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Dave Campbell
Editorial Content Chief, *WOOD* magazine

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Contractor-Grade Mobile Crane

Junior operating engineers will enjoy doing the heavy lifting with this fully operational construction toy.

Before your favorite youngster gets bogged down in video games, give a gift that lets his imagination do the lifting—this sturdy wooden crane.

PROJECT HIGHLIGHTS

- Overall dimensions: 25" high ×13⅝" reach × 7¾" track ×11⅜" wheelbase.
- Hand-operated hoists raise and lower the boom and bucket.
- The tower assembly pivots smoothly on a ball-bearing lazy Susan to easily pick up and place loads.
- A wide-track chassis featuring eight sets of dual wheels provides sure-footed mobility.
- You provide the flat stock and a few wood screws. We provide a one-stop source for the remaining hardware and special fittings.

Skill Builder

- Discover how to hold rounded items steady for drilling on your drill press.

Make the chassis

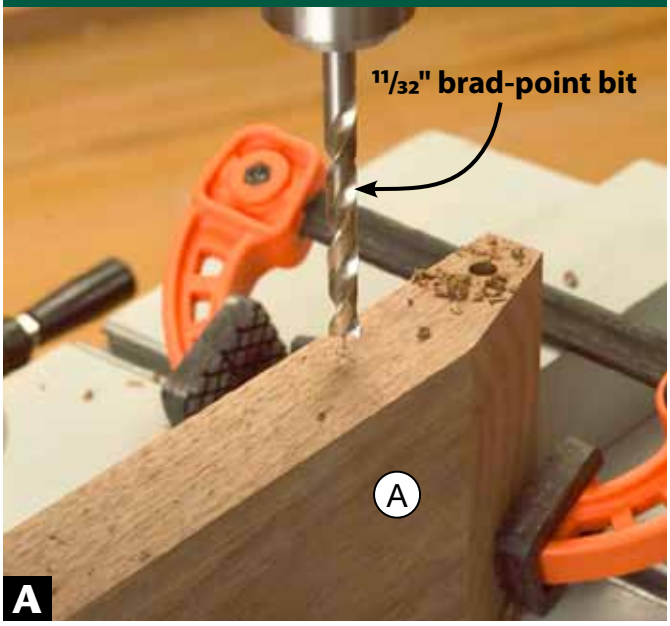
1 For the chassis (A), cab (G), and counterweight (H), cut a 1½×6¼×12" blank. (We used walnut.) Rip a 1½"-wide piece from one edge, and set it aside for the cab and counterweight. Cut the remaining piece to size for the chassis [**Materials List**, *page 10*].

2 Lay out the chassis (A) front and rear bevels [**Drawing 1**], and bandsaw and sand them to shape. Then chuck an 11/32" brad-point bit into your drill press, position the fence ½" from the bit center, and drill axle holes in both sides of the chassis [**Photo A**]. Finish-sand the part.

Build the mast and boom

1 For the mast sides (B) and mast spacers (C), cut two ¾×1½×26" blanks (We used maple). Cut one mast side and one spacer from each blank. Chuck a 1" Forstner bit into your drill press and drill five holes in the mast sides [**Drawing 2, Photo B**].

DRILL THE AXLE HOLES



Lay out the axle hole centers on the chassis (A). Clamp the chassis to the drill-press fence at each location, and drill 1½"-deep holes.

2 To assemble the mast, cut two ¾×2¼×24" cauls from scrap. (We used MDF.) Cover one side of each caul with masking tape to keep glue from sticking. Apply tape to one side of each mast (B) to mark the mast spacer (C) locations [**Drawing 2**]. (The thickness of the tape provides just enough of a lip to keep the spacers from shifting and makes it easy to remove excess glue.) Glue and clamp the mast [**Photos C** and **D**].

3 Mark the 3/16" boom pivot hole center on one mast side (B) [**Drawing 2**]. Chuck a brad-point bit into your drill press, insert a ¾"-thick scrap block between the mast sides to prevent chip-out, and drill the hole.

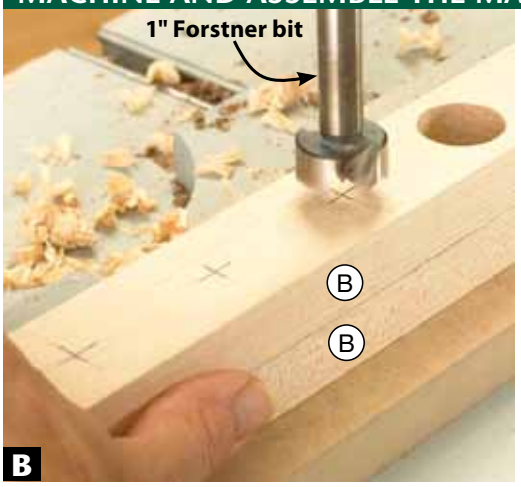
4 Form the mast (B/C) top bevel [**Drawing 2**, **Photo E**], and sand it smooth. Sand ⅛" round-overs on the top corners of the mast sides (B) and upper mast spacer (C). Chuck a chamfer bit into your table-mounted router, and rout 1/16" chamfers along the edges of the 1" holes and the outside edges of the mast, except for the bottom. Finish-sand the mast.

