The Woodworker's Journal

Vol. 11, No. 2 $3.00

Included in this issue: Shaker Sewing Desk • Pine Shelf Contemporary Hall Table • Wood Sawyer Whirligig Mirrored Shelf • Rhombohedron Puzzle • Kangaroo Toy

March/April 1987

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The Woodworker's Journal

MARCH/APRIL 1987 VOLUME 11, NUMBER 2

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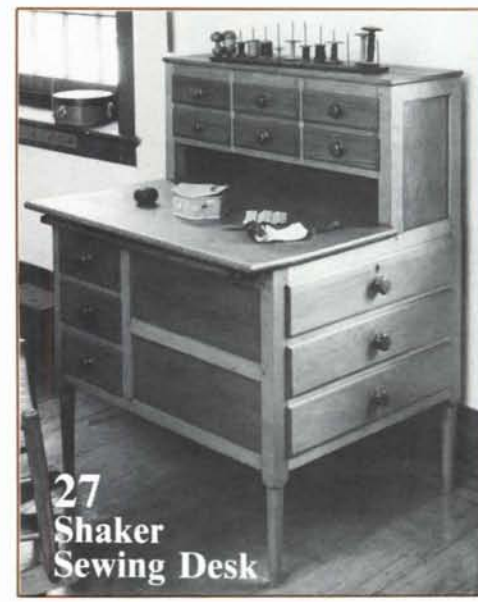

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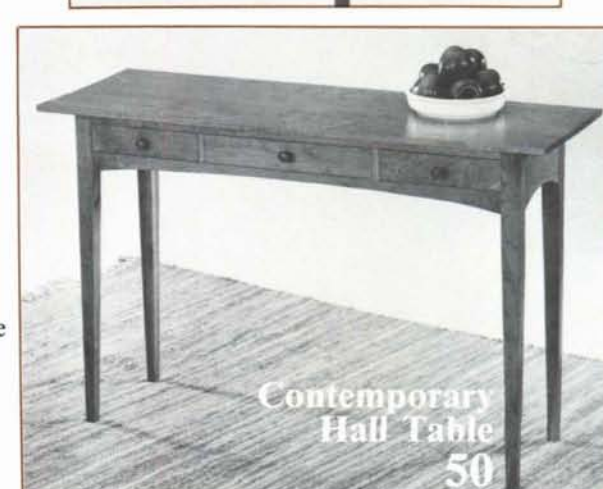
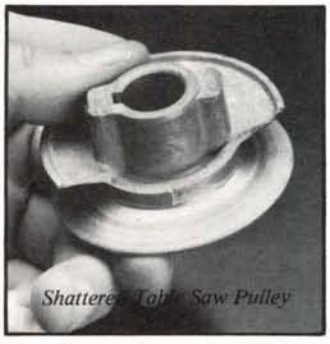


Cover: Garden Bench and Table photographed at Cosmo's Florist Shop, New Milford, Connecticut

Shoptalk

Cheap Accident Insurance

Woodworking injuries can usually be attributed to faulty equipment, carelessness, or a combination of both. I had a near miss recently which I initially blamed on faulty equipment, but after thinking about the mishap, I realized later that I was partially to blame.



Shattered Table Saw Pulley

I had to rip a couple of doorjambs from long pine boards, so an outfeed support was set up and the first long cut was made. After it was completed and the boards were clear of the blade, I walked around to the back end of the machine to pick up the boards, *but I did not turn the saw off.* As I was lifting the two pieces, I was startled by a loud bang on the wall in back of me, and saw that the belt had jumped off the motor pulley, causing the motor to fall on its hinge against the back end of the saw bench.

After shutting off the power, I noticed that the motor pulley had shattered and a large crescent shaped piece of flange had broken away. An examination of the wall in back of where I had stood revealed a large chunk gouged out of the wood door trim about knee-high and some 6 in. from where my right leg had been.

I took the pulley to the local hardware store and showed it to the clerk who remarked that "those die-cast white-metal pulleys will sometimes shatter and should be replaced with steel ones". When I asked how much a 2 in. steel pulley cost, he said the price was $5.20 and "that's a lot cheaper than emergency room charges at the hospital".

After I got home and installed the new pulley, I realized that the arbor pulley also needed replacing, so I made yet another trip downtown.

If you're like me, you probably have a bunch of pulleys banging around the shop, most of them for machines long ago discarded. Of course, not all pulleys pose a threat. Some, because of their size, speed of rotation and location will never attack you, but from now on my table saws will have steel pulleys.

Now here's the part I'm embarrassed to admit. When the saw was new, it had a plastic guard which covered the motor pulley and the exposed part of the belt. This guard, if it had been in place, probably would have deflected the projectile that just missed my leg. Unfortunately, as so often happens, the guard was removed years ago and misplaced, and I never bothered trying to get another. Mea culpa. And if I had turned the saw off immediately after the cut, I would not have exposed myself to danger at the rear of the machine. Mea culpa.

Jim McQuillan

RYOBI TOOLS

		List	Sale
S500A	3x5½ Finish Sander	70	41
SU6200	Finishing Sand. ½ Sheet	142	88
B7075	3x21" dustless Belt Sand.	179	116
B7100	3x24" dustless Belt Sand.	208	140
B7200A	4x24" dustless Belt Sand.	269	165
D100VR	⅜" VSR 0-1200 rpm drill	91	49
W640	7¼" 13 amp circular saw	158	99
W740	8¼" 13 amp circular saw	171	109
JS60	Jig Saw-Single Speed	172	99
JSE60	Jig Saw-electronic vlspeed	198	123
R150	1 H.P. Plunge Router	138	86
R330	2 H.P. Router	220	138
R500	3 H.P. Route	265	163
E3800	Drywall screwdriver 0-4000	126	79
L120U	3¼" Planer	142	89
BD1020R	⅜" 2-spd. Cordless Drill w/free holster-Xtra special buy	148	95
TS251U	10" Mitre Box	300	169
SG1150C	4½" H.D. Mini-Grinder	99	59

YOUR ATTENTION PLEASE!

All Above RYOBI TOOL Prices
Take Additional **10% OFF Sale Prices**

MILWAUKEE TOOLS

		List	Sale
0224-1	⅜ drill 4.5A magnum	173	109
0234-1	½ drill 4.5A magnum	173	112
0244-1	½ drill 4.5A magnum	173	115
0222-1	⅜ drill 3.3A 0-100 rpm	159	99
0228-1	⅜ drill 3.3A 0-1000 rpm	139	92
0375-1	⅜ close quarter drill — NEW — 3.5 amp	191	118
0210-1	⅜ cordless drill — NEW — 2 speed	189	95
6539-1	cordless screwdriver — NEW — 190 RPM	99	59
1007-1	½" drill 4.5A D-Hdle	217	145
1107-1	½" drill 4.5A D-Hdle	222	145
3300-1	magnum rt angle drive kit	271	170
3102-1	Pimbrs rt angle drill kit	287	180
1676-1	HD Hole Hawg w/cs-2 sp	363	235
5395	⅜ sgle sp hammer drill kit	203	150
5397	⅜ var sp hammer drill kit	208	155
5371-1	HD mag. hammer drill ½"	313	207
5373	HD mag. ham. drill ⅜"	262	175
6511	2 speed Sawzall w/case	197	122
6226	port band saw 2 sp w/case	416	280
6234	TSC band saw port w/case	416	280
6405	8¼" circ. saw 13 amp	191	127
6460	10¼" 15 amp w/case	380	245
6155	12" Chop saw 15 amp 4200 R.P.M	311	189
6255	vlsp Jig Saw 3.8 amp	217	140
6245	sgle sp Jig Saw 3.8 amp	191	125
6012	½ sheet HD Orb. sander	173	110
6014	½ sheet HD orb. sander	184	112
5660	1½ HP router 10 amp	289	175
5680	2 HP router 12 amp	342	220

DRYWALL SHOOTERS

6753-1	3.5 amp 0-4000 rpm **new**	125	79
6747-1	4.5 amp 2500 rpm	157	100
6750-1	4.5 amp 0-4000 rpm	141	90

NEW FROM RYOBI

MODEL AP-10 — 10" SURFACE PLANER
LIST PRICE 699.00 X-TRA SPECIAL 339.00
LIMITED QUANTITIES

MILWAUKEE Super Specials!

