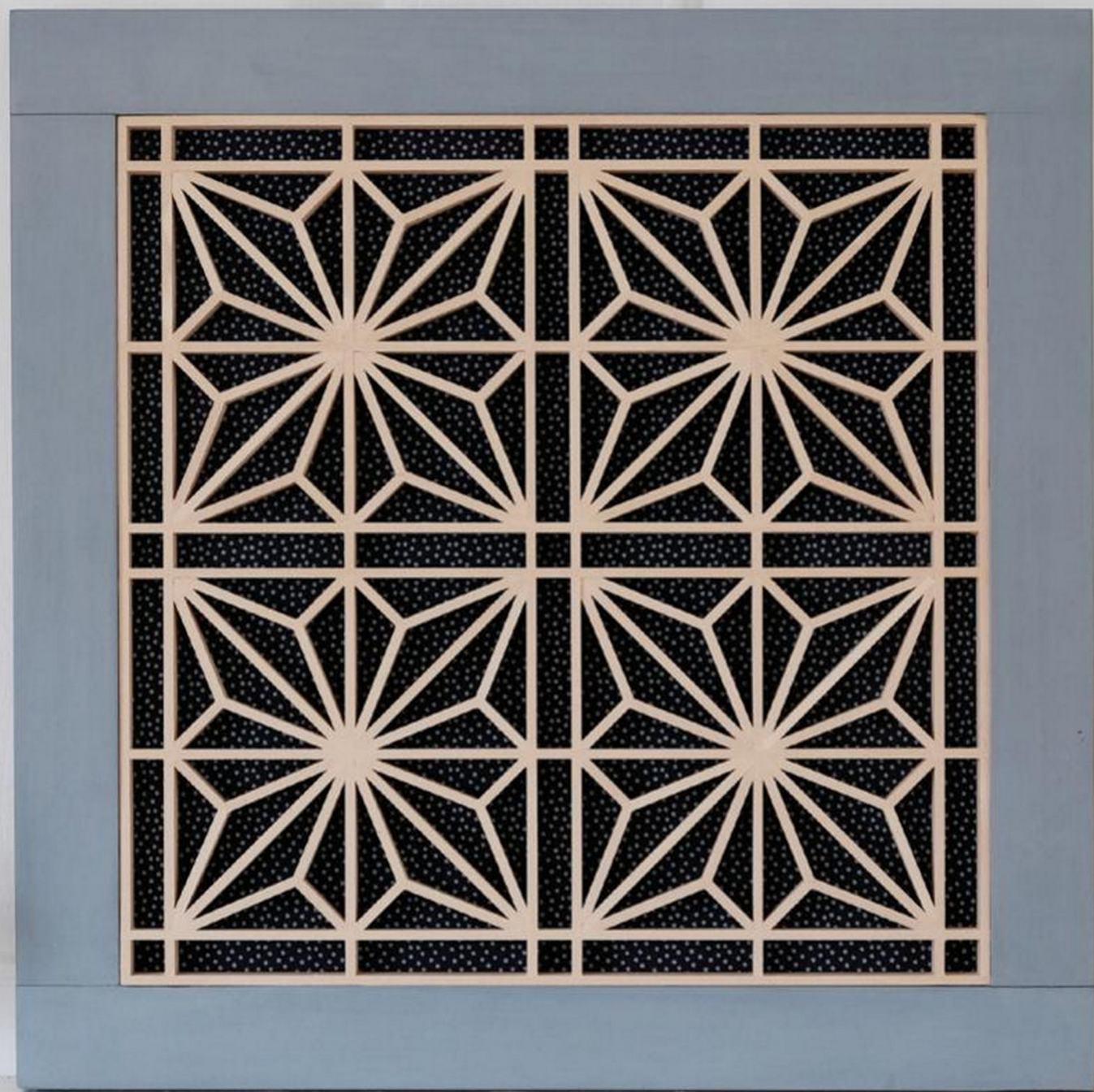




CHAPTER 12

DECORATIVE PANELS

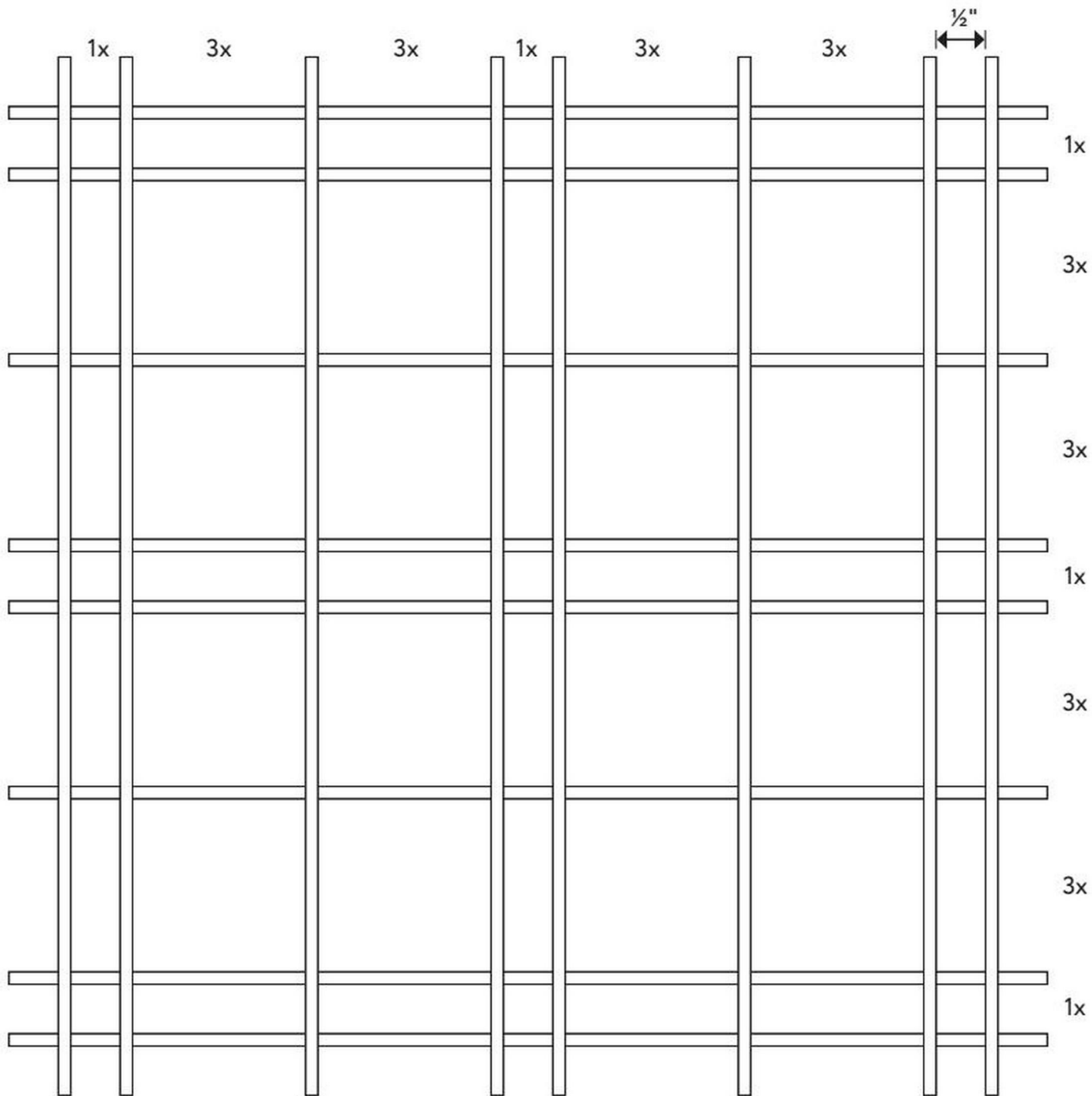
The patterns you've learned so far are beautiful, but they are just the beginning, but not because there are dozens and dozens of other patterns that you can learn. Rather, the 10 patterns in this book are your first step toward using kumiko creatively, toward practicing kumiko as art. At its best, kumiko is a material expression of the inner, creative life of the person who made it. So, take the patterns and use them as building blocks to make something new, something beautiful, and something that gives voice to the unique way in which you see and love the world. Don't be afraid to change their size, and after you have a good practical understanding of how they work, don't be afraid to break the rules. I've done that a few times in the decorative panels that follow (like the hashtags in Panel 5).



PANEL 1

The hemp leaf pattern looks amazing when several are clustered together, but the way a group of them bleeds together can also be disorienting. This is why I often separate individual hemp leaves with a narrow border. This is a simple, but elegant pattern. And it's a good introduction to arranging patterns in a panel so that it's beautiful, balanced, and harmonious.