5 From a ¾×1⅜×22" piece of stock, resaw and plane a ¼"-thick blank for the front spacer (D) and rear spacer (E). (We used walnut.) Cut the parts to length. Bandsaw and sand the chamfer on the front spacer and the taper on the rear spacer [**Drawing 3**].

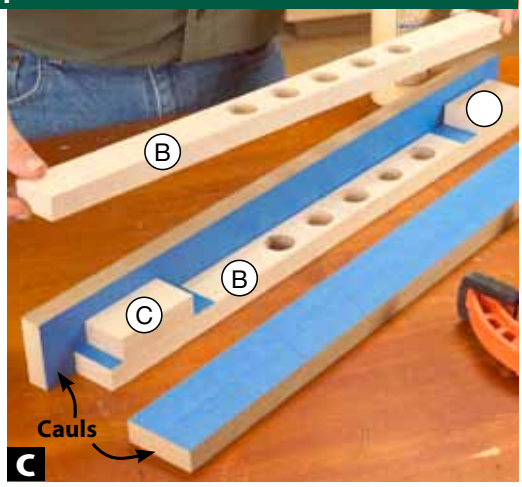
6 From a ¾×1⅜×22½" piece of stock, resaw and plane the two boom sides (F). (We used maple.) Glue and clamp the boom spacers (D, E) between the boom sides [**Drawing 4** and **Photo F**].

7 With the glue dry, use your drill press to drill a 3/32" hole through the rear spacer (E) for the boom-operating string, a 3/16" hole for the boom pivot, and another 3/16" hole at the front end of the boom [**Drawing 4**]. When drilling the front hole, insert a ¼"-thick piece of scrap between the boom sides (F) to prevent chip-out. Then mark the two tapered cuts, and bandsaw and sand them to shape. Sand ⅛" radii on the boom ends. Now rout 1/16" chamfers along the edges. Finish-sand the boom.

MACHINE AND ASSEMBLE THE MAST

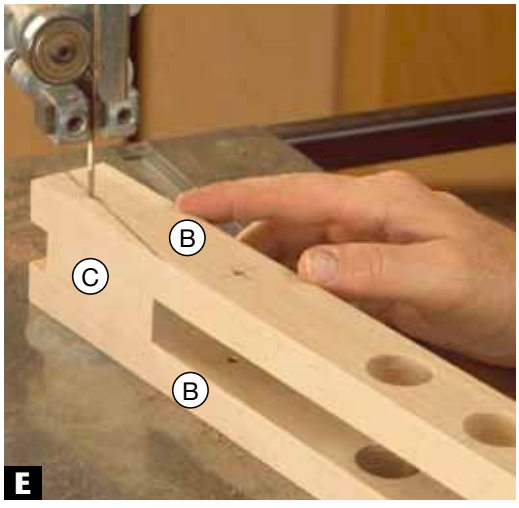


Join the two mast sides (B) with double-faced tape, mark the 1" hole centers, and drill through both parts.



Apply glue and position the mast spacers (C) on one mast side (B). Apply glue and add the second mast side.

Clamp the parts between the cauls, and then clamp vertically. Keep the mast sides (B) and lower mast spacer (C) flush at the bottom.