** BRAND NEW **
Model 0212-1 Cordless
Variable Speed ⅜" Drill
LIST...209.00 SALE...125.00

Model 6145 — 4½" Sander-Grinder
LIST...149.00 SPECIAL SALE...85.00

Once In A Lifetime Buy

RYOBI JSE 60 Jig Saw
Electronic var/spd
LIST PRICE 229.00 — X-TRA SPECIAL 79.00
LIMITED QUANTITIES

FREUD SAW BLADES

Univ. Bore — Professional Series

Item No	Description	Diam	Teeth	List	Sale
PS203	Gen'l Purp	7½"	24	27.24	17.50
PS303	Fine cutting	7¼"	40	32.97	20.50

⅝" Bore — Industrial Grade
CARBIDE TIPPED SAWBLADES

Item No	Description	Diam	Teeth	List	Sale
LU72M010	Gen'l Purp	10"	40	68.58	34
LU8M010	Gen'l Purp	10"	40	69.30	35
LU73M010	Cut-Off	10"	60	79.65	36
LU82M010	Cut-Off	10"	60	86.40	44
LU84M010	Combination	10"	40	70.99	36
LU84M011	Combination	10"	50	74.51	37
LU85M010	Super Cut-Off	10"	80	110.88	62
LM72M010	Ripping	10"	24	64.85	34
DS 306	6" Dado			139.00	92
DS 308	8" Dado			170.00	105
TR 100	3 blades & Dado set			399.00	255

MAKITA CORDLESS FESTIVAL OF VALUES

Model		List	Sale
4300WD	Jig Saw	188	99
5081DW	3⅜" Saw Kit	212	95
5600DW	6½" Circular Saw	284	125
9035DW	Finishing Sander	168	73
6010DWK	⅜" Cordless Drill Kit	174	88
6010SDW	⅜" Cordless Drill	94	45
8400DW	⅜" Hammer Drill	224	105
DA3000DW	⅜" Angle Drill	218	98
6010DL	⅜" Drill w/Flashlight	188	89
6012HDW	⅜" 2 spd Driver Drill w/Bat & Metal Case	208	98
DK1002	⅜"Drill w/Flursnt Lt	176	90
6710DW	Cordless Screwdvr Kit	176	84

LEIGH DOVETAIL JIGS

Model	List	Sale
TD514	149	125
TD514L	219	195
D1258-12	299	245
D1258-24	359	275

MAKITA BRAND NEW X-TRA SPECIAL

Model		List	Sale
5007NBA	7¼" Saw w/Elec. Brake	186	115
5008NBA	8¼" Saw w/Elec. Brake	212	130

MAKITA TOOLS

		List	Sale
B04510	Sander	92	43
9900B	3" x 21" belt sander	234	119
9924B	3" x 24" belt sander	222	130
9924DB	3" x 24" b/sand. w/bag	248	130
9035	½ sheet finish sander	96	48
9045B	½ sheet finish sander	186	90
9045N	¼ sht fin. sand. w/bag	190	105
4200N	4½ circ. saw 7.5 amp	182	93
5008NB	8¼ circ. saw 13 amp	198	105
5201NA	10¼ circ. saw 12 amp	438	215
4300BV	vlsp jig saw 3.5 amp	234	120
4301BV	orb vlsp jig saw 3.5 amp	248	125
JR3000WL	2 sp recip saw w/case	198	120
JR3000V	vs recip saw w/case	208	120

MAKITA TOOLS
SPECIAL PROMOTION

LS1000	New 10" Mitre Box	396	193
792210-7A	Carbide Bld for above	49	31
9820-2	Blade Sharpener	288	159
741074-9	60 (coarse) Grdg Whl	36	23
741070-7	1000 (med) Grdg Whl	34	22
741071-5	6000 (fine) Grdg Whl	45	30
1900BW	3¼" planer w/case	198	92
1100HD	3¼" planer w/case	328	160
3608BK	¼ hp router w/case	132	85
3601B	1¼ hp router	218	115
3700B	½ hp trimmer 28,000 rpm	162	82
B04530	6" Round Sander	98	48
DA3000	⅜" angle drill	206	105
DP4700	½ vlsp w/rev 4.8 amp	178	92
HP1030W	¾ v.s.r. hammer drill w/case	168	98
6300LR	½" angle drill w/rev	288	152
841988-2W	½" s.sp. hammer drill w/case	268	150
GV5000	Disc Sander	108	53
6800DB	2500 rpm 3.5 amp	146	79
6800DBV	0-2500 rpm 3.5 amp	156	89
6801DB	4000 rpm 3.5 amp	146	79
6801DBV	0-4000 rpm 3.5	156	89
2030n	12" planer/jointer	2580	1475
2040	15⅜ planer	2180	1195
1805B	6⅛ planer kit w/case	498	265
JV1600	var speed jig saw	178	89
JV2000	var speed orb. jig saw	198	100
5005BA	5½" circular saw 8 amp with brake	192	98
9207SPC	7" var/speed electronic sander/polisher	250	130
9303BH	4½" sander-grinder kit	166	95
4014NV	var/speed blower	168	79

DELTA — BRAND NEW

Model		List	Sale
34-080	10" Miter Box w/rotary table	279	179
	Repeat of a Sellout		
	DELTA — SUPER SPECIAL		
40-601	18" Electronic vlsp scroll saw — complete	1117	679

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Model	STANLEY	List	Sale
33-116	PL-316 ¾"x16" Rule	15.95	7.50
33-320	PL-320 ¾"x20C Rule	16.95	7.95
33-425	PL-425 1"x25' Rule	18.95	8.95
33-430	PL-430 1"x30' Rule	20.95	9.95

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SAW-ATHON
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#314 4½" Trim Saw
List 180 ..... SALE 109

#346-1 6½" Top Hdle
List 161 ..... SALE 100

#617 7¼" Push Hdle
List 166 ..... SALE 96

#587 7¼" Speedtronic
List 199 ..... SALE 125

#315-1 7¼" Top Hdle
List 166 ..... SALE 96

#358-1 8¼" Top Hdle
List 176 ..... SALE 110

BELT SANDERS
by PORTER CABLE

#363 — 4" x 24" w/o Bag
List - 280 Sale - 185

#362 — 4" x 24" w/Bag
List - 295 Sale - 198

#503 — 3" x 24" w/Bag
List - 510 Sale - 350

DELTA
#34-761F
UNISAW
with 1½ H.P.
Single Phase
XTRA SPECIAL
1250.00
DELIVERED

SUPER CORDLESS SPECIALS from BLACK & DECKER

Model	DRILL KITS	List	Sale
1930	⅜" rev/hi speed	165	110
1950	⅜" High Torque	165	110
5930	Reversible Hammer	179	120
1970	⅜ rev/hi torque screwdriver	179	120
1980	Rev/adj. clutch Scrudnlt	179	120