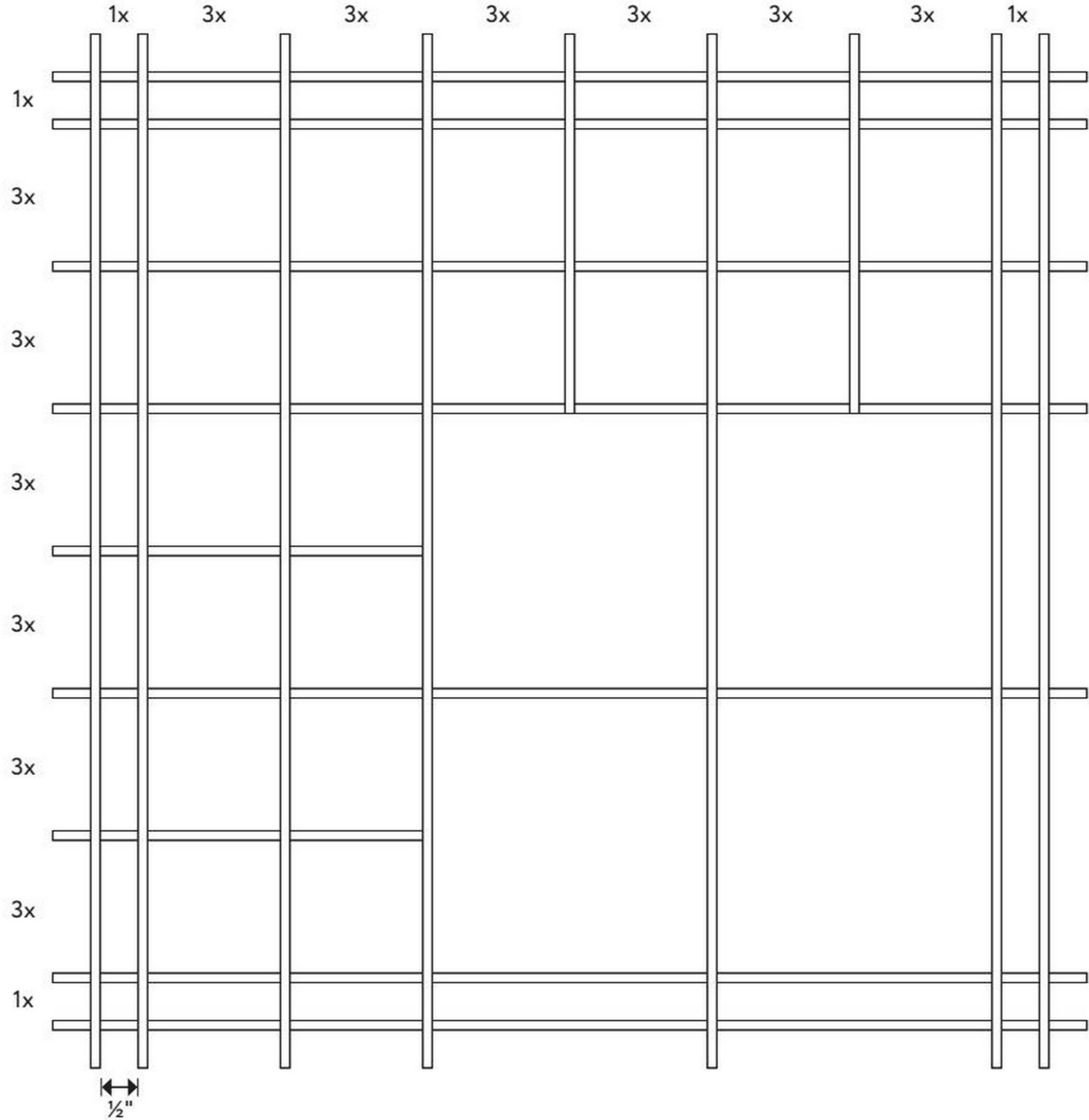
FRAME DRAWING



PANEL 2

This is the first panel I ever made, and it's still one of my favorites. The large hemp leaf in the lower right corner is striking, but not overpowering. The five smaller hemp leaves provide balance despite the panel's asymmetry. But the most important lesson to take from this one is that you can make gorgeous kumiko panels with just a single pattern by using it in different sizes.

FRAME DRAWING



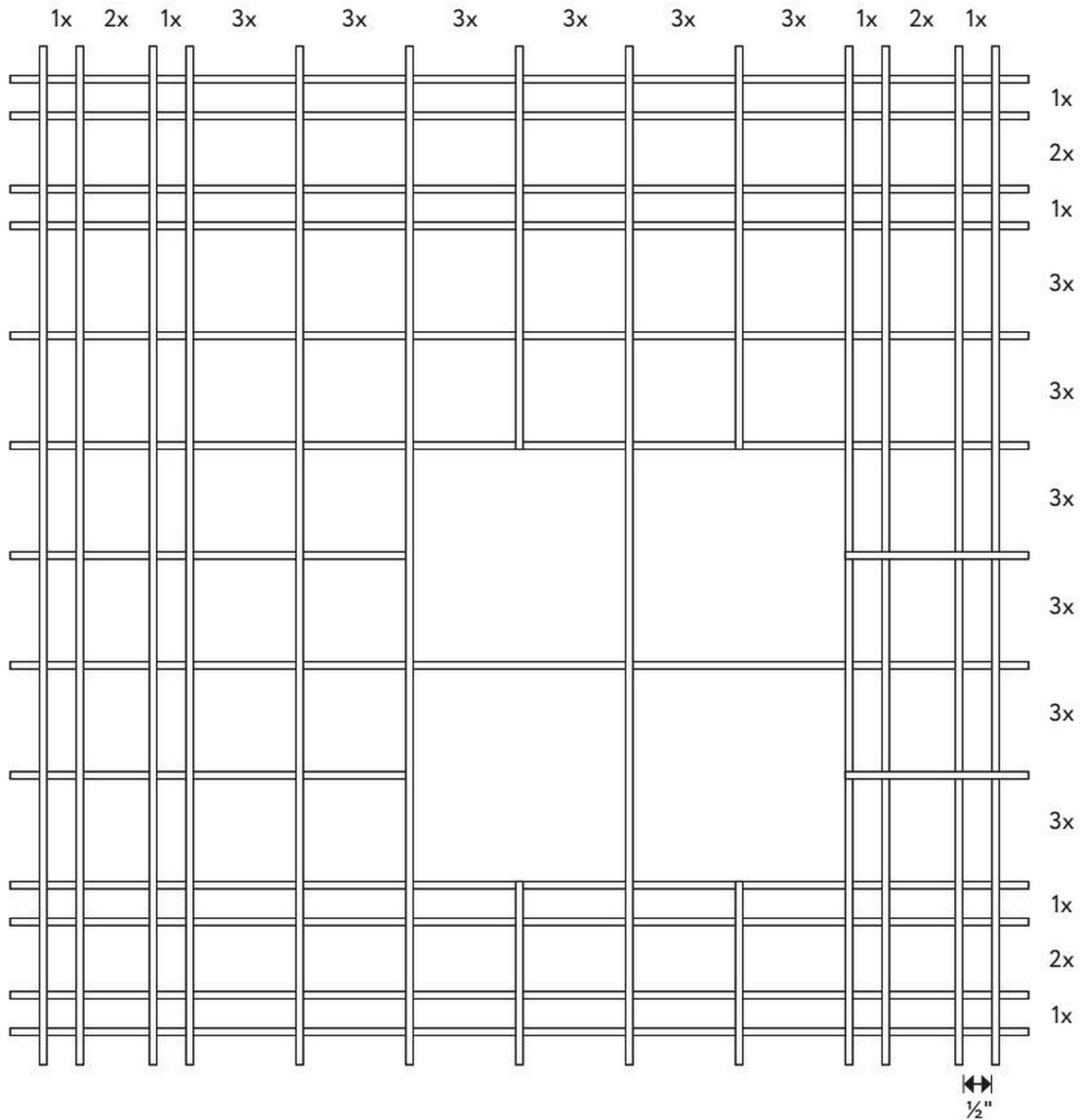




PANEL 3

You say you really like making kumiko. Okay, then, give this panel a try. There are a lot of pattern pieces to make, and some of them are tiny. When I am faced with repetitive and physically demanding work (your fingers are going to get a workout!), I make little piles of parts and think of just one pile at a time. Then I tell myself that I don't need to run an entire marathon. I just need to take the next step. And I put on some good music.