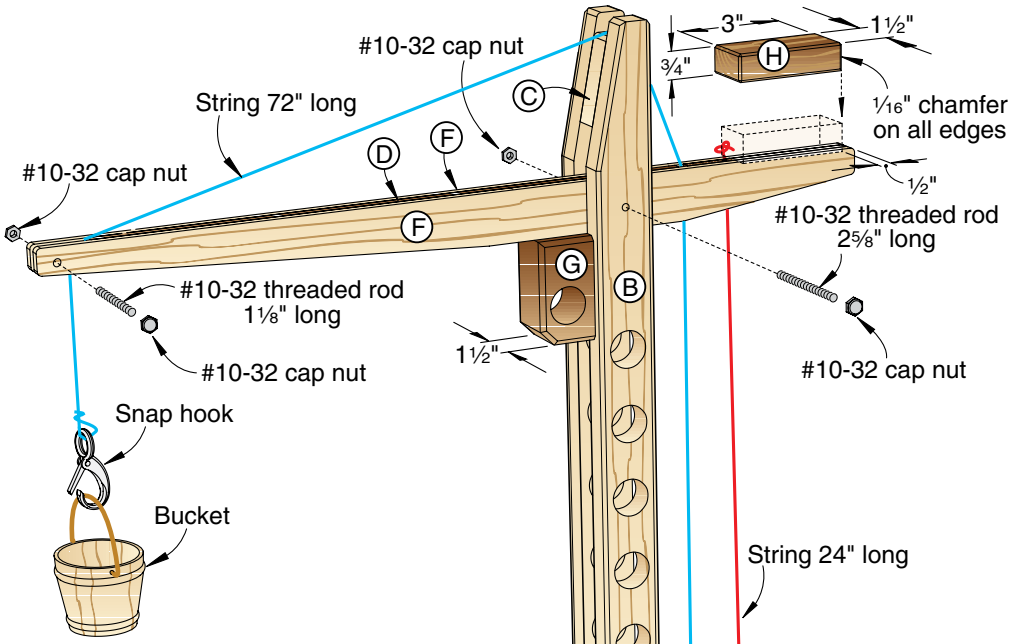


With the glue dry, remove the clamps and cauls, mark the bevel at the top of the mast, and bandsaw it to shape.

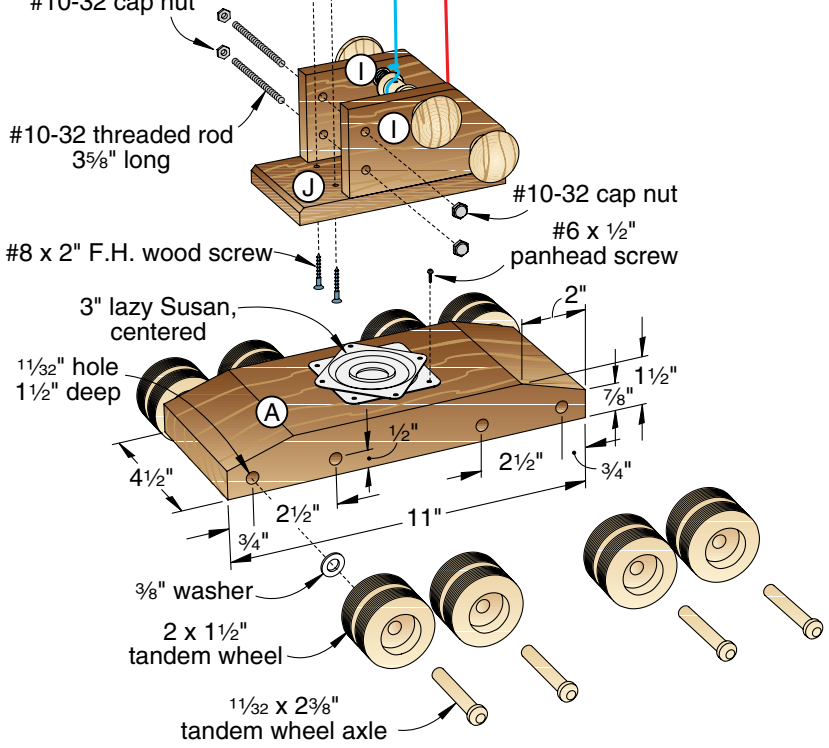
Add cab and counterweight

1 Retrieve the walnut cab (G) and counterweight (H) blank. Mark the hole center near one end [**Drawing 1a**]. Chuck a 1" Forstner bit into your drill press, and drill the hole. Then bandsaw and sand the ⅜" angled corner. Crosscut the cab from the blank. Now rout 1/16" chamfers along the edges of the hole and ⅛" chamfers along the outside edges of the cab. Finish-sand the cab.

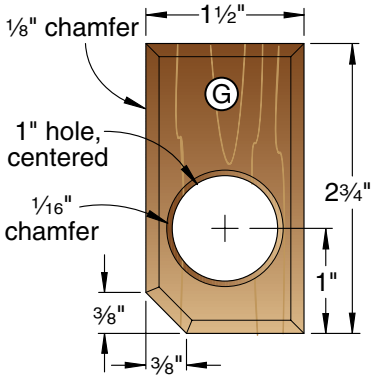
2 To position the cab (G) on the mast (B/C), first insert the boom between the mast sides (B), and slide a piece of #10-32 threaded rod through the holes in both assemblies. Then glue and clamp the cab to the mast sides (B) [**Drawing 1** and **Photo G**]. Remove the boom from the mast.