BRAND NEW! SUPER SPECIALS from MILWAUKEE

0214-1	⅜" c/less drive/drill	189	109
8975	H.D. heat Gun. 11.6A Low 570°F - High 1000°F	81	49
5920	belt sander 3x24 w/o bag	315	199
5925	belt sander 3x24 w/bag	315	215
5930	belt sander 4x24 w/o bag	326	209
5935	belt sander 4x24 w/bag	348	214

PORTER-CABLE = NEW ITEMS +

Model		List	Sale
655	Drywall Driver 0-4000 Rev	115	85
367	3¼" Plane 6.5A	170	115
5009	Mortise & Tenon Jig	50	34
351	3"x21" Belt Sander	189	125
352	3"x21" Belt Sander w/bag	199	135
9810	Cordless Screwdvr kit	175	115
320	Abrasibe Plane 3A	129	91

★★ROUTER RIOT★★ by PORTER-CABLE

Model		List	Sale
100	7/7 H.P. 6.5 amp	141	98
630	1 H.P. 6.8 amp	150	100
690	1½ H.P. 8 amp	194	130
691	1½ H.P. D-Hdle 8 amp	218	145
536	1½ H.P. Speedmatic Double Handle	300	190
537	1½ H.P. Speedmatic Cordless Handle	315	215
520	3 H.P. Production	460	270
518	3 H.P. Micropressor 5-sp	490	345
	TRIMMERS BY PORTER-CABLE		
309	3.8 amp laminate trimmer	130	90
310	3.8 amp laminate trimmer	190	135
312	offset base laminate trim	205	140
319	tilt-base laminate trim	215	150

★X-TRA SPECIALS★
MAKITA TOOLS

		List	Sale
6010DL	C/less Drill w/flashlight - charger & case	188	90
DP3720	⅜ drill Rev. 0-1800 rpm	99	47
6510LVR	⅜ drill Rev. 0-1500 rpm	144	67
6013BR	½" Drill rev. 8 amp	208	100
5402A	16" Circular Saw - 12 amp	542	315
2414	14" Cut Off Saw - 13 amp	338	169
3612BR	3 HP Plunge Router	338	175
9401	4x24 belt Sander w/bag	288	160

MILWAUKEE HAMMERS AT BLOW OUT PRICES

MODEL	DESCRIPTION	LIST	SALE
5343	[illegible]	550	360
5344	[illegible]	669	419
5347	[illegible]	595	375
5348	[illegible]	711	530
5332	[illegible]	1150	695

BOSCH TOOLS

		List	Sale
1581VS	Top Handle Jig Saw	225	126
1582VS	Barrel Grip Jig Saw	126	118
1604	1¼ H.P. Router	199	118
1942	Heat Gun 600°-900°	99	85
1272	3x24 Belt Sander	259	159
1272D	3x24 Belt Sander w/bag	274	169
1273	4x24 Belt Sander	274	169
1273D	4x24 Belt Sander w/bag	289	179

		List	Sale
101-084	Shop Helpers	79.50	69.00

★NEW LOW PRICES★
PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
#50	for ¼ Black Pipe	11.23	7.15	79.00
#52	for ½ Black Pipe	9.36	6.10	67.50

JORGENSEN HAND SCREWS

Model	Jaw Length	Open Cap.	List	Sale	Box of 6
#5/0	4	2	11.59	7.25	39.15
#4/0	5	2½	12.45	8.10	43.75
#3/0	6	3	13.36	8.50	45.95
#2/0	7	3	14.36	8.95	48.35
#0	8	4	15.97	9.95	53.75
#1	10	6	18.25	11.35	61.25
#2	12	8	20.94	13.60	72.95
#3	14	10	26.56	16.75	91.35
#4	16	12	34.55	23.75	128.25

JORGENSEN BAR CLAMPS
STYLE 37 — 2½" Throat ¼" x ¾"

Model	Jaw Length	List	Sale	Lots of 6
#3706	6	7.88	5.50	29.70
#3712	12	8.73	5.95	32.13
#3718	18	9.64	6.95	37.53
#3724	24	10.54	7.35	39.69
#3730	30	11.76	8.25	44.55
#3736	36	12.85	8.95	48.33

Who Has The Saws That Cut It Across The Board?
BLACK & DECKER of course!!!

Model	WORM DRIVE SAWS	List	Sale
3050	6½" 12 amp - 4600 rpm	247	169
3051	7¼" 13 amp - 4300 rpm	232	149
3052	8¼" 13 amp - 4300 rpm	247	169
	SUPER SAWCATS		
3047-09	7¼" w/brake - 12.5 amp	226	149
3048-09	8¼" w/brake - 13 amp	240	155
	BUILDERS SAW CAT		
3030	7¼" 13 amp - 5800 rpm	155	100
3035	8¼" 13 amp - 5800 rpm	175	125
3034	7¼" 13 amp - 5800 rpm	162	115
3033	6½" 13 amp - 5800 rpm	162	115
	JIG SAWS		
3157-10	var/sp orb action d/hdl	174	115
3153-10	var/speed 4.5A 0-3100	158	105
3159-10	2/sp orb action barrel grip	178	120
	CUT SAW KITS		
3103	2 sp 6 amp-2400 strokes	163	100
3105	vlsp 6 amp-2300 strokes	170	110
3107	vlsp orb 6A 0-2300 strokes	183	119
4300	Drill Bit Sharpener	289	205
1321	½" drill 450 rpm 6 amp	175	115
4010	Palm Sander	80	48
4015	½ Sheet Finish Sander	160	105
	DRYWALL GUNS		
2034	v.s.r. 0-4000 rpm	121	79
2037	v.s.r. 0-4000 rpm	139	89

"Door Openers" from MAKITA

9501B	4" Grinder Kit	119	55
2708	8¼" Table Saw	348	199
5007NB	7¼" Circ. Saw	158	94

MILWAUKEE BUY OF THE YEAR

Model 6365 — 7¼" Circular Saw
List $169.00 Sale $99.00
Lots of 3 — $289.00

Brand New • PORTER CABLE

Model 7548 Top Hdle Jig Saw
LIST 199 — SALE 129.95
Model 7648 Barrel Jig Saw
LIST 199 — SALE 129.95

PORTER-CABLE

		List	Sale
9548	HD v/s bayonet saw w/case	255	169
9627	2 sp. tiger saw kit 8 amp	193	130
9629	V/sp. tiger saw kit 8 amp	204	135
505	H.D. ½ sheet finish/sander	175	100
330	spd bloc sander ¼ sheet sz	87	54
304	Professional 7" disc sander	169	120
305	Professional 7" polisher	169	120
7511	¼" xtrahvy v/s drill 5.2 amp	164	115
7554	½" xtra hvy drill 8 amp	210	150
9652	Versa-Plane Kit	419	285
9118	Porta Plane Kit	289	190
	DRYWALL SHOOTERS		
7544	5.2 amp — 2500 rpm	158	105
7545	5.2 amp — 0-2500 rpm	158	105

AEG POWER TOOLS

Model		List	Sale
EZ 501	C/less Screwdvr **Brand New**	59	35
EZ 502	C/less Screwdvr 190 rmp	98	52
EZ 505	C/less Drill/Driver	139	79
EZ 506	C/less Electronic Dril/Drvr	159	94
EZ 581	C/less Caulk Gun var/sp	179	106
SCR1E	Drywall Screwgun 0-2000	125	74
SCR11E	Drywall Screwgun 0-4000	125	74
BE8RL	⅜" var/sp drill 3.8 amp rev	86	51
BE10RL	⅜" var/sp drill 5 amp rev	125	74
SBE401RL	½" Ham Drill vlsp n.d	88	52
SE2E13RL	½" Ham Drill 2 sp n.d	169	101
TC25E	Tech Driver vlsp 5 amp	150	89
PC70	7¼" Circular Saw 12 amp	157	93
VS130	Orb Sndr 20,000 OPM 1½ sh	75	48
VS260	Orb Sndr 25,000 OPM 1½ sh	156	88
VSS260	Orb Sndr 25,000 OPM w/bag	189	118
Hbse75S	Belt Sander vlsp 3"x21"	199	118
BSPE60	Jig Saw Orb vlsp 4.6A w/case	214	127
RSK600	Recip Orb Saw 10 amp	229	136
	ROTARY HAMMERS		
PHE 16 RL	3.8 amp ⅝" capacity in concrete	269	175
PH 210	5.2 amp ¾" capacity in concrete	398	260
PHE 20	Same as above — except var/sp 0-750	418	270
PHD 26	6.3 amp 1" capacity in concrete	495	320
PH 38	7.5 amp 1½" capacity in concrete	549	355