FRAME DRAWING

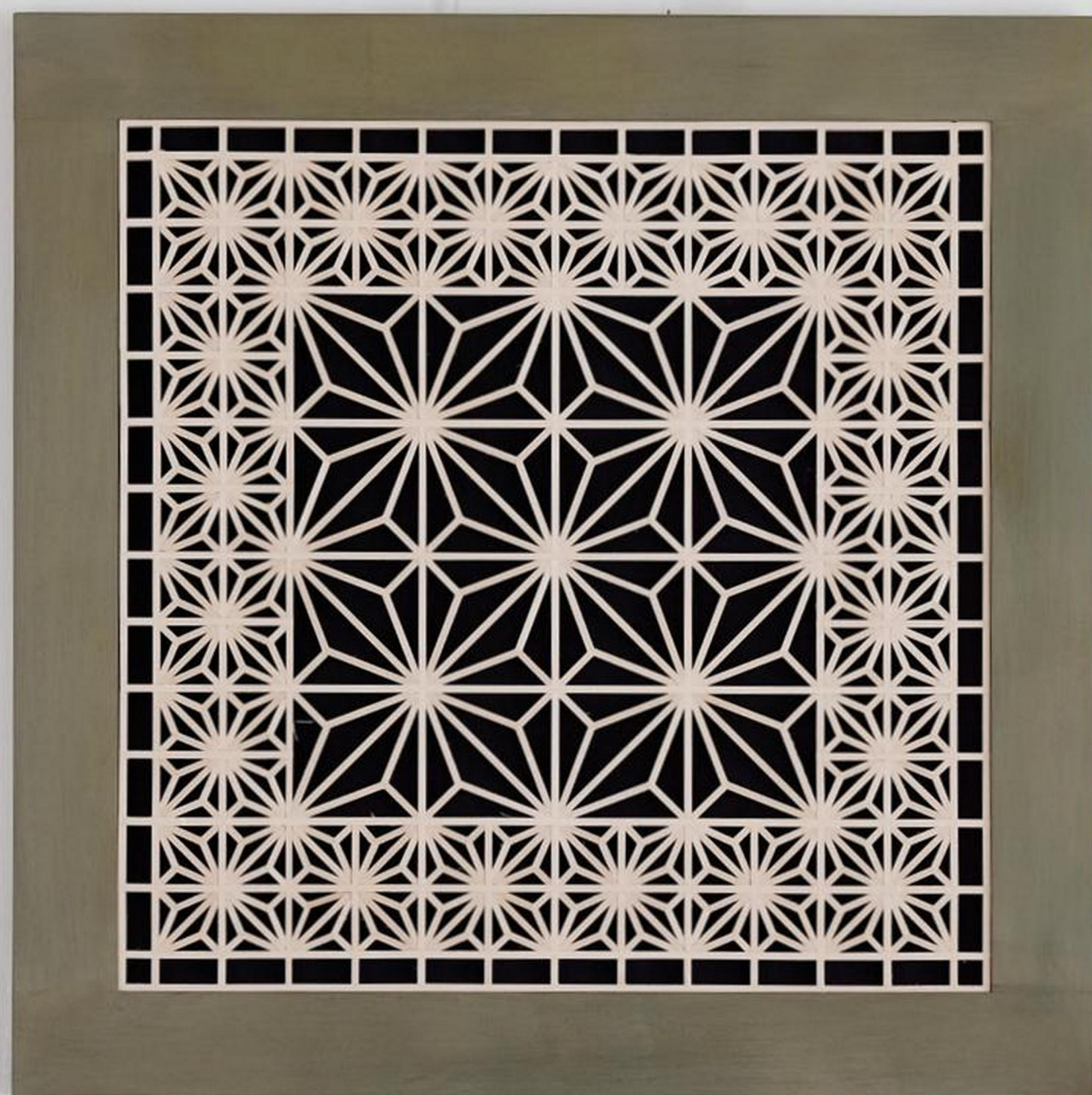


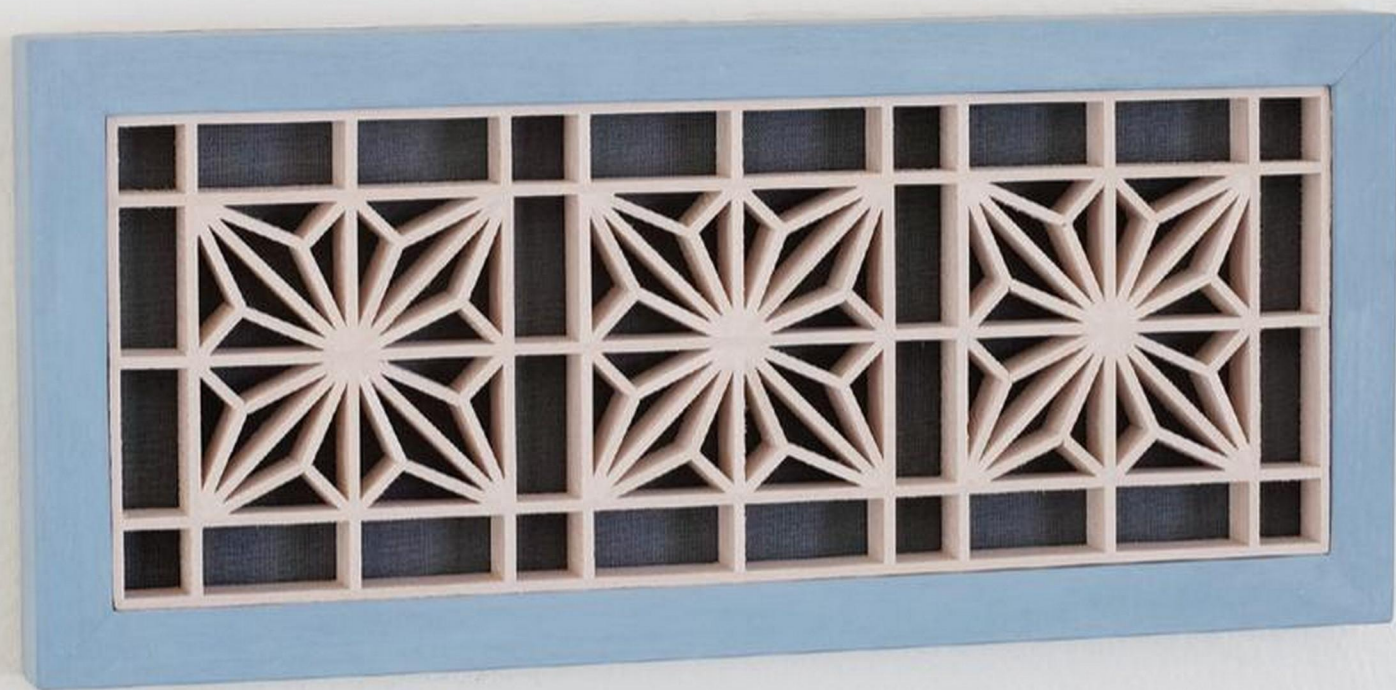
I made this panel for a friend. I like that it's symmetrical, but with some asymmetry (two sizes of hemp leaf) contained within the symmetry. This one just makes me calm, and the cluster of leaves in the center is lovely. There is something about the density of the leaves that gives the panel a robust power. It's not delicate, but it's nonetheless attractive.

1x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 1x

1x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 2x 1x

1/2"

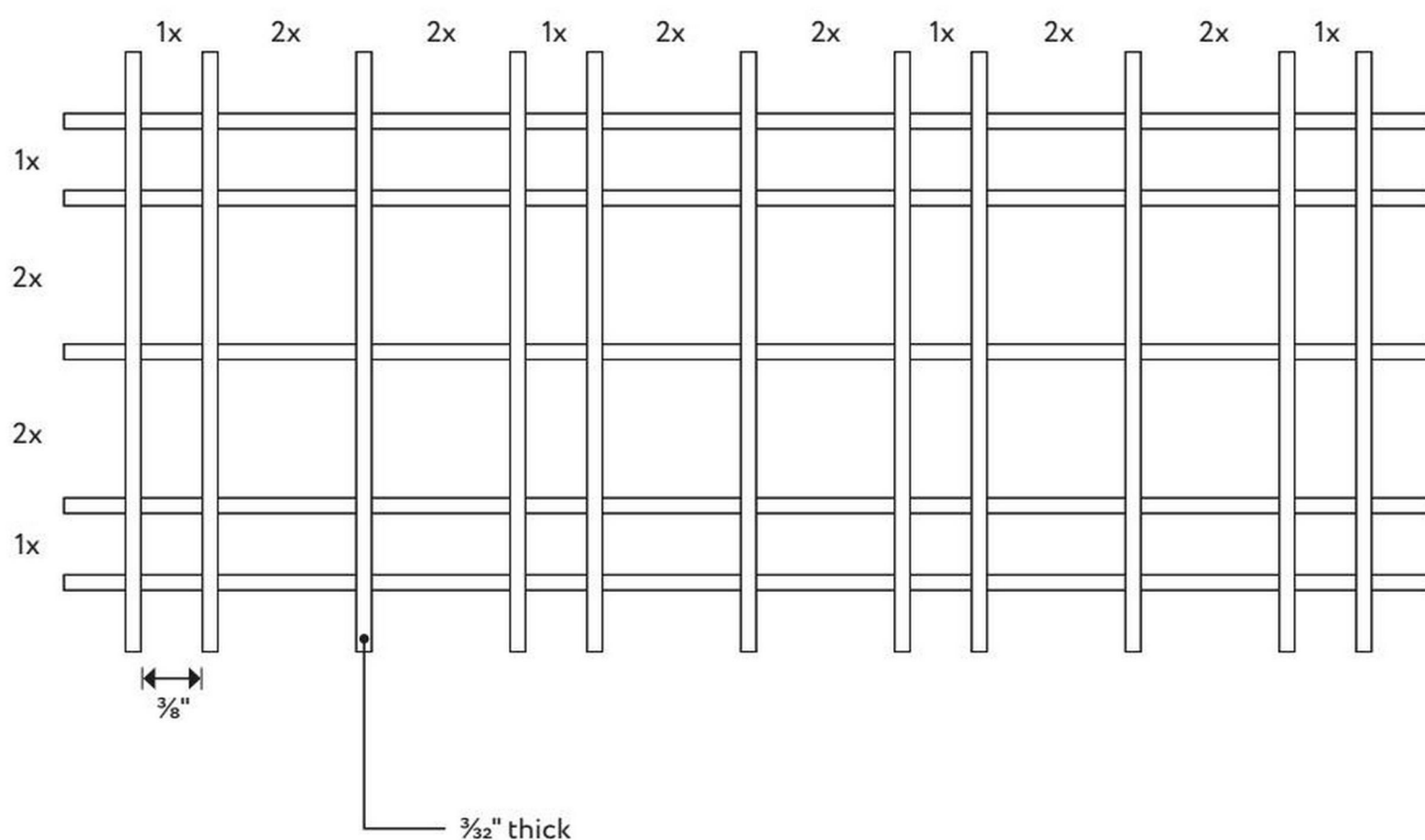




PANEL 5

I like small and delicate. This panel is both. It's also uncomplicated, and there is great beauty in things that are not complex. What the simplicity of this panel does is allow the beauty of a single hemp leaf to shine, and the harmony of repetition to be heard. To ensure that there is enough negative space, use a thin-kerf blade to cut the notches.