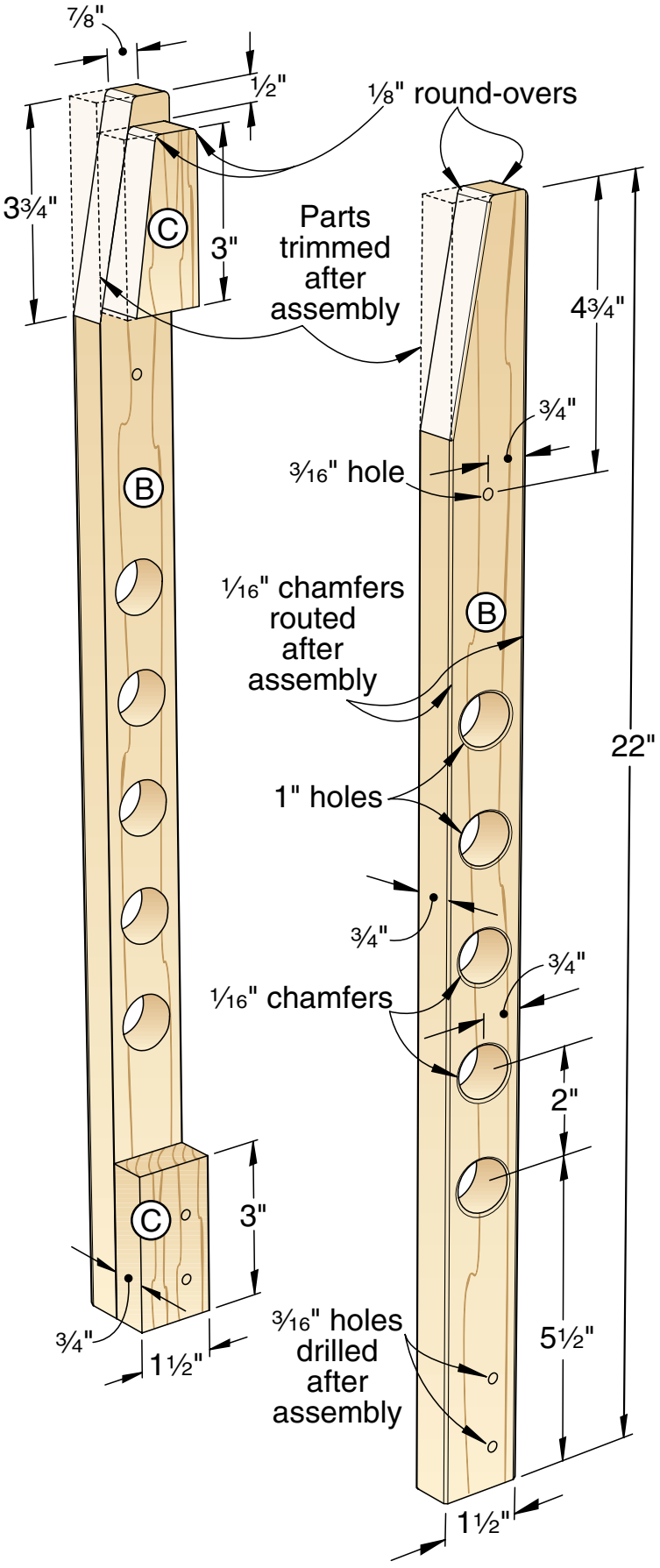
1 EXPLODED VIEW



1a CAB DETAIL



2 MAST ASSEMBLY



3 From the remaining walnut blank, cut the counterweight (H) to size. Rout chamfers on the edges [**Drawing 1**], and finish-sand it. Now glue and clamp the counterweight to the boom (D/E/F), ½" from the end and centered.

Fabricate the hoist

1 From ½"-thick stock, cut the hoist sides (I) to size. Adhere them face-to-face with double-faced tape. Mark hole centers [**Drawing 5a**], and drill the holes on your drill press with a ¼" brad-point bit. Lay out the angled corner. Bandsaw and sand it to shape. Sand round-overs on the corners at both ends of the angle. Separate and finish-sand the parts.

2 Cut the hoist base (J) to size, making sure the width equals the combined width of the mast (B/C) and the hoist sides (I). Rout a chamfer along the top front edge [**Drawing 5**]. Drill shank holes for fastening the hoist base to the mast sides (B). (For the #8 screws, drill 5/32" shank holes and 7/64" pilot holes.)

3 Clamp the hoist sides (I) to the hoist base (J) [**Drawing 5**]. Drill screw holes, and drive the screws. (For #6 screws, drill 9/64" shank holes and 3/32" pilot holes.) Clamp the mast (B/C) between the hoist sides. Using the screw holes in the hoist base as guides, drill pilot holes into the mast sides (B), and drive the screws. Now, on your drill press, drill 3/16" holes through the mast [**Photo H**].

4 With the mast/hoist assembly upside down, position the lazy Susan on the hoist base (J) equidistant from the front and side edges. Drill pilot holes, and drive the screws [**Drawing 1**]. Then position the mast/hoist assembly on the chassis (A), and mark the lazy Susan screw-hole locations [**Photo I**]. Now remove the mast/hoist assembly, and drill the holes.