All above complete with cases

SKIL TOOLS

		List	Sale
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807	7¼" Skilsaw 13A-Super	153	100
808	8¼" Skilsaw 13A-Super	172	110
2016-02	⅜" Cordless Drill complete W/Charger Case & 2 batteries	199	95

Letters

I enjoy your newer format. Seems you are refining every issue or two and it does show. The color photos are a big help. Keep it up.

John Eller

I'm impressed. With release of the January/February 1987 edition of the "Journal", you have achieved another milestone — color. I'm particularly excited about Mr. Lydgate's jewelry box. I'd like to see more projects on that order.

J. Brant Pichon
Slidell, La.

I must write to thank you for the enjoyment I get from each issue of *The Woodworker's Journal.* Not much of a furniture man, lacking both the interest and the ambition, I prefer the shorter projects, particularly those that "do" something when completed.

The January/February 1987 issue, for me, has to be one of the best. Not only is it sharpened up by the addition of color, but it contains the kinds of projects I enjoy most.

I have already completed the Balancing Sawyer Folk Toy and the Canada Goose Mobile. Both perform perfectly, and the mobile is on display at the picture framing shop where I work part time — my boss insisted on it. I have also sent for the parts to build the door harp. My Christmas break has been productive and much fun, thanks in good part to *The Woodworker's Journal.*

Bob Wade
Bloomfield, Conn.

Yours remains the finest woodworking magazine I receive, but I was disappointed when I opened the January/February 1987 issue to see that it was in color. Sometimes "progress" is not beneficial and, like some of the old black and white films that have recently been color enhanced, the addition of color to *The Woodworker's Journal* detracts rather than improves.

Frank Gebbia
Medford, N.J.

I made the Old-Time Coffee Mill project as featured in the July/August 1986 issue. You listed Woodcraft Supply Corp. as a source for the mill mechanism, but I learned from them that it is no longer available. Can you tell me if there is another source for this part?

B. Willcox
Granada Hills, Calif.

The coffee mill mechanism can be ordered from The Woodworkers' Store, 21801 Industrial Boulevard, Rogers, MN 55374. It's part number F1130 and the current price is $16.95 each plus $2.50 shipping and handling.

The Shaker Oval Box project in your March/April 1986 issue is interesting. I particularly noticed the use of a 2 in. wide band clamp instead of a narrower one or some other method of holding the material to the form. A 2 in. wide band is wide enough for almost any size Shaker box.

I make Shaker-style boxes and carriers and have solved one problem with these clamps — the unwieldy length of the bands for this use. I have obtained shorter lengths of 2 in. webbing in lengths of 3 ft. to 6 ft. from a canvas supply firm. These are a little thinner than the regular bands, but thick enough for the band dogs to tighten on.

The carriers I make are in the shape of an ellipse 10¼ in. wide by 14½ in. long and 3⅜ in. high. Using hard maple, I resaw to ⅛ in. in thickness, and then surface plane (both sides) to 5/64 in. for this size carrier. I use #3 copper tacks which are ⅜ in. long and work well in this material, with ½ in. brass brads to fasten the bottoms. These are provided by Fasco Fastener Co., 2023 Clement Avenue, Alameda, CA 94501, Attn: Mr. Kevin J. Miller, Vice President.

Robert G. Ericson
Fresno, Calif.

Your November/December 1986 issue came in handy as I made two of the Cassette Tape Holders for my grandchildren. However, I didn't think much of the plans to use ½ in. lumber. It costs money to get ¾ in. thick stock planed down at a mill and most hobbyists don't have 6 in. planers.

I revised the plans and used all ¾ in. thick lumber. Also, since I was using pine, I felt it would be better to make the dadoes a bit deeper than 3/16 in. Rather than use a threaded insert, which I found tends to pull out of pine if too much tension is applied, I ran the rod clear through the top and put a cap nut on it.

Melvin Shurlow
Alpena, Mich.

The Router Table project in the November/December 1986 issue is a beauty. I modified it somewhat to make things more accessible when changing bits and the depth of cut. I placed the switch at the end rather than the front and hinged the top at the back.

Earl Watts
Konawa, Okla.

Editor's Note: *Several readers have advised us that we failed to include a dimension in the Victorian Sleigh project in our November/December 1986 issue. On page 49, the side view of the sleigh should show a dimension of 6¼ in. between the end of the runner (A) and the nearest leg (B).*

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	#06	1/2" R	1/2"	1½"	3/4"	19.00
		ROMAN OGEE				
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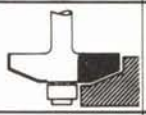
	#12	45° CHAMFER	45° Angle	1½"	5/8"	15.00
	#15	RAISED PANEL	20° Angle	1-5/8"	1/2"	25.00
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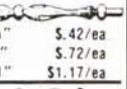
GALLEY SPINDLES 
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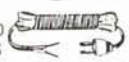
CORD SETS 
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Readers' Information Exchange

Looking for an owner's manual for an old band saw? Need a bearing for a hand-me-down table saw? Can't find a source of supply for an odd piece of hardware? Maybe our readers can help. Send along your request and we'll try to list it here — and hopefully one of our readers will have an answer for you. Due to space limitations, we will be unable to list all requests, but we will include as many as we can.

We need a source for the toothed wheel used for tilting the blade on our older 9 in. Magna bench saw, model 710.

Molly Dight
3008 E. Division, Mt. Vernon, WA 98273

Does anyone know of a saw sharpener capable of reconditioning an old dovetail saw?

Bruce Seaton
Rt. 1 Box 257, Camden, TN 38320

I have a Goodell-Pratt Co. Brest drill (pat. 1912, No. 246) with a broken half-moon shaped shaft key. The key is 1 in. long, 7/16 in. wide with a 1/8 in. screw hole at the top. How to fix or replace it?

Ralph Sheaffer, Jr.
14002 Arctic Ave., Rockville, MD 20853

I need a spindle return spring for a Beaver 16 in. drill press, model no. DP3700.

Earl Bolin
3715 Beech N.W., Johnstown, OH 43031

Owner's Manuals/Parts Lists Needed

Craftsman 10 in. table saw, model no. 103.24441 .....
George Roth
840 Essex St., Glendora, CA 91740

Sears 12 in. radial arm saw, model no. 113.29510 .....
Bernard St. Laurent
26 Oak Hill Rd., Pepperell, MA 01463

Crescent Machine Co. 12 in. table saw & 18 in. thickness planer .....
Billy Davis
42 El Cerro Mission Rd.
Los Lunas, NM 87031

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Ben Sticka
743 S. Main, Dickinson, ND 58601

Sprunger scroll saw, model no. J520 .....
John Reeves
1203 Huntcliff Way, Clinton, MS 39056

Sears 10 in. tilting arbor table saw, model no. 103.22450 .....
Michael Stern
3776 Hudson View St.
Mohegan Lake, NY 10547

Sears jigsaw, model no. 103.0402 .....
Joseph Hausele
RR 5 Box 288, Latrobe, PA 15650

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Events

We will be glad to list as many events of interest to woodworkers as space permits. Listings are free and may include shows, fairs, competitions, workshops and demonstrations. The issue closing date is the 1st of the 2nd month preceding the cover date (3/1 for May/June; 5/1 for July/August, etc.). Please address announcements to the Events Department.