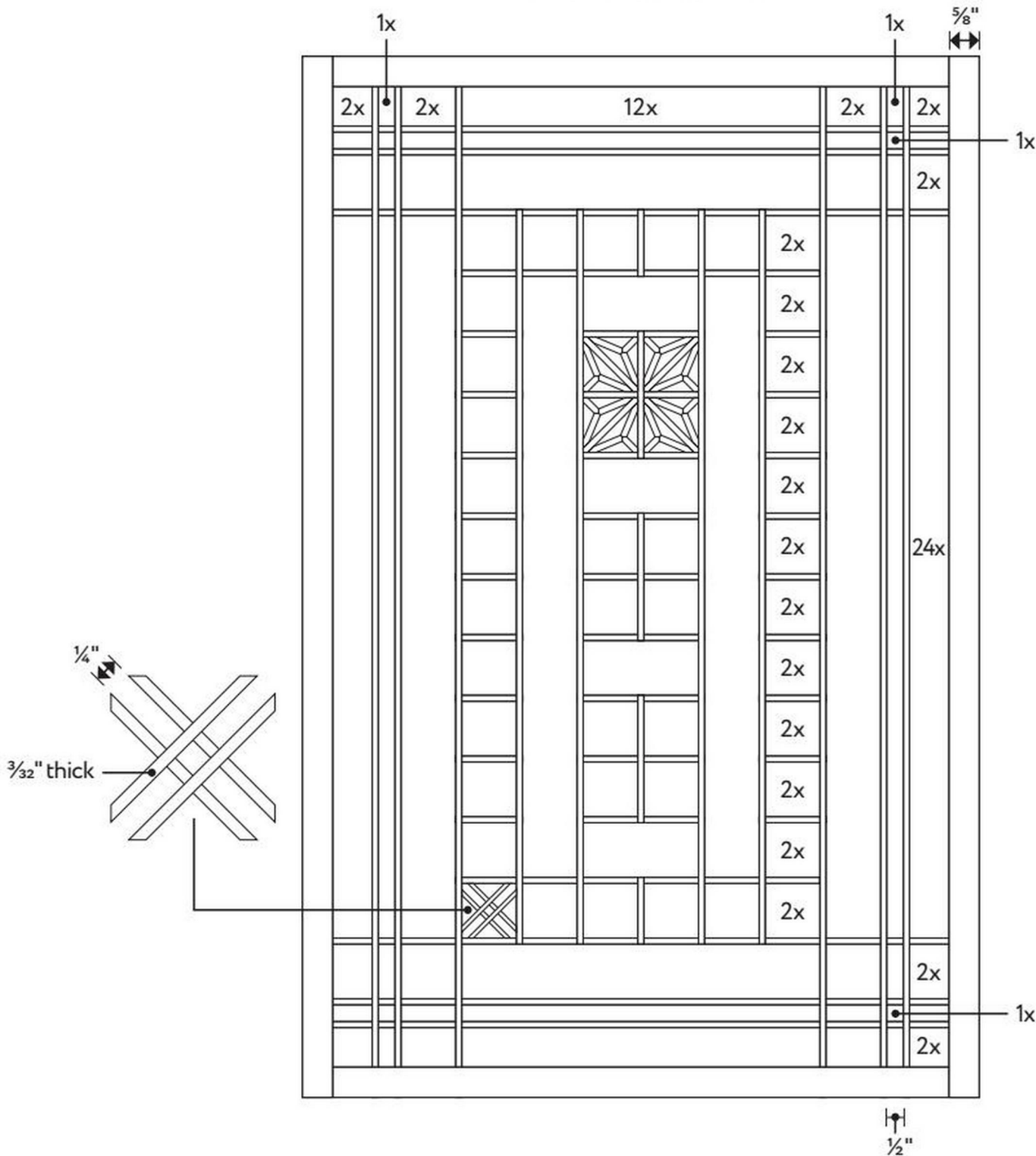
FRAME DRAWING

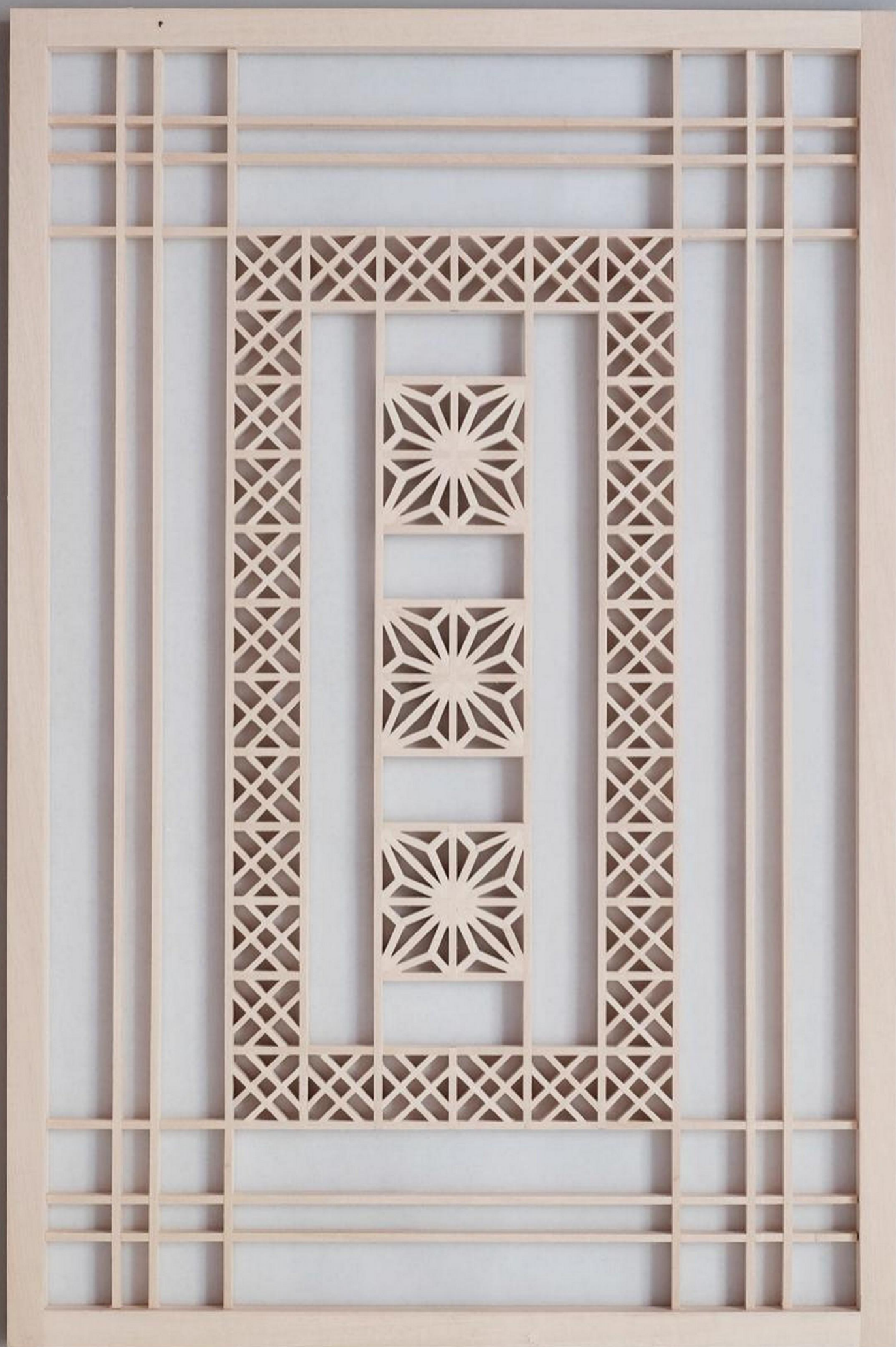


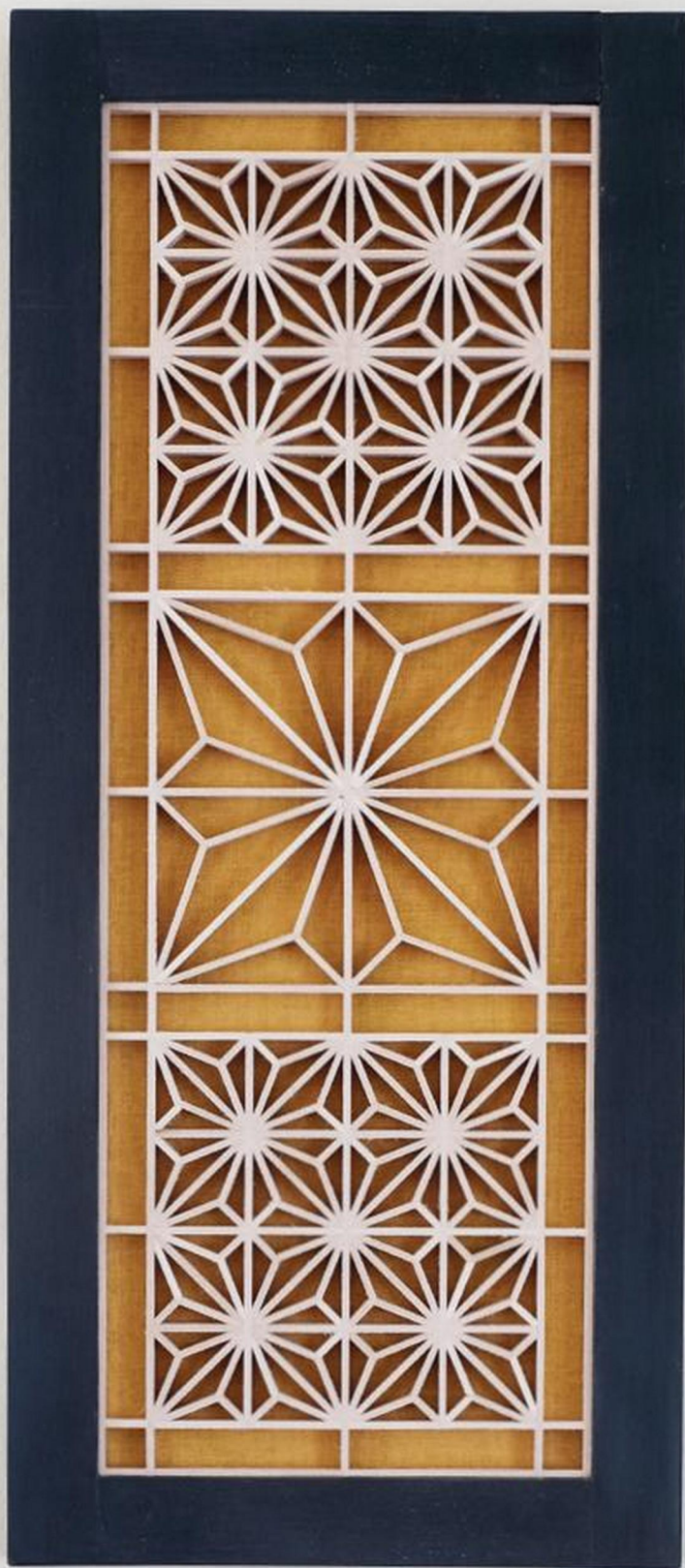
PANEL 6

Spare. Minimal. Delicate. This is my jam. I love that the panel seems almost to hang in the air. But I will tell you, with simplicity comes difficulty. This is the most challenging panel I've shared so far. Here's a tip: Cut all the narrow notches first, then switch to a dado set and cut the wide notches for the outer frame, using the outermost narrow notch and registration pin to ensure that the wide notches are spaced uniformly. Also, the pattern that runs around the three hemp leaves is a hashtag rotated 45°. Cut the miters just as you would for the square dance pattern. And...I made them with a thin-kerf blade rather than a standard-kerf blade.

