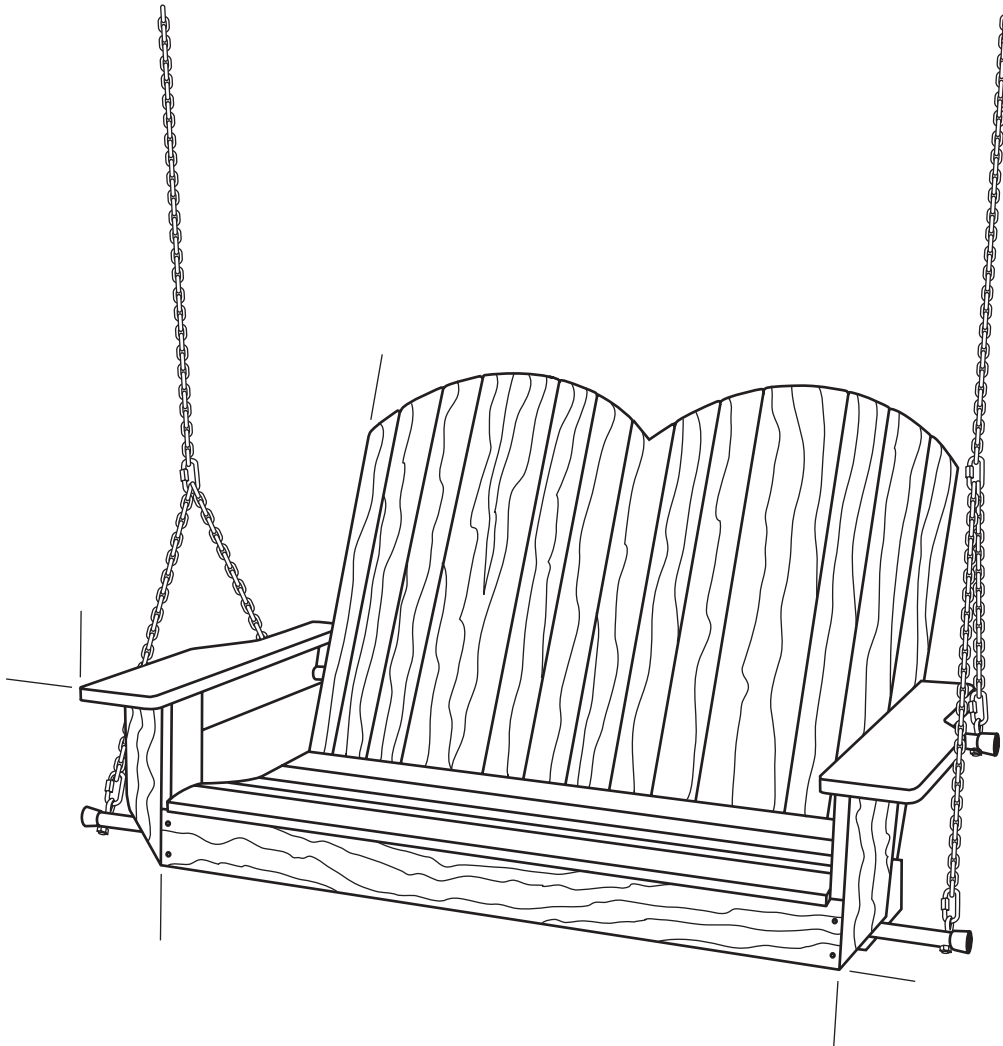


WOODWORKS: INTERMEDIATE PROJECT 2004-2005 PORCH SWING



Kick back and relax with this fun-to-build weekend project. The smooth, gentle glide of the porch swing will keep you daydreaming for hours.

This project is designed with a unique suspension system made from ordinary 1/2" black steel pipe (commonly used for gas piping). It slips through the swing frame to act as a cradle and to eliminate stress on wood joints. Eyebolts are fastened through the steel pipe and covered by soft rubber caps to prevent accidental scrapes. The swing assembly is then supported with a welded steel chain that is securely fastened to solid framing in the porch roof.

In this intermediate-level project, you'll gain experience in working with templates to make shaped pieces and doing some complex and precise assembly. And after you build it, you'll learn more about applying and using finishes to protect the wood and keep it looking beautiful.