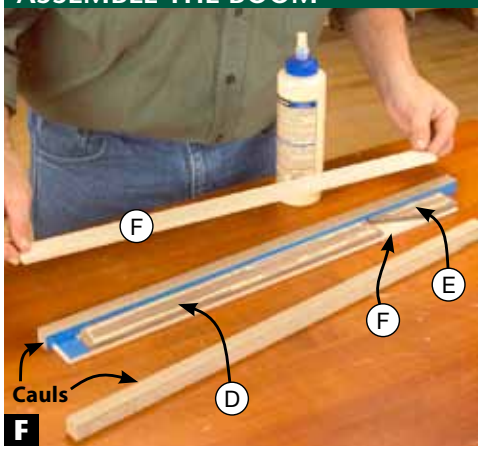
5 Cut two 4"-long pieces of ¼" dowel, and glue a spool onto each piece, centered on the length [**Drawing 5**]. With the glue dry, drill a 3/32" hole, centered, through each spool and dowel.

6 Enlarge the screw holes in four 1¼"-diameter wood knobs to ¼", drilling them ⅜" deep. To hold the knobs on the drill press, see the **Shop Tip** on *page 7*.

Apply finish and assemble

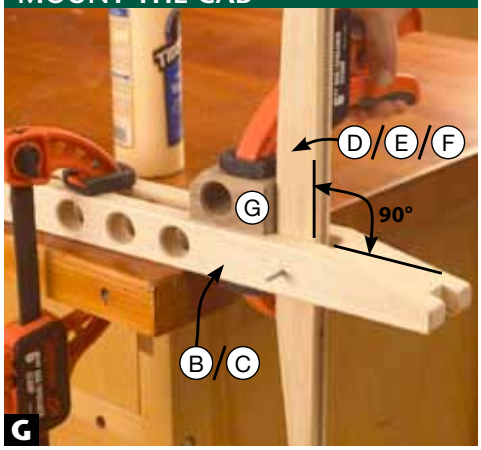
1 Remove the lazy Susan, mast (B/C), and hoist sides (I) from the hoist base (J). Examine all parts and assemblies, and finish-sand where needed. Slide the wheels and bucket onto a ¼" dowel, and support it at the ends with 2×4 scraps. To hold the axles and keep finish off the ends for gluing, drill eight ⅜" holes into a 2×4 scrap and insert the axles. Drill six ¼" holes at least 2" apart into another scrap block. Insert short pieces of ¼" dowel into four of the holes, and press a knob onto the end of each one. Wrap masking tape around one end of each spool dowel, and insert the other end into one of the remaining holes. Apply a clear finish to all the parts and assemblies. (We applied four coats of aerosol satin lacquer,

ASSEMBLE THE BOOM



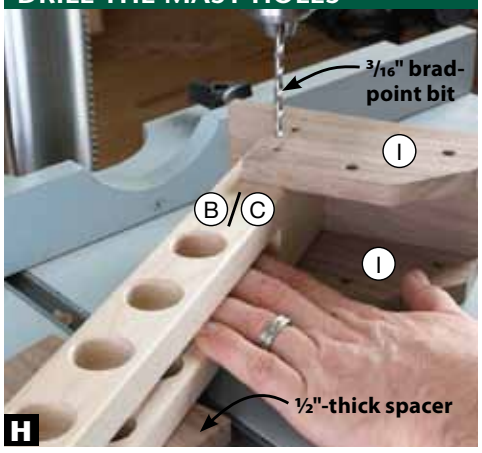
As with the mast, cut ¾×¾×24" cauls, applying masking tape, to align the spacers (D, E) between the boom sides (F) for gluing.

MOUNT THE CAB



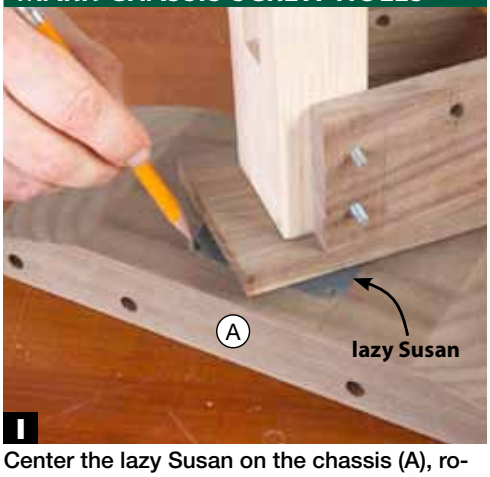
Sparingly apply glue to the cab (G), position it against the boom (D/E/F), centered on the mast (B/C), and clamp the cab in place.

DRILL THE MAST HOLES



Using the holes in the hoist side (I) as guides, drill 3/16" holes for the threaded rod through the mast (B/C) with a brad-point bit.