FRAME DRAWING



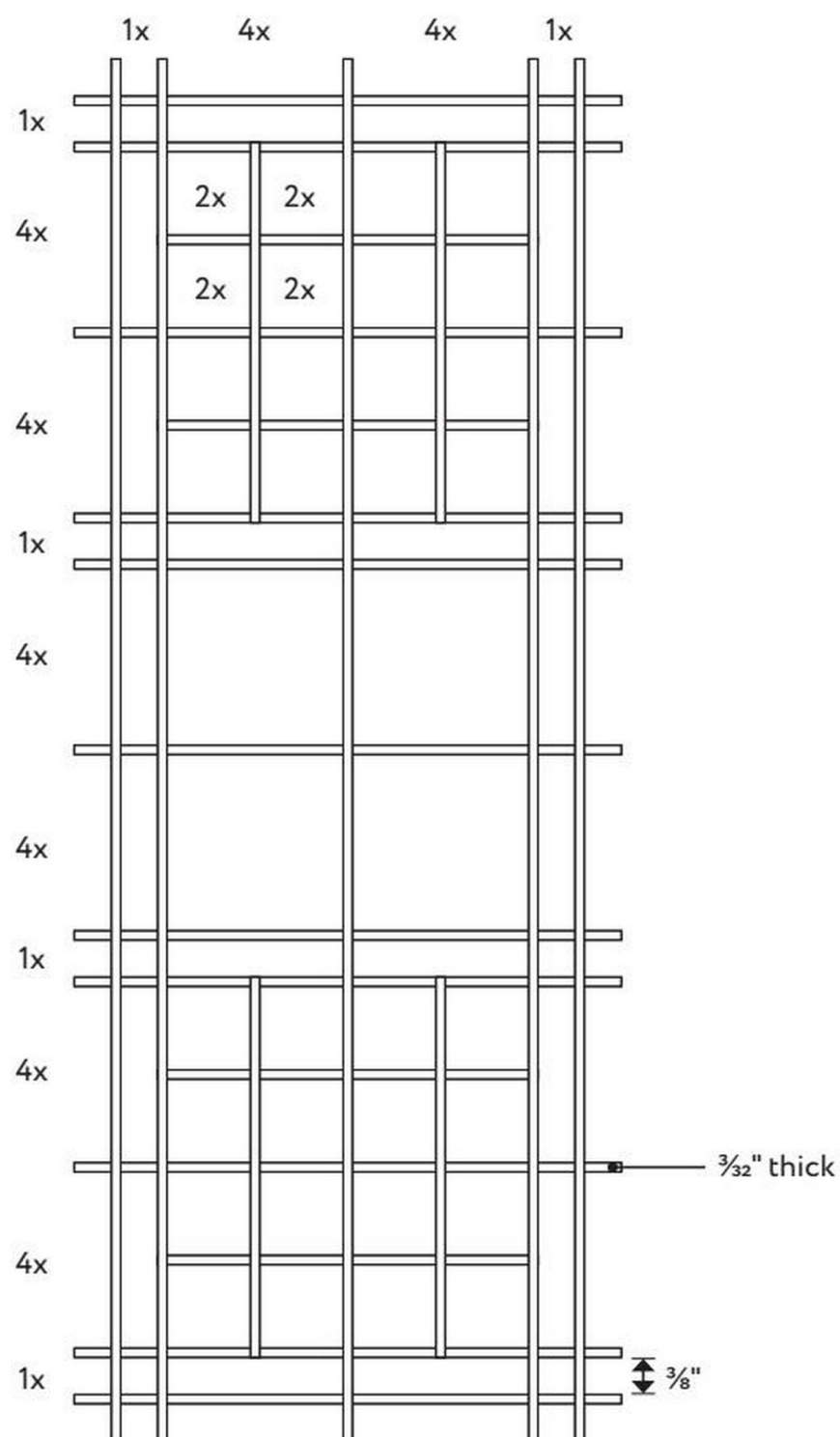




Decorative Panels

155

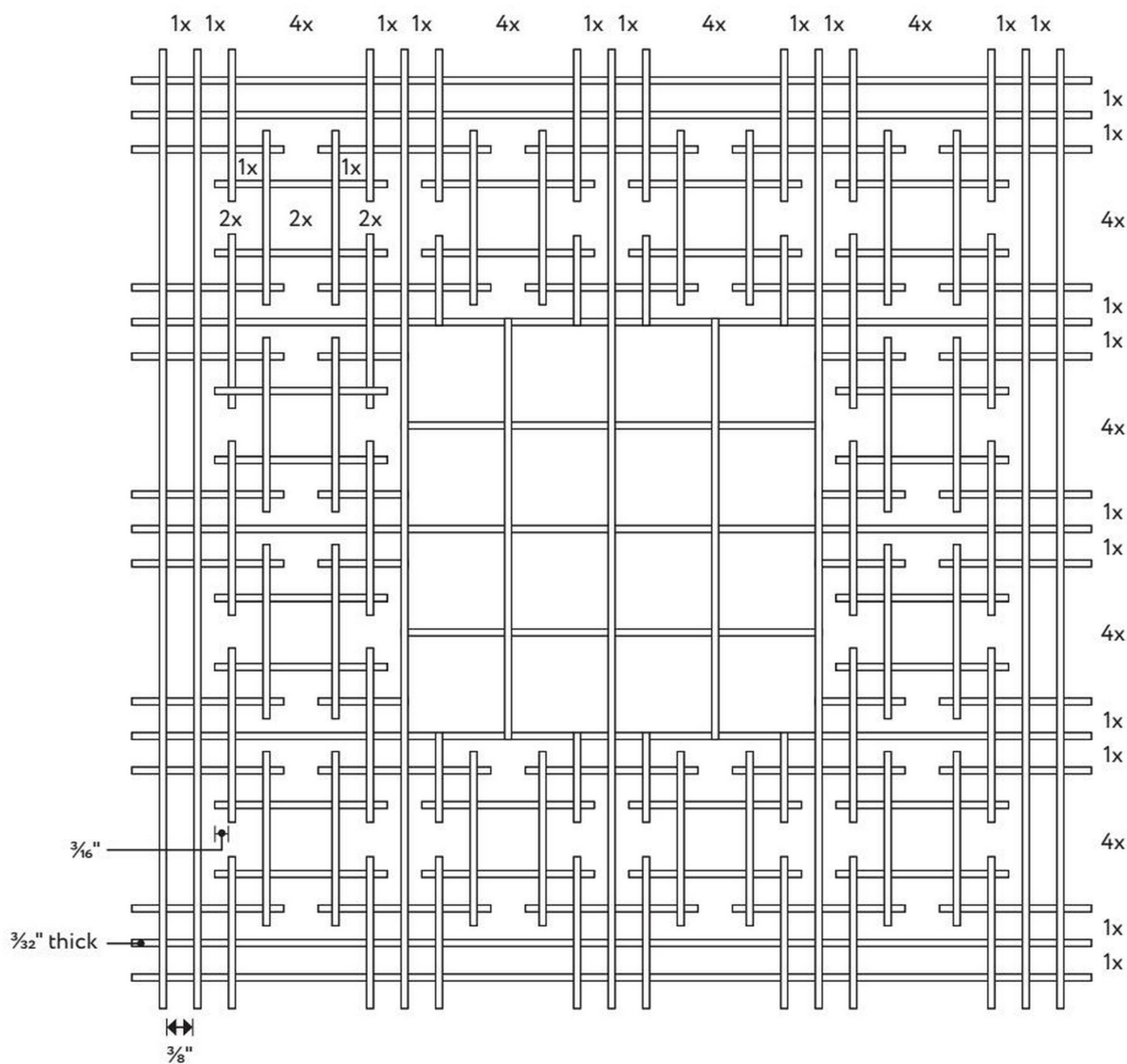
THE ART of KUMIKO

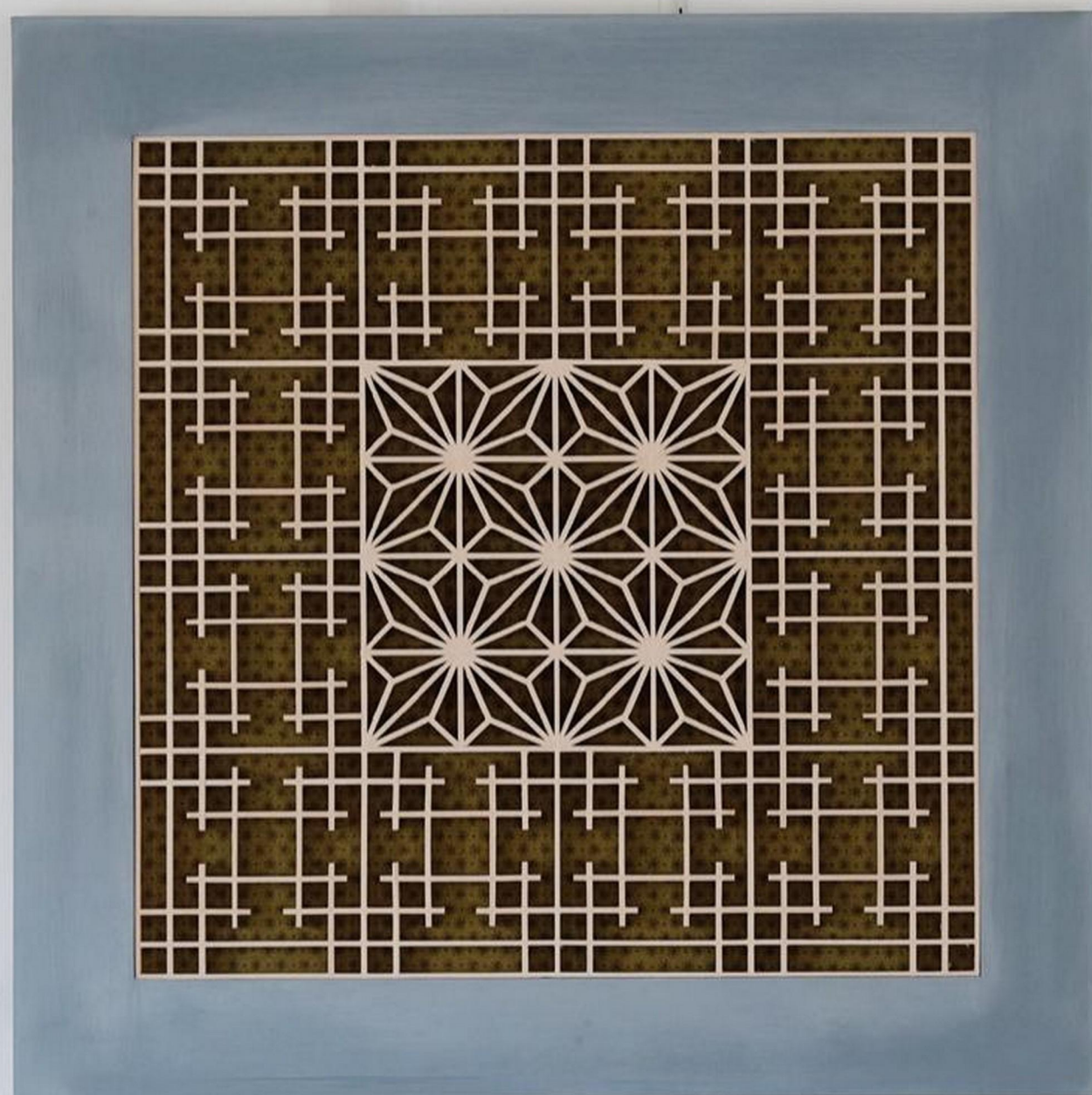


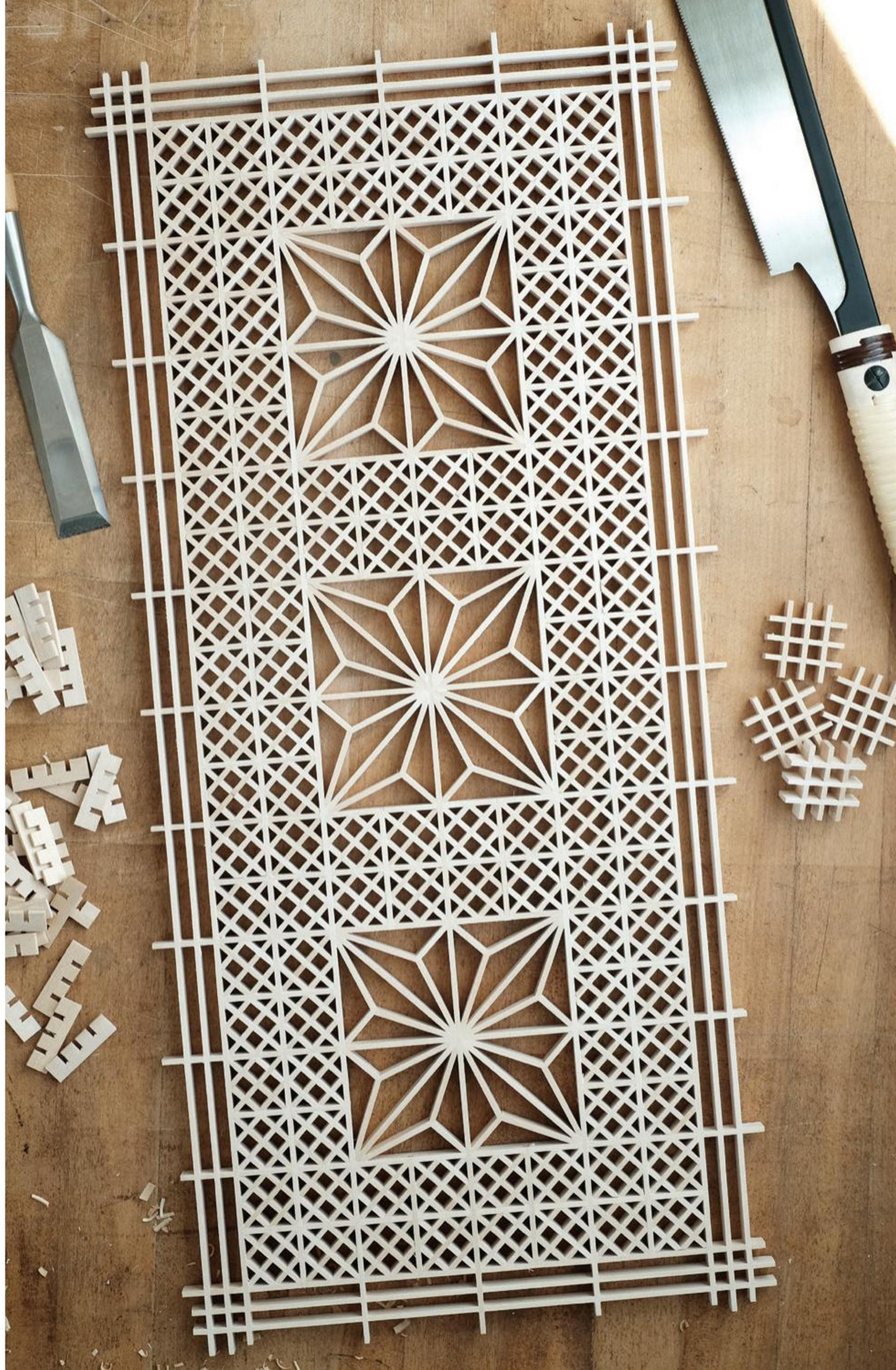
PANEL 8

Now we get to it: mixing different patterns. I chose the holding hands pattern to surround the cluster of hemp leaves because there is so much negative space, which balances well with the density of the hemp leaves huddled together in the center. I also like that the pieces in the