Caution: Swings are inherently dangerous for small children. This swing moves slowly, but it has hard edges that can give a nasty bump. Kids will love this swing, but never let small children play around it unattended.

TOOLS REQUIRED

Hand Tools

- Hacksaw
- Adjustable wrench
- Block plane
- Bar clamps

Power Tools

- Miter saw or circular saw
- Drill with bits and screw-driver attachment
- Jigsaw
- Table saw
- Orbital sander

Miscellaneous

- Tape measure
- Safety glasses
- 120-, 150- and 220-grit sandpaper
- Clean, lint-free cloths
- Respirator
- 4" roller
- Gloves for finishing
- Mineral spirits (for oil-based finishes)
- Water-filled metal container with tight-fitting lid
- Minwax® Wood Finish™ Stain Brush or other good quality, natural bristle brush (for oil-based stains and finishes)
- Minwax® Stainable Wood Filler
- Construction adhesive
- Thread-locking compound
- Exterior spray primer
- Black or brown spray paint

SHOPPING LIST

NOTE: The wood for this project is cedar, a naturally rot resistant species. White oak, cypress, and poplar are also good alternative dense woods that won't mar easily and stain beautifully.

Item	Quantity
1" x 6" x 8' boards	7
1" x 4" x 8' boards	3
1-1/4" galvanized deck screws	2 lbs.
1-5/8" galvanized deck screws	2 lbs.
1/2" unthreaded black pipe 56" long	1
1/2" unthreaded black pipe 51" long	1
Pilot hole/countersink drill bit	1
3/16" welded, zinc-plated chain	17'
1/4" threaded eyebolts	4
2-1/4" quick-link eyes	8
3/4" rubber caps	4

Woodworker's Tip: Knots can weaken a board and spell disaster, especially on furniture, so be sure to select knot-free boards.

WOOD FINISHING PRODUCTS

Recommended Finish

Thompson's® WaterSeal® Waterproofer PLUS Tinted Wood Protector Honey Gold (or your choice of Natural Cedar, Nutmeg Brown, Rustic Red, or Coastal Gray).

Alternate Finish

Thompson's® WaterSeal™ Deck & House Semi-Transparent Latex Stain – Cedartone (for a cedar appearance), Briarwood (for a brownish tone), Woodland (for a reddish tone), or Superwhite (for a white appearance).

CUTTING LIST

Key	Pcs.	Size & Description
A1	2	3/4" x 5-1/2" x 17-1/2" (side seat braces)
A2	1	3/4" x 5-1/2" x 14-1/2" (center seat brace)
B	2	3/4" x 3-1/2" x 10-1/2" (front arm braces)
C	1	3/4" x 3-1/2" x 43" (front stringer)
D	1	3/4" x 3-1/2" x 40" (rear stringer)
E	1	3/4" x 3-1/2" x 40" (lower back brace)
F	1	3/4" x 2-5/16" x 43" (center back brace)
G	1	3/4" x 1-1/2" x 40-1/2" (top back brace)
H	2	3/4" x 5-1/2" x 35" (center back slats)
J	9	3/4" x 2-11/16" x 35" (back slats)
K	2	3/4" x 1-13/16" x 35" (tapered back slats)
L	2	3/4" x 2-1/2" x 10-1/2" (arm supports, waste from parts P)
M	2	3/4" x 3" x 22-1/4" (horizontal arm supports)
N	6	3/4" x 2-11/16" x 41-1/2" (seat slats)
P	2	3/4" x 5-1/2" x 27" (arms)
Q	1	1/2" (13/16" outside diameter) x 56" black steel pipe
R	1	1/2" (13/16" outside diameter) x 51" black steel pipe

BEFORE YOU BEGIN

Good craftsmanship begins and ends with good work habits, so make the following steps part of your routine workshop practice. If you have any doubts or questions about how to proceed with a project, always discuss them with your shop instructor.

- Carefully and fully review plans and instructions before putting a tool to the project lumber.
- Work sensibly and safely. Wear safety goggles when doing work that creates flying chips and sawdust; wear the appropriate respirator whenever making sawdust or working with thinners or other solvents.
- At the end of every work session, clean up your shop area and put away all portable tools.