New England:
Woodworking World — The New England Show, Apr. 24-26, Springfield Civic Center, Springfield, Mass.

National Working With Wood Show, Mar. 13-15, Sheraton Boxborough Inn, Mass.

Middle Atlantic:
The Olde Mill Cabinet Shoppe's upcoming seminars include: Chip Carving, Mar. 7; INCA owner's seminar, Mar. 14; Sharpening seminar, Apr. 4; INCA demonstration, Apr. 11. For info: Olde Mill Cabinet Shoppe, RD #3, Box 547-A, York, PA 17402. Ph. 717-755-8884.

East North Central:
The Greater Milwaukee Woodworking Show, Apr. 3-5, MECCA Convention Hall, Milwaukee, Wis.

West North Central:
The St. Louis Woodworking Show, Mar. 27-29, Chase Park Plaza Hotel, St. Louis, Mo.

The Minnesota Woodcarvers Assn. Annual Show, Mar. 14-15, Northtown Shopping Center, Blaine, Minn.

South Atlantic:
The Atlanta Woodworking Show, Mar. 13-15, Atlanta Civic Center, Atlanta, Ga.

The Florida Woodworking Show, Mar. 20-22, Florida State Fair & Expo Park, Tampa, Fla.

East South Central:
Woodworking World — The Memphis Show, Apr. 10-12, Memphis Convention Center Complex, Memphis, Tenn.

Scholarship applications for the Arrowmont School of Arts and Crafts are due by Apr. 1. For info, write to the school at P.O. Box 567, Gatlinburg, TN 37738, or call 615-436-5860.

West South Central:
Woodworking World — The Houston Show, Apr. 3-5, Houston West Convention Center, Houston, Tex.

The North Texas Woodworking Show, Apr. 24-26, Arlington Convention Center, Arlington, Tex.

Mountain:
Three-day woodturning workshop with Richard Raffan, Apr. 17-19. For info: Albuquerque Woodworkers Assn., P.O. Box 40407, Albuquerque, NM 87196. Ph. 505-835-0987.

Pacific:
National Working With Wood Show, Apr. 10-12, The Concourse, San Francisco, Calif.

The Northern California Woodworking Show, Apr. 10-12, San Mateo County Fairgrounds, San Mateo, Calif.

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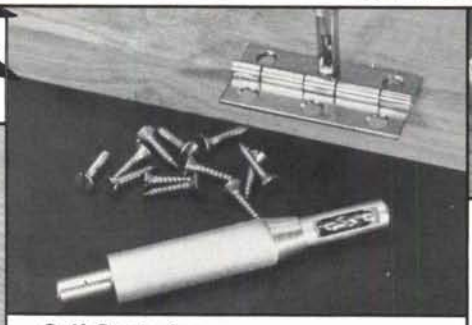

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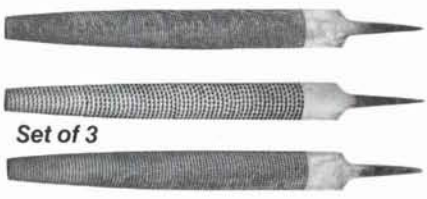

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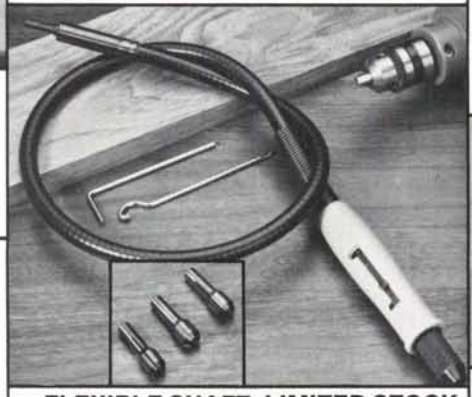

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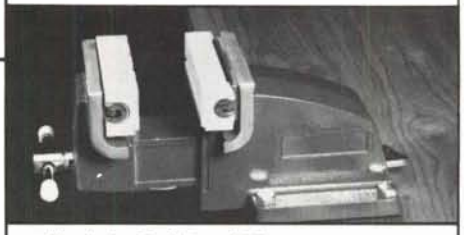

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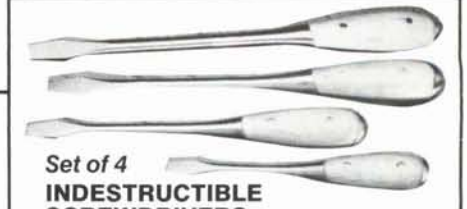

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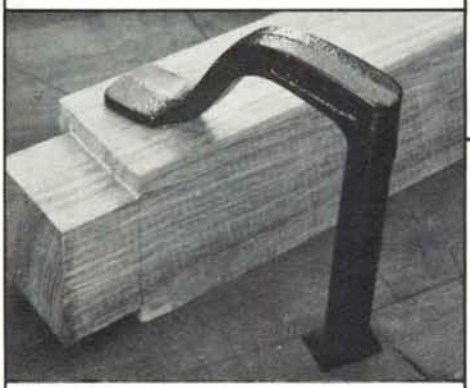
#8 & #9 screws	3/4", 1", 1 1/4", 1 1/2", 2" long
#10 screws	1", 1 1/4", 1 1/2", 2" long
#12 & #14 screws	1", 1 1/4", 1 1/2", 2" long

200-0125



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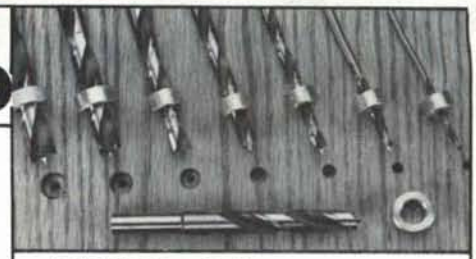

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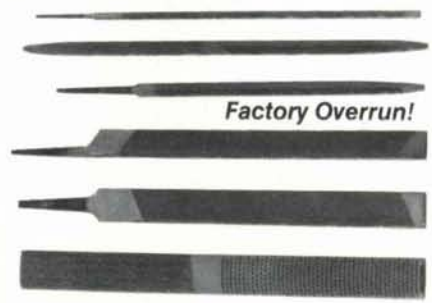

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How to Create a Direct Mail Promotion

Last issue we looked into the prospects of woodworkers/craftsmen marketing their work through direct mail. While the term "direct mail promotion" may sound overwhelming, there are different types of promotions to consider, some requiring no special skills or equipment. Here are brief reviews of three possible promotions.

Promotion #1: The simplest and least expensive promotion is usually one where you do most or all of the work yourself. A basic black and white flier on one side of an 8½ by 11 sheet of plain white paper can cost less than 25¢ per piece, including postage. You may use almost any medium to create the graphics, including felt-tipped marker, pen, pencil, typewriting, or hand lettering. We admit to having seen some very crude promotions over the years, so keep in mind that a neat, clean, professional looking job will reflect in a positive way on the quality of your work. Be sure to include pertinent information such as your place of business, telephone number, product, price and any other facts that will attract the interest of a potential buyer.

There are essentially two options for the actual reproduction of your promotion — photocopying and mimeographing. Expect to pay about 10¢ per copy for black-and-white photocopies on plain paper, and slightly more for the use of photocopiers with color capability. Mimeographed copies can cost as little as $20.00 per thousand or 2¢ each. High quality photocopiers will reproduce photos, however reproduction of photographs is not possible with mimeograph machines, which will reproduce only line drawings.