holding hands pattern are either perfectly vertical or horizontal. It's a nice foil to the angularity of the hemp leaf pattern.

FRAME DRAWING



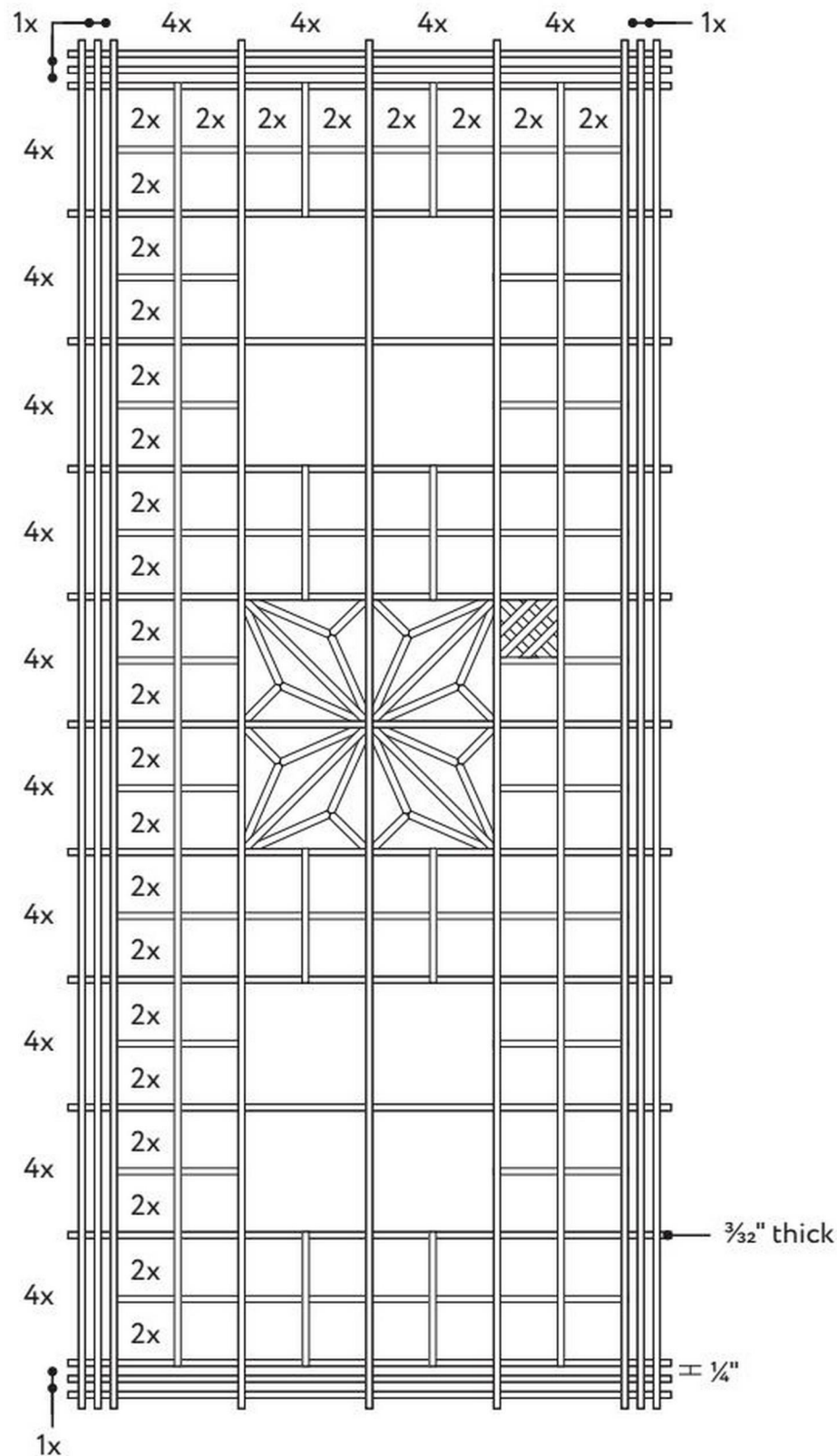




PANEL 9

The less complicated a panel is, the more difficult it is to make well. The same goes for size. The smaller it is, the tougher it is. There are 112 squares of little bitty square dance patterns in this one. You make them using the same techniques I've shown already, but the absurdly small size makes it challenging. Good luck.