CUTTING AND ASSEMBLY PROCEDURE

1. Cut all the parts to the dimensions shown in the CUTTING LIST. Using a table saw, make 1x3s from the 1x6s.

2. Notch the front arm braces (B) with a jigsaw to accept the front stringer (C) as shown in Fig. 1. Fasten C to both parts B with 1-5/8" deck screws. Drill pilot and countersink holes and apply a dab of construction adhesive at each joint.

Woodworker's Tip: *Why use construction adhesive instead of carpenter's glue? We used Liquid Nails brand LN-600 because it's waterproof and resilient. Construction adhesive will help your porch swing stand up to both weather and stress. Apply a small bead at every joint. If the glue oozes slightly, let the excess harden and then cut it off with a sharp putty knife or wood chisel.*

3. Draw the curved shapes for parts A1, A2 and P onto hardboard templates, shown in Fig. 1, cut them out and trace them onto boards. To cut them out with a jigsaw, clamp them to the workbench to keep them from wandering while you cut the curves. Sand the curves smooth with 100-grit sandpaper. Drill 7/8"-dia. holes with a sharp spade bit into parts A1 and A2 as shown in Fig. 2 for the front pipe hanger.

4. Trace the angle of the center seat brace (A2) onto each side brace (A1) to locate the holes for attaching the rear stringer (D). Again, drill pilot holes and glue and screw the seat braces to the front stringer and the front arm braces. Next, glue and screw the rear stringer to the seat braces.

Woodworker's Tip: *You'll need to pre-drill holes for every screw so you won't split the wood or break off the screw head. To make this process easier, buy a special combination bit that can drill and countersink in one operation.*

5. Drill through the front arm braces (B) with a 7/8" spade bit after you've glued and screwed the side seat braces to them. These two holes will complete the pathway for the front pipe support (Q).

6. After you assemble the arm braces, stringers and seat braces, glue and screw the curved front arm supports (L) to the sides of B as shown in Fig. 1.

7. Use a table saw to cut the center and top horizontal back braces (F and G) from 1x4s. Set the blade at 27-1/2 degrees for the bevel cuts.

8. Mark a diagonal taper onto a 1x3 as shown in Fig. 1 to make the two outer slats (K) from this single piece. Cut along the line with your jigsaw, then use a block plane to smooth the cut edge.

9. Assemble the back as shown in Figs. 1 and 4. Lay all the back slats (H, J, K) face down on a flat surface and slip temporary 1/4" spacers between them to help maintain consistent spacing. Fasten the bottom brace (E) to the middle slat, using a framing square to make sure they're joined at 90 degrees. Start at the center and work out to the sides. When you get to the fourth slat on each side, check your spacing; you may need to adjust it so the outer edge of the tapered slat (K) is flush with the end of the lower back brace.

10. Cut the curves on the back assembly. Make a simple beam compass from a scrap of wood as shown in Fig. 5. Flip the backrest assembly over and nail one end of the compass 14 inches from the top and in the center of the 1x6 back slat. Insert your pencil into the 1/4" hole drilled in the other end of the compass and draw the curve. Cut along the mark with your jigsaw. With the backrest assembly in this position, measure and mark a 2-1/2" line parallel to the bottom edge.

11. Hang the lower part of the back assembly over the edge of the work surface and slide the seat assembly onto it. Place the seat frame assembly you built earlier onto the backrest assembly. It's crucial to align the rear seat frame stringer (D) to the 2-1/2" line on the backrest so the remainder of the assembly will fit together. Glue the joint, then clamp and screw the assemblies together.

12. Drill 7/8" holes in the horizontal arm supports (M) to the exact dimensions shown in Fig. 1. Then glue and screw these pieces to the front arm braces (B) and the center back brace (F).

13. Glue and screw the seat slats to the seat braces. Start in the back and leave approximately a 3/16" space between each piece. Trim the last slat to overhang the front stringer by 1/2". Plane the transition piece on the curve of the seat and at the leading edge of the front seat slat for maximum comfort. Also shave off any high spots in the seat slats with a block plane.

14. Test-fit the pipe, chain and connecting links in the wooden assembly. This is a good time to discover any glitches and correct them before you do any finishing. Slide the pipes through the holes in the seat frame and along the back, leaving an equal amount exposed on each side.

15. Drill a 3/16" hole in the center of the rear support pipe, then screw a 2" No. 8 sheet metal screw (use a 1/8" pilot hole) up into the center back support. This connection will keep the pipe from sliding to one side while the swing is in motion.