This bare-bones type of promotion is best limited to local mailings, and offers the craftsman who is just starting out an opportunity to get his feet wet in the business of promoting and selling.

Promotion #2: The next step up is to hire a print shop to create and/or print a promotion. While the per piece cost of anything up to one thousand pieces is usually prohibitive, with more than 1,000 pieces the per piece cost will drop significantly. Most craftspeople and artists take this route, which results in a relatively high quality product without major expense. The print shop will typically work at your direction, using photos and material you provide to create an attractive promotion. Their typesetting, composition, layout and printing capability will provide you with a professional looking final product. *Note:* typesetting, composition and layout may not be available at limited service "quick-print" shops.

A typical black-and-white self-mailer promotion, printed on both sides of 8½ by 11 gloss-coated stock, will cost about 35¢ each for 1000 pieces, with that per piece cost dropping to about 15¢ each for 5,000 pieces, and 10¢ each for 10,000

pieces, not including postage. Color will add to the cost as will other factors such as special setups and other in-house production costs. You can keep the final tab to a minimum by taking care of folding, stapling, addressing and stamping yourself. The dramatic savings in larger press runs is possible because the fixed costs of creating the initial promotion and the press setup are spread over a greater number of pieces.

Promotion #3: If you become successful on a large scale and want to market your products on a national basis, you may hire a company to take care of everything from the creation of the promotion through printing and mailing. Here you will need to take into account things such as the need for order forms, addressed return envelopes, metered postage and a host of other elements that only a professional service can adequately master.

Computer-generated mailing lists, the cost of printing, handling and mailing, sufficient product on hand to handle prospective orders, and packaging are but a few of the important considerations. Naturally, this requires a mail-order operation.

The concept may sound complicated, yet many small businesses have used mail order to build large and successful operations.

While few woodworking businesses ever reach the stage where they develop into full-scale nationwide mail-order operations, most full-time woodworkers who retail their products themselves will, on occasion, have need of printed promotions and price lists. On a recent visit to a major craft fair we found that nearly all the participants offered some form of printed promotion, many in 4-color. One word of caution, however, especially when dealing with color: be available for a "press proof" to check the accuracy of the color reproduction. Complaints of oak that looks green, cherry that looks too red, or padauk that's not red enough are common and not totally unexpected, since press operators usually have little knowledge of what color a specific wood should be.

As general advice, seek bids from several printers and look over samples of their work. Remember that it's better to start small, tailoring your product and the promotion as you gain experience, rather than starting big with large sums of money potentially at risk.

This article concludes our Workshop Income series. We hope our advice has helped some readers, and steered others seeking more detailed information in the right direction. There is no argument that promoting, marketing and selling are the most difficult, challenging aspects of running a small business.

To those readers who, after trying everything, have written asking why they still aren't succeeding, we would caution — don't miss the forest for the trees. The problem may be in the product. Examine it in an unbiased light and ask yourself the big question, "Is this really such a great idea?"

Next issue, we'll present the first article of a new feature titled "In The Shop". We're excited about this new series which will focus on tools and equipment. We plan to cover everything from stationary power tools to the smallest hand tools, including proper use, care, setups, problem solving and fielding reader's questions — a real "hands-on" column! WWJ

Finishing

Types of Finish — An Overview

As a discipline, woodworking comprises many separate elements and produces equally as many rewards. Some woodworkers enjoy planing and hand operations, others favor assembly and glue-up, some like ripping and cutting or router operations, while others take pride in mortise and tenon work and the smooth execution of a perfectly fitted joint. Whatever your personal preference, each skill is a distinct subject, an area of expertise, yet all these separate parts must be successfully integrated to produce a final product. One very important and often overlooked aspect of woodworking is the final step in the completion of most any project — the preparation of the wood surface and the application of the finish; in short, the finishing process.

In this, the first feature in our new series *Finishing,* we'll review the various types of common wood finishing treatments and briefly examine their advantages and disadvantages. Future articles will cover different aspects of the finishing process, from sanding, filling, and staining, through spray finishing and on to the finer techniques such as French polishing, chemical fuming, and the application of gold leaf. Where possible, features will take a "how-to" approach, and on occasion articles will be devoted to answering readers questions and solving common finishing and refinishing problems. We welcome your letters, comments and ideas.

In the broadest sense, a finish serves to provide a protective coating, and to enhance the beauty of the wood.

With little exception, woodworkers find the application of the final finish to be one of the more rewarding and satisfying aspects of the woodworking experience. This is the point at which the true color, pattern of grain, and the inherent beauty of the wood are revealed.

As we all know, the difference between an unfinished wood surface and that same surface with a finish applied, can be dramatic. Yet, while practically any finish will improve the appearance, the type of finish selected and its value for a particular application will depend on a variety of criteria, including the species of wood, the characteristics of the finish, and the intended use of the piece.

In the broadest sense, a finish serves to provide a protective coating and to enhance the beauty of the wood. While all finishing products will penetrate the wood to a degree, there are essentially two classifications of finishing materials: those that sit as a layer or layers on the surface of the wood,

such as varnish, polyurethane, lacquer, and shellac, and those that penetrate or are absorbed deeply into the wood pores, such as tung oil, linseed oil, and the many commercial blends of penetrating oils including Watco, Minwax Oil, and Formby's. As a further classification, based on the specific chemical processes by which liquids become solids (in other words, how the finishing material dries or hardens), all these finishes may be identified as either "chemically reactive" or "solvent release". Very basically, chemically reactive means that the finish hardens by means of a complex chemical reaction triggered by the absorption of oxygen at the surface. The so-called solvent release finishes "dry" or form a solid film through the process of evaporation. Shellac and varnish are solvent release materials, while all the other above mentioned finishing products fall into the chemically reactive category.

The Penetrating Oils

As a group, the penetrating oils are the easiest, most trouble free finish to apply. They are simply wiped or brushed on, allowed to soak in or penetrate, and then wiped off. There are no runs, drips, sags, brush marks, or dust problems such as are encountered with layered finishes. Several coats are usually needed to saturate and fill the wood pores at the surface, with the final appearance dependent on the number of coats applied and any buffing or waxing of the final coat. Penetrating oils harden the surface of the wood, making it less susceptible to damage, and since they do not sit on the surface, they are not liable to chip or flake. Penetrating oil finishes are also easy to renew, requiring only a fresh application to achieve that new look.

As a group, the penetrating oils are the easiest, most trouble free finish to apply.

Tung Oil: A natural oil derived from the nut of the Tung tree, tung oil is extremely hard, durable, waterproof, and is resistant to alcohol and common drink liquids. Processed or heated tung oil will polymerize when applied and produce an exceptionally fine finish. When it comes to protecting and enhancing wood surfaces while maintaining a natural look, as a group the tung oil finishes are considered the premier treatment. Most penetrating or tung oil blends contain a percentage of tung oil in combination with other ingredients to speed drying and improve or ease application.

Linseed Oil: In itself, linseed oil is a rather poor finish, being somewhat soft with low moisture resistance. Most linseed oil base finishes are actually combinations of linseed with other oils and additives to provide faster drying time, greater hardness, durability, and resistance to moisture.

Commercial Blends: Brands of penetrating oil such as Watco are usually mixtures of tung oil, linseed oil, resins, petroleum distillates, and other ingredients blended to provide the broadest combination of desirable characteristics such as durability, ease of application, degree of luster or gloss, fast drying time, and resistance to moisture and liquids. Special non-toxic blends of penetrating oils are recommended for use on toys, bowls, cutting boards, and wooden utensils.