MARK CHASSIS SCREW HOLES

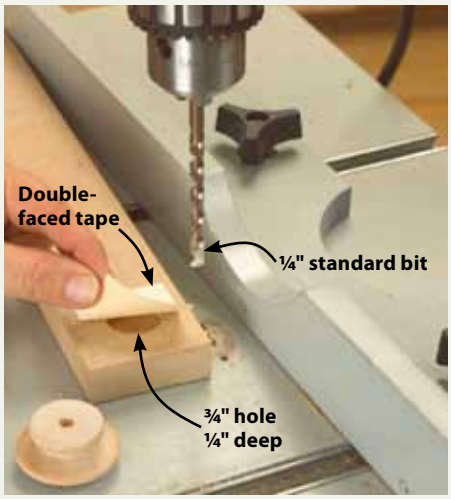


Center the lazy Susan on the chassis (A), rotate the mast/hoist assembly to uncover the mounting holes, and mark the locations.

SHOP TIP

How to safely hold rounded objects for drilling

Enlarging the screw holes in the wood knobs for the hoist assembly presents two challenges: holding a part with a domed surface steady on the drill-press table, and keeping it from spinning as the drill bit bites into the surface. Here's an easy way to overcome both. Drill a ¾" hole ¼" deep in a piece of ¾"-thick scrap. Place a 1½×1½" piece of double-faced tape over the hole, as shown at *right*. Center the knob over the hole, and press down firmly. Now support the scrap with the drill-press fence, centering the bit on the knob screw hole, and drill, as shown at *far right*. This method also works for drilling into wood balls.



sanding between coats with 320-grit sandpaper. To smooth the wheels between coats, use a soft brass wire brush.)

2 Slide a wheel and washer onto each axle. Glue the axles into the chassis (A) holes, inserting business cards between the wheels and washers to ensure free spinning.

3 Screw one hoist side (I) to the hoist base (J) [**Drawing 5**]. Slip a washer, spring, and another washer onto each spool dowel, and insert the dowels into the hoist side holes. Slip another washer, spring, and washer over each dowel, and fasten the second hoist side in place, capturing the spool dowels within the hoist side holes. Add a washer to each dowel protruding from the hoist sides, and glue the knobs onto the dowels.

4 Screw the mast (B/C) to the hoist base. Cut two 3⅝"-long pieces of #10-32 threaded rod (⅜" longer than the total thickness of the assembly), and slide them through the hoist sides (I) and mast [**Drawing 5**]. Apply medium-strength thread locker to the rod ends, and thread on cap nuts. Screw the lazy Susan to the hoist base (J), and then to the chassis (A).

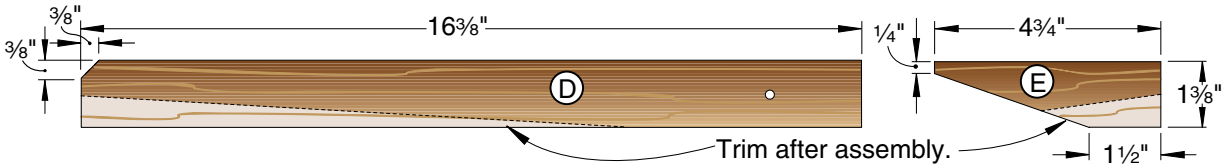
5 Cut one 2⅝"-long and one 1⅛"-long piece of threaded rod. Slide the boom (D/E/F/H) between the mast sides (B). Slide the long rod through the pivot holes [**Drawing 1**]. Apply thread locker and cap nuts. Slide the short rod through the holes at the front end of the boom, and apply thread locker and cap nuts.

6 Cut a 24"-long piece of string and tie a knot in one end. Thread it from the top through the hole in the rear spacer (E), through the hole in the rear spool, and then tie it off. Wind the excess cord onto the spool by turning the knobs.