16. Drill 9/32"-dia. holes for the eyebolts. Angle the eyebolts slightly toward the center of the swing to minimize the torque on the pipe and prevent the lock-screw from breaking.

17. Hang the swing using the quick-link eyes to join the lengths of chain. This swing could be holding 400 pounds or more, so you must anchor the swing's chain with 1/2" screw eyes screwed at least 2" into solid framing as shown in Fig. 6. Also, distribute the weight to more than one joist or rafter by screwing a pair of 2x4s 54" apart and then inserting the screw eyes into the 2x4s. The swing should tip back slightly at the arms (about 1" from back to front) when it is at rest. During the final assembly after finishing, squirt thread-locking compound on the eyebolt threads. Be sure to cut the ends of the eyebolts flush with the nuts for safety. When the installation is complete and secure, remove the swing for finishing.

18. Before applying the finish, remove the chains and pipes. Sand the pipes with 100-grit sandpaper, then wipe them down thoroughly with a rag dampened with mineral spirits. Let the mineral spirits evaporate off the surface, then spray-paint the pipes with exterior primer followed by a brown or black exterior enamel.

19. Sand the wood parts with 100-grit sandpaper, paying particular attention to the arms and the edges of the seat and back. Softer edges will be safer and more comfortable and hold the finish better.

20. Wipe off the dust and vacuum the swing. You'll make better time if you apply the finish with a small 4" roller and follow it up with a brush to even the coat. Use the brush to get between the slats and then look for runs and drips coming through the other side.

PROTECTING YOUR PROJECT

Any type of wood that's used outdoors needs protection from water damage. We've chosen Thompson's® WaterSeal® Waterproofer PLUS Tinted Wood Protector to provide complete protection for your project. It not only prevents water damage, but the coating also resists mildew and U.V. (ultraviolet radiation in sunlight) damage, and it exceeds industry standards for waterproofing on wood. In addition, Tinted Wood Protector adds color without hiding natural wood grain.

Woodworker's Tip: Always be sure to choose a waterproofer that claims to exceed industry standards for waterproofing on wood.

FINISHING TIPS

- When you apply Thompson's® WaterSeal® Waterproofer PLUS Clear or Tinted Wood Protector, do not mix it with other waterproofing products because variations in the final appearance of the surface being treated may result. Also, do not thin these products.
- Coverage: The approximate coverage of Clear Wood Protector on cedar is 300 to 400 square feet per gallon. A gallon of Tinted Wood Protector will cover about 250 to 300 square feet. The approximate coverage of oil or latex stain on smooth wood is 250 to 300 square feet per gallon.

Recommended Finish

21. Before applying Thompson's® WaterSeal® Waterproofer PLUS Clear or Tinted Wood Protector, read and follow the directions found on the back of the can. Be sure that both surface and air temperature are above 50° F during application and for 48 hours after application, and if you're working outside, do not apply product if rain is forecasted within 24 hours of application.

22. The surfaces must be free of all mildew, dust, dirt, oil, soot, grease, and other contaminants. If the surface is damp or wet from cleaning or weather, allow the surface to dry thoroughly (a minimum of 48 hours) before application.

23. Cover plants and shrubs and move all objects that could come in contact with Wood Protector.

24. When you apply Clear or Tinted Wood Protector, do not mix it with other waterproofing products because variations in the final appearance of the surface being treated may result.

25. Before applying Wood Protector over the entire surface, a small trial patch is recommended to verify color.

26. In most applications, only one light coat is necessary. Apply with a brush, roller, applicator pad, or by dipping the piece into the product. Regardless of which application method is used, remove excess within 15 minutes by redistributing it to drier areas or wiping it off.

27. Use only with adequate ventilation. Oiliness and tackiness will result if over-applied or applied to wet or damp surface or if overnight temperature falls below 50° F within 48 hours of application. Excessive oiliness caused by over-application may be removed by scrubbing wood with a concentrated degreaser.

28. Allow at least 48 hours to dry before you hang the swing. Drying time will vary depending on the substrate, temperature and humidity.