The Surface Finishes

While they are generally more difficult to apply than penetrating oils, layered surface finishes are favored for certain applications. One of their primary advantages is that they are permanent, and need not be renewed regularly like the penetrating finishes. In addition, the protective "shell" these finishes form over the wood is in most cases extremely hard, durable, and impermeable. Several thin layers of a surface finish are usually preferable to one heavy coat. Application of surface finishes can be a challenge, however, with environmental factors such as humidity and dust often making the task more difficult.

Varnish: Modern varnishes are mixes of oils, synthetic resins, and driers. Among the many types of varnish are alkyd resin, which often contains tung oil, is fairly flexible, and makes a good finish for interior surfaces, and phenolic resin, which is very moisture and weather resistant and therefore is ideal for exterior use.

Polyurethane: Although a type of varnish, polyurethane is actually closer to a true plastic. Commercial blends of polyurethane typically include drying agents, oils, or alkyd resin to improve flexibility and speed drying. While they all protect well, polyurethanes are generally not the first choice of professional woodworkers for use on fine furniture.

Lacquer: Modern lacquers are blends of synthetics, usually nitrocellulose dissolved in solvents, with the addition of a plasticizing agent. Since lacquer is fast-drying, three or more coats may be applied in the same time it takes to apply a single coat of varnish. Lacquers are hard, abrasion resistant, and impervious to water, alcohol, heat, and mild alkalies and acids. They dry completely clear, do not alter the color of the wood or stain, and may be rubbed or polished to achieve varying degrees of gloss. All these factors, together with their fast drying time, make lacquers the professional and industry choice for finishing.

Shellac: Like lacquer, shellac is a solvent release finishing material, and therefore has a fast drying time. Processed from the hand-gathered deposits of the lac bug (tachardia lacca) found in India, shellac is very hard and can be either rubbed to a high gloss or "French polished". Since its solvent is an alcohol base, however, shellac is liable to be dissolved or damaged by spillage of alcoholic drinks. Also, water left on the surface will turn the affected area a milky white. Although it was the preferred finish for many centuries, these problems, coupled with a relatively short shelf life and the fact that a superior finish can be obtained with modern lacquers, has limited the use of shellac today largely to antiques or authentic antique reproduction work. WWJ

Next Issue: Penetrating Oil — The Natural Approach To Wood Finishing

Woodworking Basics

The Mortise and Tenon, Part II

Last issue we reviewed the mortise and tenon, examining the various types of mortise and tenon joints, how they work and their applications. This issue, as promised, we'll present a simple, sensible, reliable method for cutting the common blind mortise and tenon.

Now this may sound easy, but just how to approach the topic has been the subject of considerable discussion here. It is a generally acknowledged fact that every woodworker has his own system for cutting the mortise and tenon, and we would agree that there is no categorically right or wrong way. The system that works for you is best.

However, woodworkers just starting out are often frustrated in their first attempts at mortise and tenon work. Frankly, using a backsaw and chisel to accurately establish the tenon shoulders and chop out the mortise is not something that comes easily after a day or even a week of practice. Years of familiarity and experience with hand tools are required to attain the skill level needed for consistent, accurate results with hand cut mortise and tenon joinery.

With these facts in mind, as noted earlier it was our intention to present a clear, uncomplicated, simple, sensible, reliable method to produce effective mortise and tenon joints. We believe that the following step-by-step instructions fulfill this promise. While *The Woodworker's Journal* project plans typically show square-edged tenons for clarity and ease of illustration, the rounded tenon is much easier to cut and fit, and can be substituted in most situations requiring a blind tenon. Naturally, various other types of exposed mortise and tenon joints, where the joint itself is an important visual element (such as slip and bridle joints and keyed tenons) need to retain their square-edged look for proper appearance.

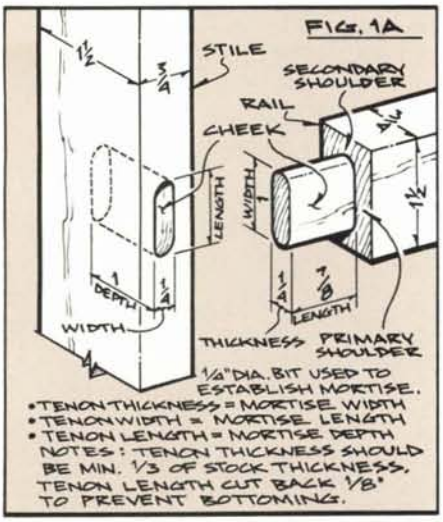
The accompanying illustrations show a ¼ in. thick tenon and corresponding mortise that can be used when working with ¾ in. thick stock (see Fig. 1A), such as in frame and carcase construction. The length and width of the tenon will depend on the width of the stock. By increasing the size of the drill bit used, the same step-by-step technique can be used with various other stock thicknesses. For example, with 1 in. thick stock use a ⅜ in. diameter drill bit to make a ⅜ in. wide mortise, and with 1½ in. thick stock use a ½ in. diameter bit (Fig. 1B). Remember, the diameter of the drill bit establishes the width of the mortise. As a rule, the width of the mortise and therefore the thickness of the tenon should be approximately ⅓ - ½ the overall stock thickness. It is important that all stock be accurately thickness planed for the parts to fit up properly.

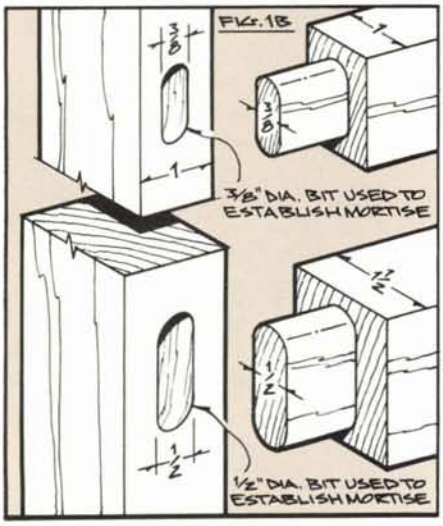
The Mortise

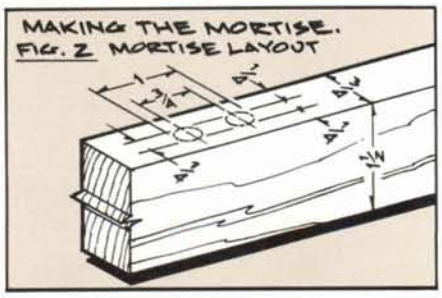
From a practical point of view, it is easier to create the mortise first and then size the tenon to fit it, rather than the other way around. While the deeper the mortise and the longer the tenon, the greater the glue area, blind mortises should extend no more than ⅔ of the stock width.

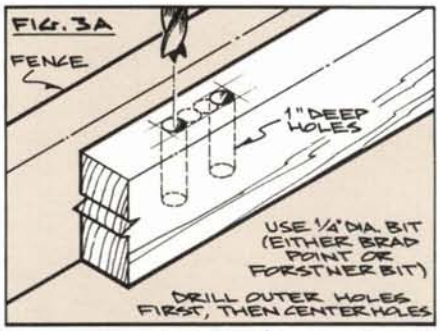
Step 1 — Laying Out: Determine the mortise size. Fig. 2 shows the mortise layout for the Fig. 1A illustration, where all stock is ¾ in. by 1½ in. As shown, a ¼ in. wide by 1 in. long mortise will leave a ¼ in. shoulder. Since we will be using a ¼ in. diameter bit to rough in the mortise, it is important to lay out the centerpoints of the two outside holes so that the actual mortise length is 1 in. As indicated, this requires that the centerpoints be exactly ¾ in. apart.