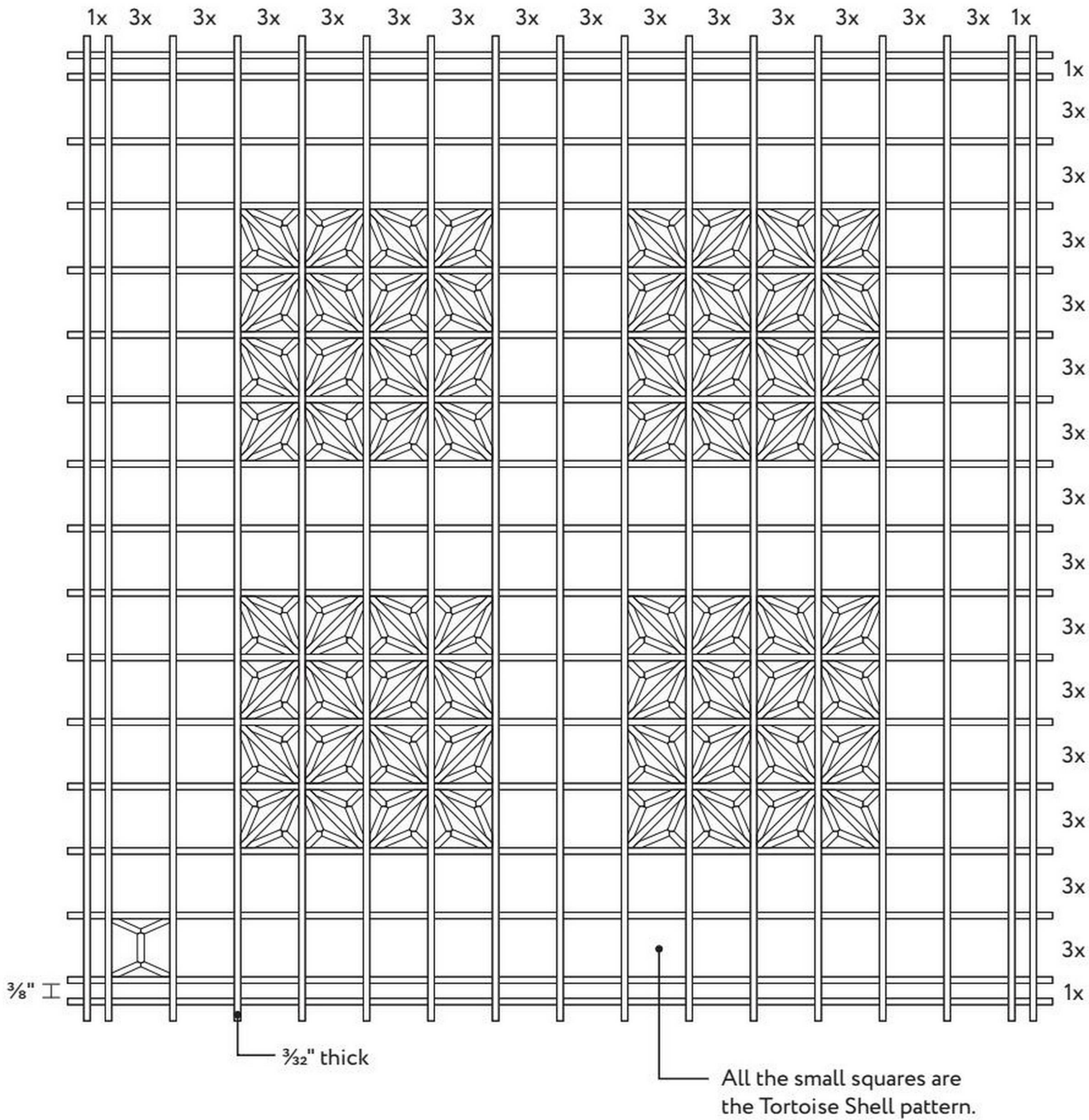
FRAME DRAWING

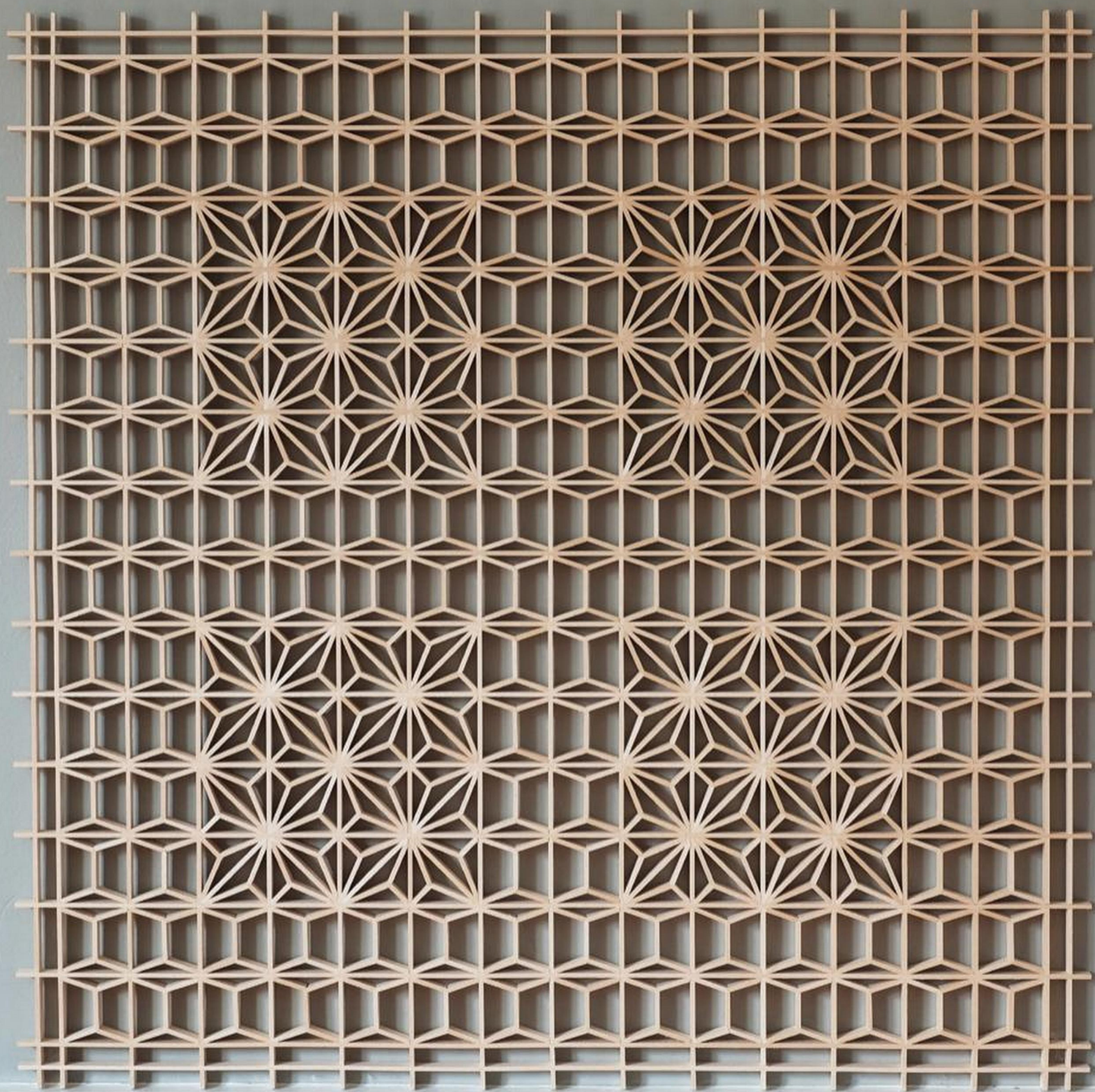


PANEL 10

Turn on a good playlist. Settle down. Say goodbye to your social life (and children if you have them). There are more than 1,100 individual pieces in this panel. There are 132 squares of the tortoise shell pattern and 16 hemp leaves. And they are small. Still, it's worth the effort. This combination of patterns would work extremely well in contemporary furniture, especially if you are trying to capture some mid-century magic.

FRAME DRAWING





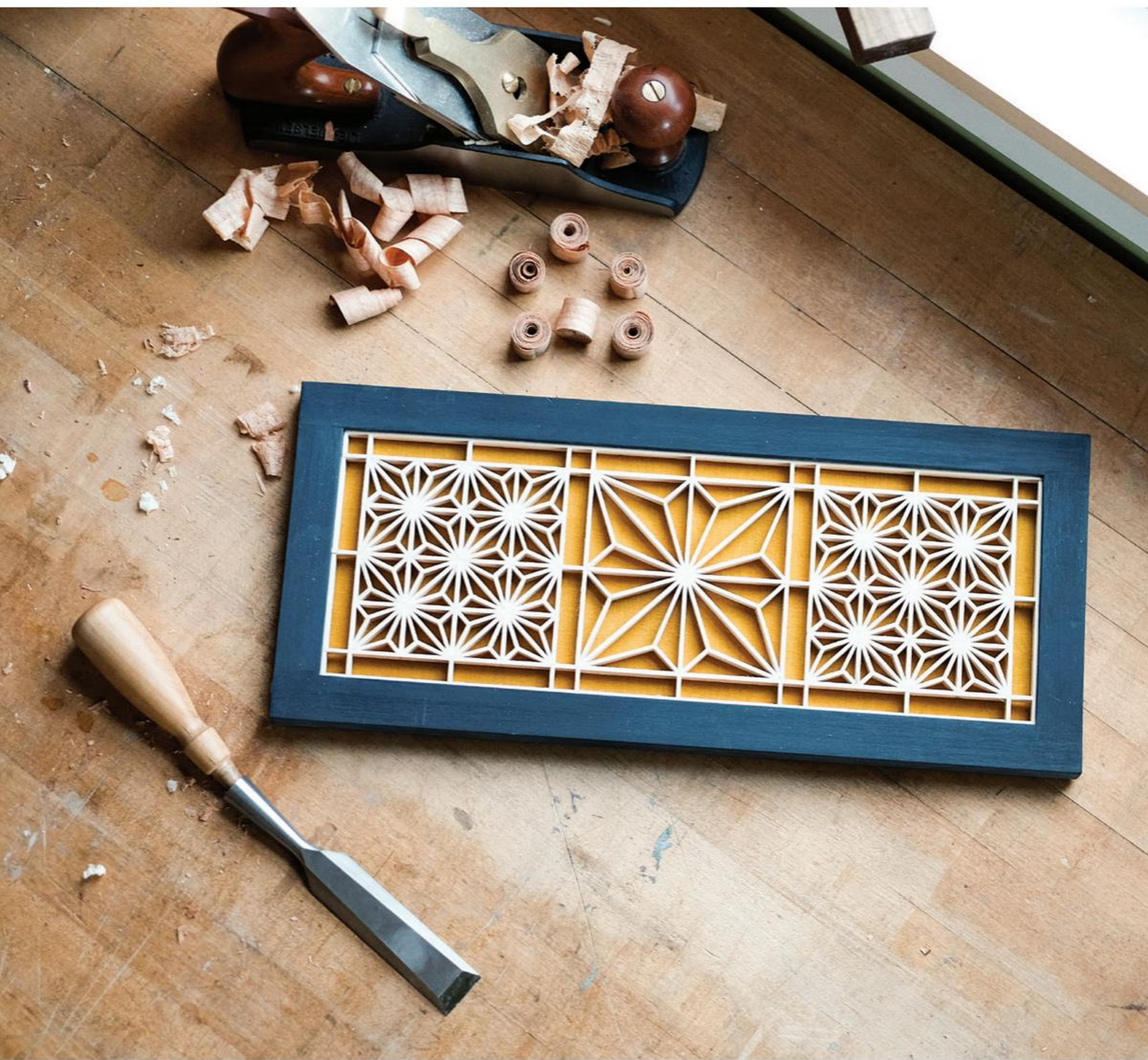
ABOUT *the* AUTHOR

MATT KENNEY grew up making things such as tree forts and skate ramps from wood. Now he's a furniture maker whose passion for the craft drives him to share his knowledge and experience with other woodworkers. He's written dozens of magazine articles, been featured in instructional videos, and is the author of *52 Boxes in 52 Weeks* (Taunton Press), which chronicles his effort to design and make 52 boxes during the course of a year. Happily, he was successful. Matt also teaches woodworking at schools around the United States and overseas. He's co-host of a bi-weekly podcast, "The Matt and Joe Woodworking Fun Hour," that documents co-host Joe Faraoni's journey as Matt teaches him woodworking. A former editor at *Fine Woodworking*, Matt is at the



forefront of a revival in interest in kumiko. When he's not woodworking, you'll likely find him drawing robots. Check out what he's up to in the shop and at the drawing table by following his Instagram accounts @mekwoodworks and @thebookofrobots. Matt lives and works in Watertown, CT.