29. Clean brushes and equipment with mineral spirits, then rinse with clean water.

NOTE: The length of protection will vary depending on environment. Perform the following splash test once a year to see whether reapplication is necessary. Sprinkle water on various sections of surface to be sealed. If water absorbs and darkens color of substrate within 5 seconds, the surface is porous and considered ready to be treated. If water beads up or otherwise sits on top of surface, then surface doesn't need protection at this time. For maximum protection from color change and other damage caused by the sun, reapplication is recommended every year. Vertical and horizontal surfaces will experience color changes at different rates.

Alternate Finish

If you want more color along with excellent protection, use Thompson's® WaterSeal™ Deck & House Latex or Oil Stain, both of which come in Solid and Semi-transparent formulations and are available in 117 ready- and custom-mixed colors.

30. Before applying any of these stains, read and follow the directions found on the back of the can. To ensure good penetration, do not apply in direct sunlight or on hot days. Be sure that both surface and air temperature are above 50° F and below 95° F during application and for 48 hours after application. If you're working outside do not apply product if rain is forecasted within 24 hours of application.

31. The surfaces must be free of all mildew, dust, dirt, oil, soot, grease, and other contaminants. If the surface is damp or wet from cleaning or weather, allow the surface to dry thoroughly (a minimum of 48 hours) before application. Shake or mix thoroughly before application (mechanical shaking is recommended).

32. Since in-store color samples may vary slightly when actually applied to wood (based on color, texture, grain, porosity, and type of wood), apply the stain to a small test area and let it dry to determine final color before proceeding with the entire project.

33. Apply stain with an exterior paint pad, brush, roller, or compression-driven sprayer set for low pressure. Do not use product in a pump-up garden sprayer. When rolling be sure to go back and brush-in stain to ensure even coverage. When using a pad or brush, keep the leading edge wet and distribute stain evenly. This will help avoid lap marks and keep color uniform.

34. Work from top to bottom or side to side in areas small enough to allow the leading edge to remain wet at all times during application. Use natural breaks as boundaries to divide large areas into more manageable work areas.

35. One coat of stain is recommended, but a second coat can be added if desired. Allow the first coat to dry thoroughly (approximately 4 hours for latex, 24 hours for oil) before second application. Drying time will vary depending on the substrate, temperature and humidity.

36. For oil-base stain, clean brushes and equipment with mineral spirits, then rinse with clean water. For latex stain, clean brushes and equipment with soap and water.

IMPORTANT: Place rags, steel wool and waste immediately after use in a sealed, water-filled metal container.

PRODUCT SAFETY

For your safety and the safety of those you work with, always read the safety warnings, which manufacturers print on their labels, and follow them to the letter. Typical safety advice and instructions will contain information such as the following:

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Contents are **COMBUSTIBLE**. Keep away from heat and open flame.

Contains **ALIPHATIC HYDROCARBONS**.

VAPOR HARMFUL. Use only with adequate ventilation. To avoid over-exposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air supply, or wear respiratory protection (NIOSH/MSHATC23C or equivalent), or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, get medical attention immediately.

DELAYED EFFECTS FROM LONG-TERM OCCUPATIONAL EXPOSURE.

Contains solvents that can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.

SAFE DISPOSAL OF RAGS AND WASTE.

Rags, steel wool or waste soaked in Thompson's® WaterSeal® Waterproofer PLUS Tinted Wood Protector may spontaneously catch fire if improperly discarded. Immediately after use, place rags, steel wool or waste in sealed, water-filled metal container. Dispose of in accordance with local fire regulations.