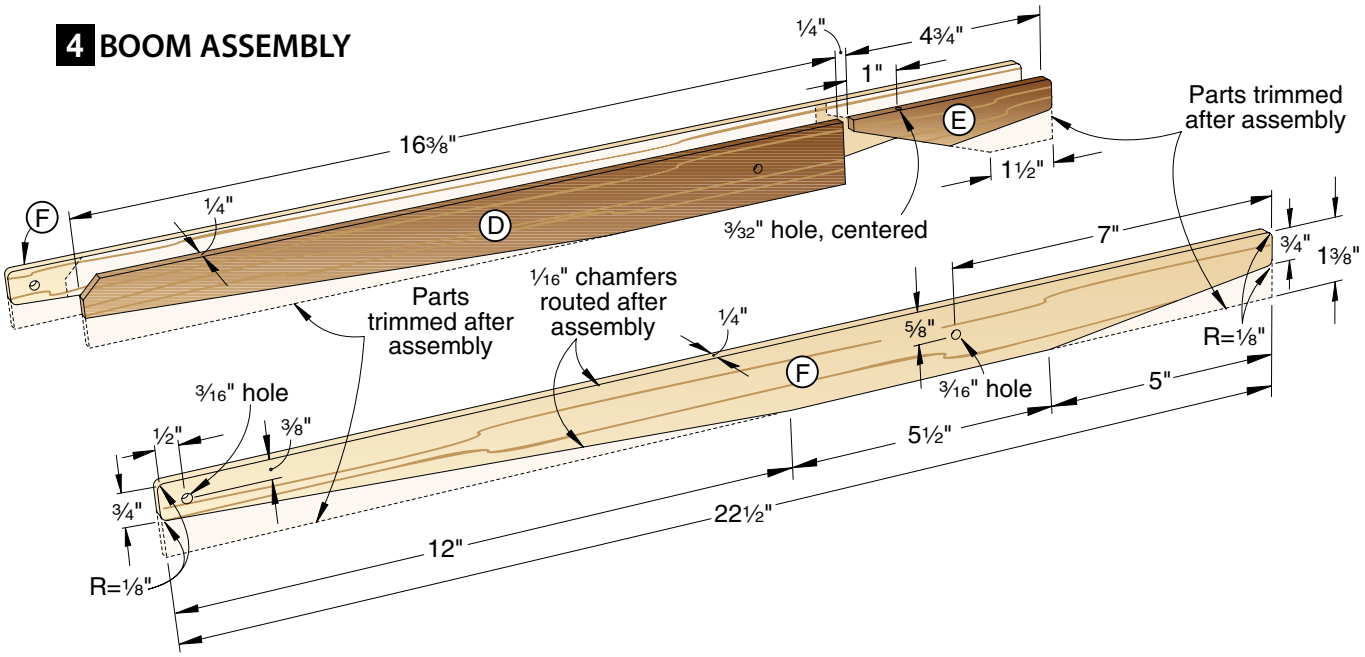
7 Cut a 72"-long piece of string, thread it through the hole in the front spool, and tie it off. Then route the cord through the space between the front spacer (D) and rear spacer (E), over the top of the upper mast spacer (C), and between the front spacer and the front threaded rod. Tie the snap hook onto the end of the string, and wind the excess onto the spool. Finally, clip the bucket bail onto the hook, slip on your hard hat, and start up your engines and your imagination.

Written by **Jan Svec**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**
Graphic design: **Lorna Johnson**