CONVERSIONS

METRIC CONVERSIONS

In this book, lengths are given in inches. If you want to convert those to metric measurements, please use the following formulas:

Fractions to Decimals

$$\frac{1}{8} = .125$$

$$\frac{1}{4} = .25$$

$$\frac{1}{2} = .5$$

$$\frac{5}{8} = .625$$

$$\frac{3}{4} = .75$$

Imperial to Metric Conversion

Multiply inches by 25.4 to get millimeters

Multiply inches by 2.54 to get centimeters

Multiply yards by .9144 to get meters

For example, if you wanted to convert $1\frac{1}{8}$ inches to millimeters:

$$1.125 \text{ in.} \times 25.4 \text{ mm} = 28.575 \text{ mm}$$

And to convert $2\frac{1}{2}$ yards to meters:

$$2.5 \text{ yd.} \times .9144 \text{ m} = 2.286 \text{ m}$$

CONVERSIONS

Fractions to Decimal Equivalents (Inches)

$\frac{1}{64}$	.015625	$\frac{33}{64}$	.515625
$\frac{1}{32}$	.031250	$\frac{17}{32}$	.531250
$\frac{3}{64}$	.046875	$\frac{35}{64}$	.546875
$\frac{1}{16}$	.062500	$\frac{9}{16}$	.562500
$\frac{5}{64}$	.078125	$\frac{37}{64}$	.578125
$\frac{3}{32}$	.093750	$\frac{19}{32}$	.593750
$\frac{7}{64}$	.109375	$\frac{39}{64}$	.609375
$\frac{1}{8}$	.125000	$\frac{5}{8}$	.625000
$\frac{9}{64}$	.140625	$\frac{41}{64}$	.640625
$\frac{5}{32}$	.156250	$\frac{21}{32}$	.656250
$\frac{11}{64}$	.171875	$\frac{43}{64}$	.671875
$\frac{3}{16}$	.187500	$\frac{11}{16}$	.687500
$\frac{13}{64}$	.203125	$\frac{45}{64}$	.703125
$\frac{7}{32}$	.218750	$\frac{23}{32}$	.718750
$\frac{15}{64}$	.234375	$\frac{47}{64}$	.734375
$\frac{1}{4}$	.250000	$\frac{3}{4}$	.750000
$\frac{17}{64}$	.265625	$\frac{49}{64}$	.765625
$\frac{9}{32}$	.281250	$\frac{25}{32}$	.781250
$\frac{19}{64}$	.296875	$\frac{51}{64}$	.796875
$\frac{5}{16}$	.312500	$\frac{13}{16}$	.812500
$\frac{21}{64}$	.328125	$\frac{53}{64}$	.828125
$\frac{11}{32}$	.343750	$\frac{27}{32}$	.843750
$\frac{23}{64}$	.359375	$\frac{55}{64}$	.859375
$\frac{3}{8}$	.375000	$\frac{7}{8}$	.875000
$\frac{25}{64}$	.390625	$\frac{57}{64}$	.890625
$\frac{13}{32}$	.406250	$\frac{29}{32}$	.906250
$\frac{27}{64}$	.421875	$\frac{59}{64}$	.921875
$\frac{7}{16}$	.437500	$\frac{15}{16}$	.937500
$\frac{29}{64}$	.453125	$\frac{61}{64}$	.953125
$\frac{15}{32}$	.468750	$\frac{31}{32}$	.968750
$\frac{31}{64}$	.484375	$\frac{63}{64}$	.984375
$\frac{1}{2}$	.500000	1	1.00000

Inches to Millimeters (Fractions to Decimal Equivalents)

$\frac{1}{64}$	0.396875	$\frac{33}{64}$	13.09688
$\frac{1}{32}$	0.793750	$\frac{17}{32}$	13.49375
$\frac{3}{64}$	1.190625	$\frac{35}{64}$	13.89063
$\frac{1}{16}$	1.587500	$\frac{9}{16}$	14.28750
$\frac{5}{64}$	1.984375	$\frac{37}{64}$	14.68438
$\frac{3}{32}$	2.381250	$\frac{19}{32}$	15.08125
$\frac{7}{64}$	2.778125	$\frac{39}{64}$	15.47813
$\frac{1}{8}$	3.175000	$\frac{5}{8}$	15.87500
$\frac{9}{64}$	3.571875	$\frac{41}{64}$	16.27188
$\frac{5}{32}$	3.968750	$\frac{21}{32}$	16.66875
$\frac{11}{64}$	4.365625	$\frac{43}{64}$	17.06563
$\frac{3}{16}$	4.762500	$\frac{11}{16}$	17.46250
$\frac{13}{64}$	5.159375	$\frac{45}{64}$	17.85938
$\frac{7}{32}$	5.556250	$\frac{23}{32}$	18.25625
$\frac{15}{64}$	5.953125	$\frac{47}{64}$	18.65313
$\frac{1}{4}$	6.350000	$\frac{3}{4}$	19.05000
$\frac{17}{64}$	6.746875	$\frac{49}{64}$	19.44688
$\frac{9}{32}$	7.143750	$\frac{25}{32}$	19.84375
$\frac{19}{64}$	7.540625	$\frac{51}{64}$	20.24063
$\frac{5}{16}$	7.937500	$\frac{13}{16}$	20.63750
$\frac{21}{64}$	8.334375	$\frac{53}{64}$	21.03438
$\frac{11}{32}$	8.731250	$\frac{27}{32}$	21.43125
$\frac{23}{64}$	9.128125	$\frac{55}{64}$	21.82813
$\frac{3}{8}$	9.525000	$\frac{7}{8}$	22.22500
$\frac{25}{64}$	9.921875	$\frac{57}{64}$	22.62188
$\frac{13}{32}$	10.31875	$\frac{29}{32}$	23.01875
$\frac{27}{64}$	10.71563	$\frac{59}{64}$	23.41563
$\frac{7}{16}$	11.11250	$\frac{15}{16}$	23.81250
$\frac{29}{64}$	11.50938	$\frac{61}{64}$	24.20938
$\frac{15}{32}$	11.90625	$\frac{31}{32}$	24.60625
$\frac{31}{64}$	12.30313	$\frac{63}{64}$	25.00313
$\frac{1}{2}$	12.70000	1	25.40000

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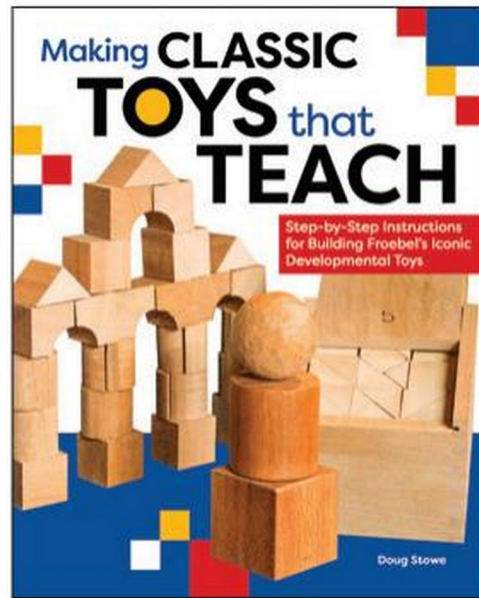
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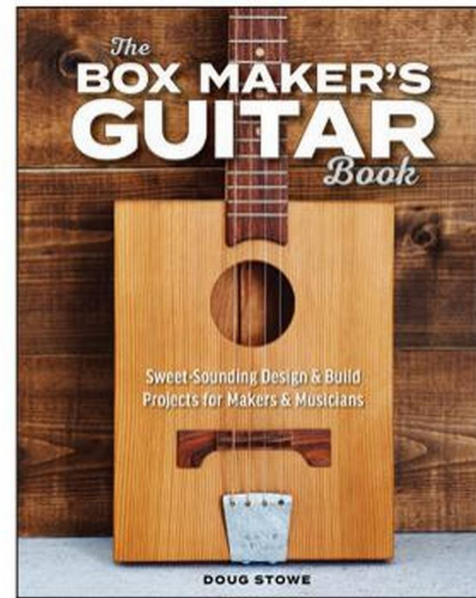
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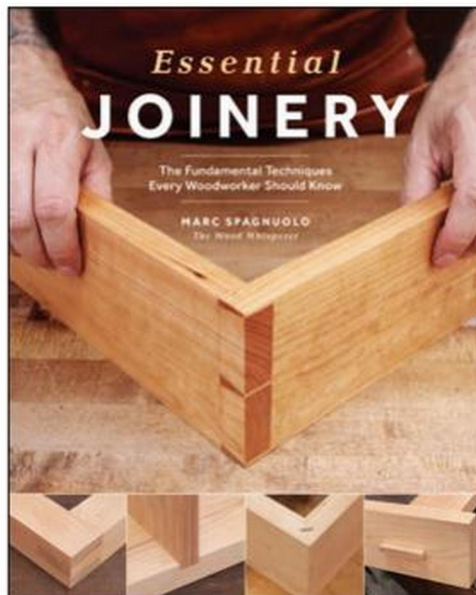
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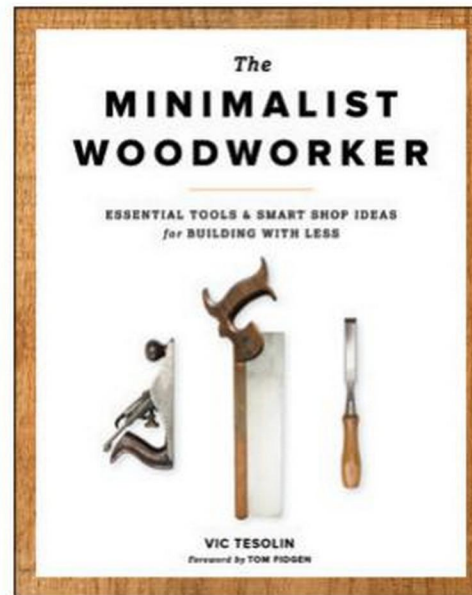
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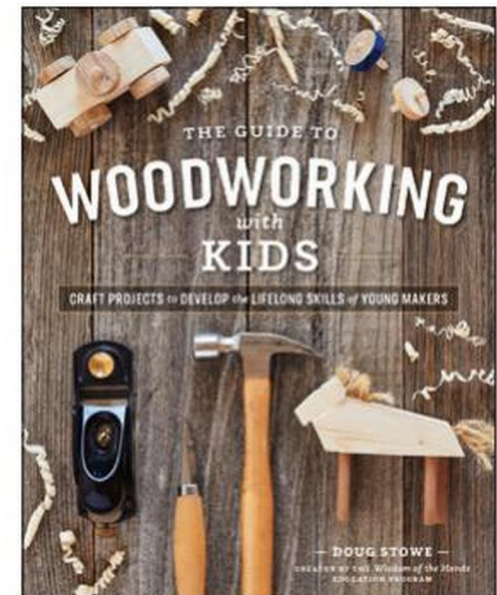
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