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FIG 1. PORCH SWING DETAILS

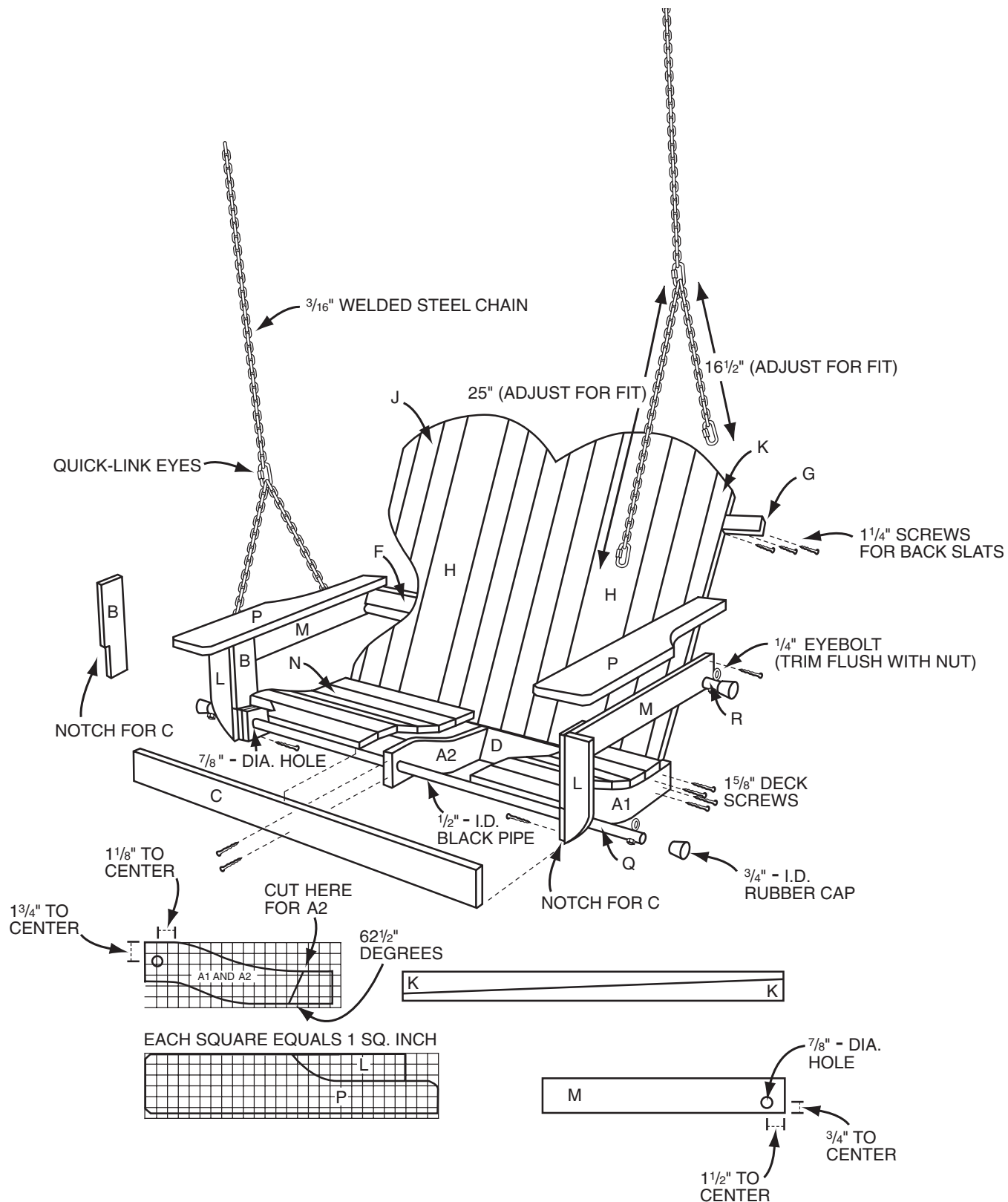


FIG 2. PORCH SWING END VIEW

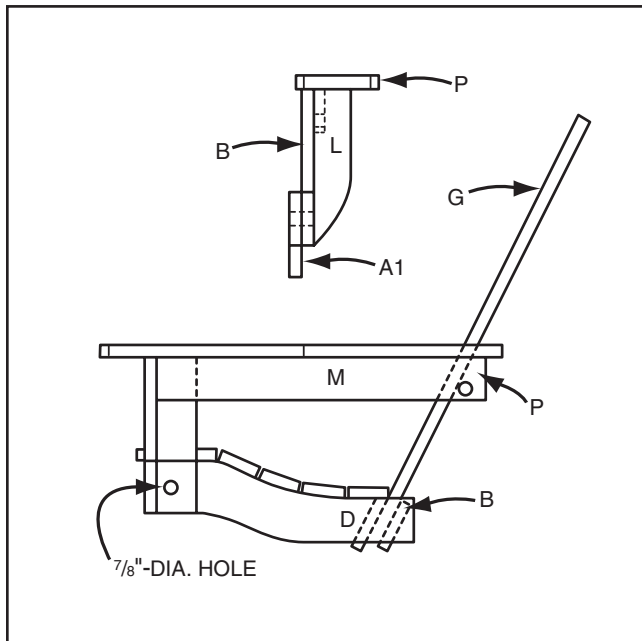


FIG 3. SEAT FRAME ASSEMBLY