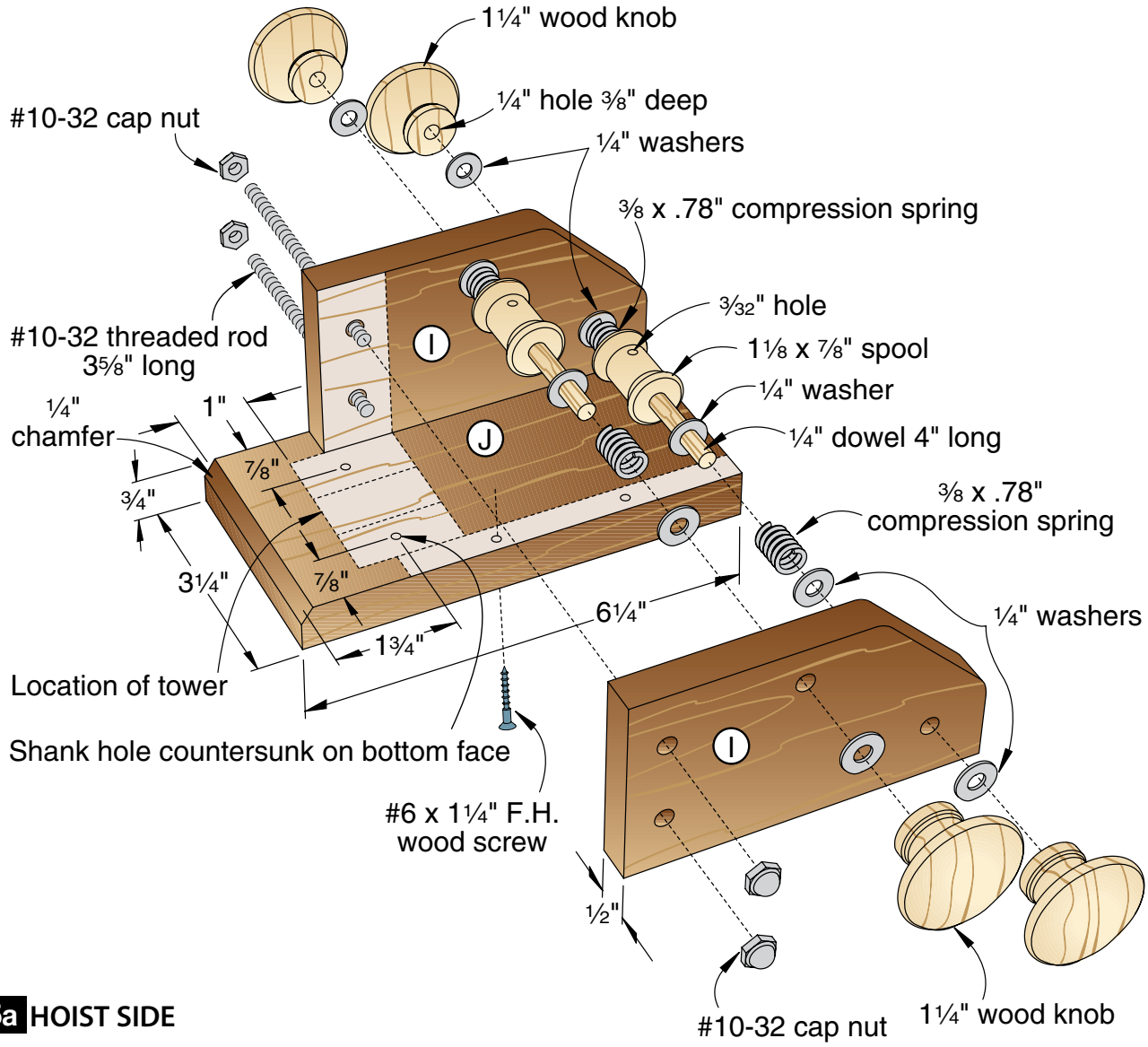
3 BOOM SPACERS



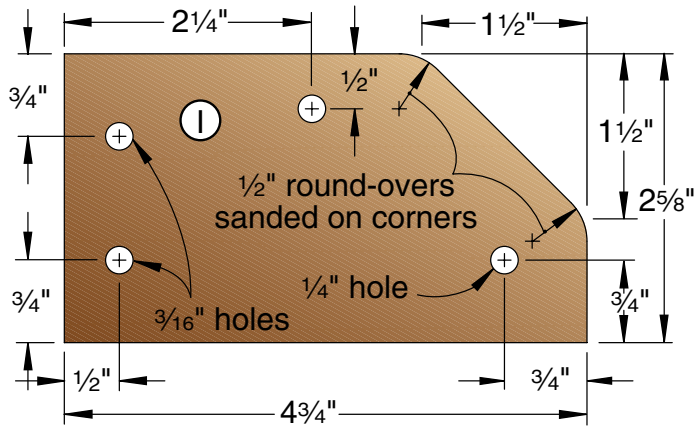
4 BOOM ASSEMBLY



5 HOIST



5a HOIST SIDE



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	chassis	1½"	4½"	11"	W	1
B*	mast sides	¾"	1½"	22"	M	2
C*	mast spacers	¾"	1½"	3"	M	2
D*	front spacer	¼"	1⅜"	16⅜"	W	1
E*	rear spacer	¼"	1⅜"	4¾"	W	1
F	boom sides	¼"	1⅜"	22½"	M	2
G*	cab	1½"	1½"	2¾"	W	1
H*	counterweight	¾"	1½"	3"	W	1
I	hoist sides	½"	2⅝"	4¾"	W	2
J	hoist base	¾"	3¼"	6¼"	W	1

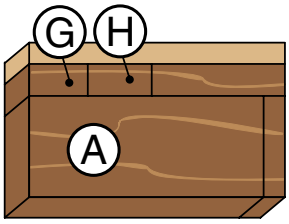
*Parts initially cut oversize. See the instructions.

Materials key: W–walnut, M–maple.
Supplies: #8×2" and #6×1¼" flathead wood screws, #6×½" panhead screws, double-faced tape.
Bits: 45° chamfer router bit; 3/16", ¼", and 11/32" brad-point drill bits; 1" Forstner bit.

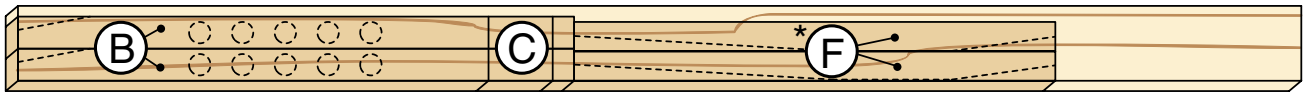
Source

Hardware kit: Each kit includes the following parts: tandem wheels (8), tandem wheel axles (8), ⅜" flat washers (8), 3" lazy Susan, #10-32×12" threaded rod, #10-32 cap nuts (8), snap hook, wood bucket, 1¼" birch knobs (4), 1⅛×⅞" spools (2), ¼×9½" wood dowel, ¼" flat washers (12), ⅜×.78" compression springs (4), nylon string (14ft).
Order kit RS-00594, woodmagazine.com/crane

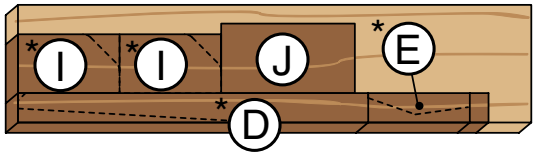
Cutting Diagram



1½ x 7¼ x 12" Walnut (1.3 bd. ft.)



¾ x 3½ x 60" Maple (1.7 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



¾ x 5½ x 24" Walnut (1 bd. ft.)

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