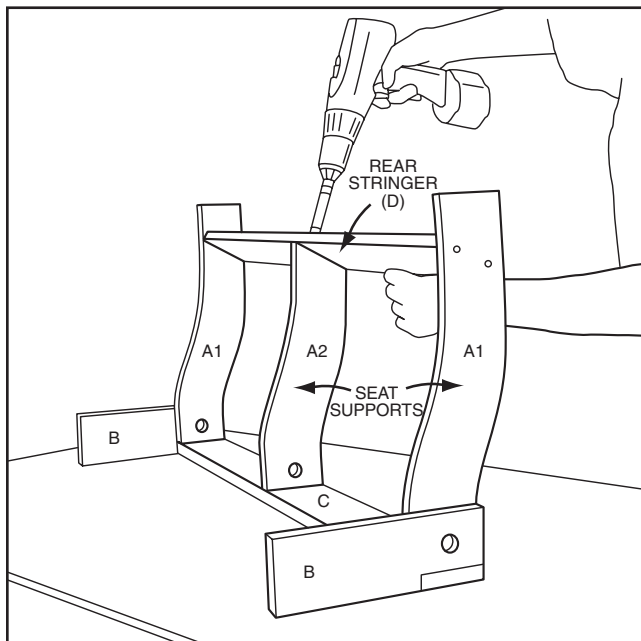


FIG 4. ASSEMBLING THE BACK

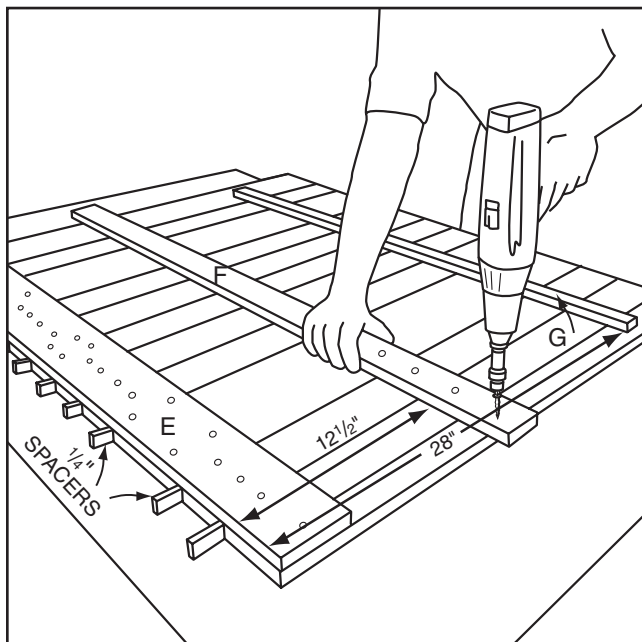


FIG 5. CUTTING THE BACK ASSEMBLY

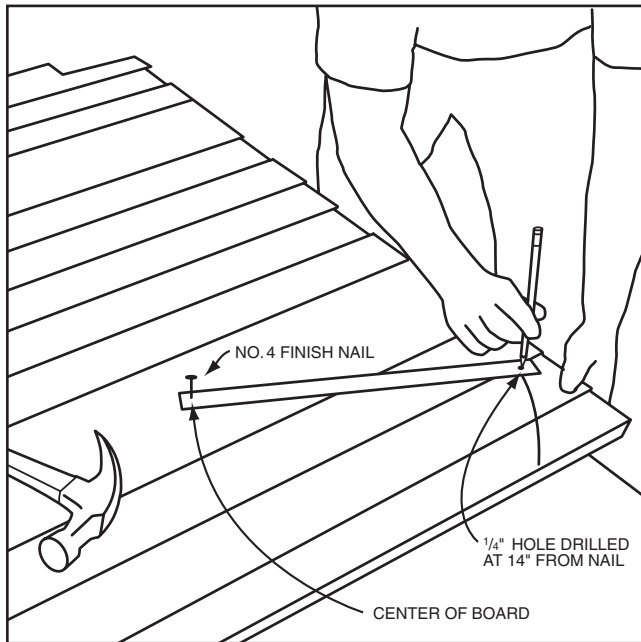


FIG 6. HANGING THE PORCH SWING