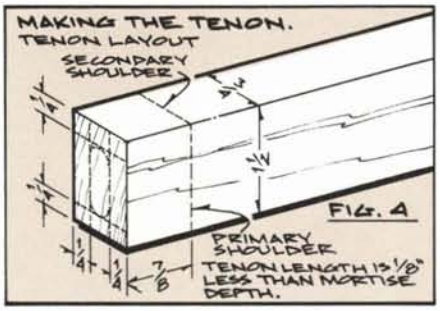
Step 2 — Clamp a fence to the drill press table so that the centerpoint of the drill bit is centered precisely on the stock. Now, using a scrap piece of the same stock, make a shallow test hole, then reverse the scrap piece and again lower the bit into the same hole to insure that fence alignment is perfect. If the holes are not centered across the thickness of the stock, the parts will not assemble with their faces flush. As shown in Fig. 3, the two outer holes are drilled first, with several holes then drilled between to clean out the bulk of











the stock. Note the use of a brad-point twist bit, or a Forstner bit to cut a clean, flat-bottomed hole. Standard V-cut drill bits tend to wander, will not cut a flat-bottomed hole and are therefore not recommended. For this particular mortise, the drill press depth stop is set to cut a 1 in. deep hole, which is equal to ⅔ the width of the stock.

Step 3 — As shown in Fig. 3B, a sharp chisel is now used to clean up the cheeks of the mortise. Carefully pare away the remaining waste, keeping within your scribed layout lines. Hold the chisel vertically to avoid undercutting and thereby enlarging the mortise. Remember, a loose-fitting, sloppy mortise and tenon will not provide a strong glue joint or a good mechanical connection.

The Tenon

The tenon is cut to fit the mortise, enabling you to adjust for any inconsistencies. While the tenon shoulders may be cut by hand using a backsaw, we prefer the table saw and dado head method, which produces more consistent, accurate results. Generally, the accepted procedure is to cut the primary shoulders or cheeks first, and then the secondary shoulders.

Step 1 — Laying Out: Mark for the primary and secondary shoulder cuts. The length of the tenon is best set at just a shade under the actual mortise depth. This will insure that the tenon

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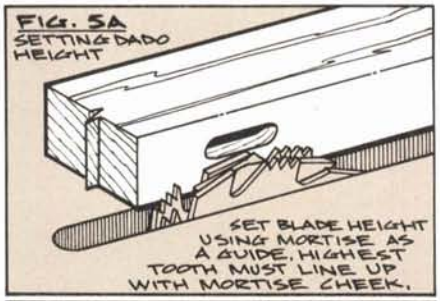
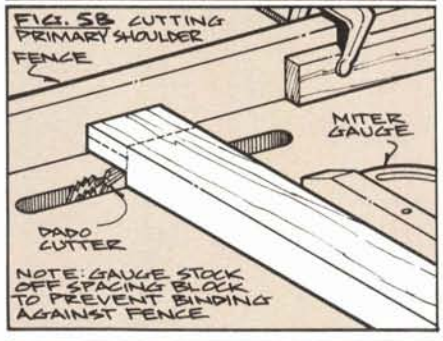
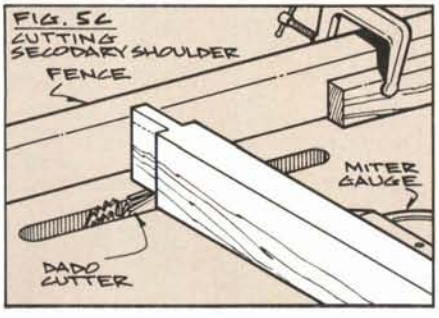
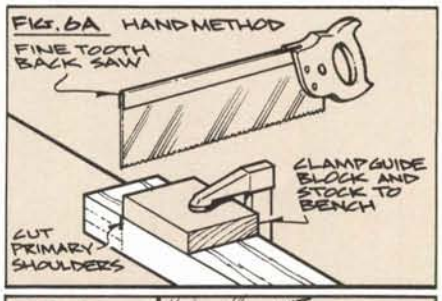
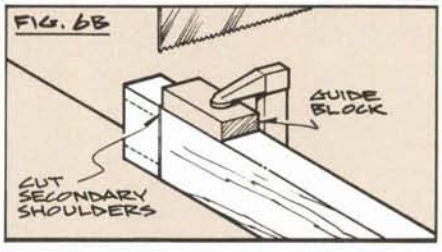








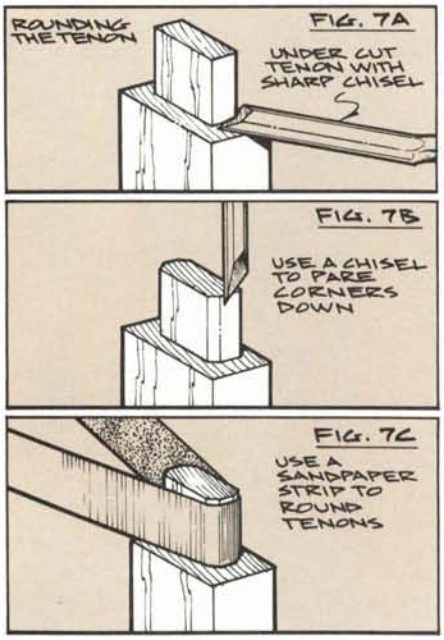


fits up snug, and is not held off by a pocket of glue or some stray sawdust forced into the bottom of the mortise. Also mark out the tenon on the end of the stock (Fig. 4).

Step 2 — Use the dado head to cut the shoulders. Where the tenon is centered and both mortise and tenon stock are the same thickness, you may set the dado head height using the mortise as a guide (see Fig. 5A). Fig. 5B shows the table saw and dado head being used. Several passes may be needed depending on the tenon length. Then flip the stock over and cut the opposite shoulder. Next, with the stock on edge, again use the dado head to establish the secondary shoulders (Fig. 5C), flipping the stock to the opposite edge for the last shoulder cut. Since our tenon had the same ¼ in. shoulder all around, no resetting of the dado head height was necessary.

As shown in Figs. 5B and 5C, a spacing block is used to gauge the shoulder cuts. Once the spacing block is properly set up, all the shoulder cuts will be the same. We recommend this set-up since making the shoulder cuts with the end of the stock rubbing the fence could result in the stock twisting and being caught by the blade and thrown back. As an added safety measure and to prevent chip-out at the shoulder where the blade exits the cut, you may wish to employ a wood extension screwed to the miter gauge.

As noted earlier, with this tenoning technique it is vital that your stock thickness be consistent. If, for example, in a typical ¾ in. thick frame and panel one rail is only $^{11}/_{16}$ in. thick, then the tenon on the $^{11}/_{16}$ rail would also be $^{1}/_{16}$ in. less, or $^{3}/_{16}$ instead of ¼ in. thick. Obviously, the $^{3}/_{16}$ in. thick tenon would not make for a snug or strong fit in the ¼ in. wide mortises in the stiles, nor would the stock faces fit up perfectly flush. Accuracy is always important in woodworking, but nowhere is it more critical than in joinery in



general, and mortise and tenon work in particular.

If you prefer cutting the tenon by hand, make all the shoulder cuts first, as shown in Figs. 6A and 6B. Then rip cut the cheeks and secondary shoulders, as shown in Figs. 6C and 6D. Remember that all saw cuts are on the waste side of the stock, with the saw blade just nicking through the marked line. Try out the technique on some scrap stock first to gain experience before committing your project stock. Since this hand method requires good control of the backsaw for your cuts and therefore the tenon to be accurate, we strongly recommend the dado head method. If you prefer the hand method, remember that a sharp, fine-tooth backsaw will produce the best results.

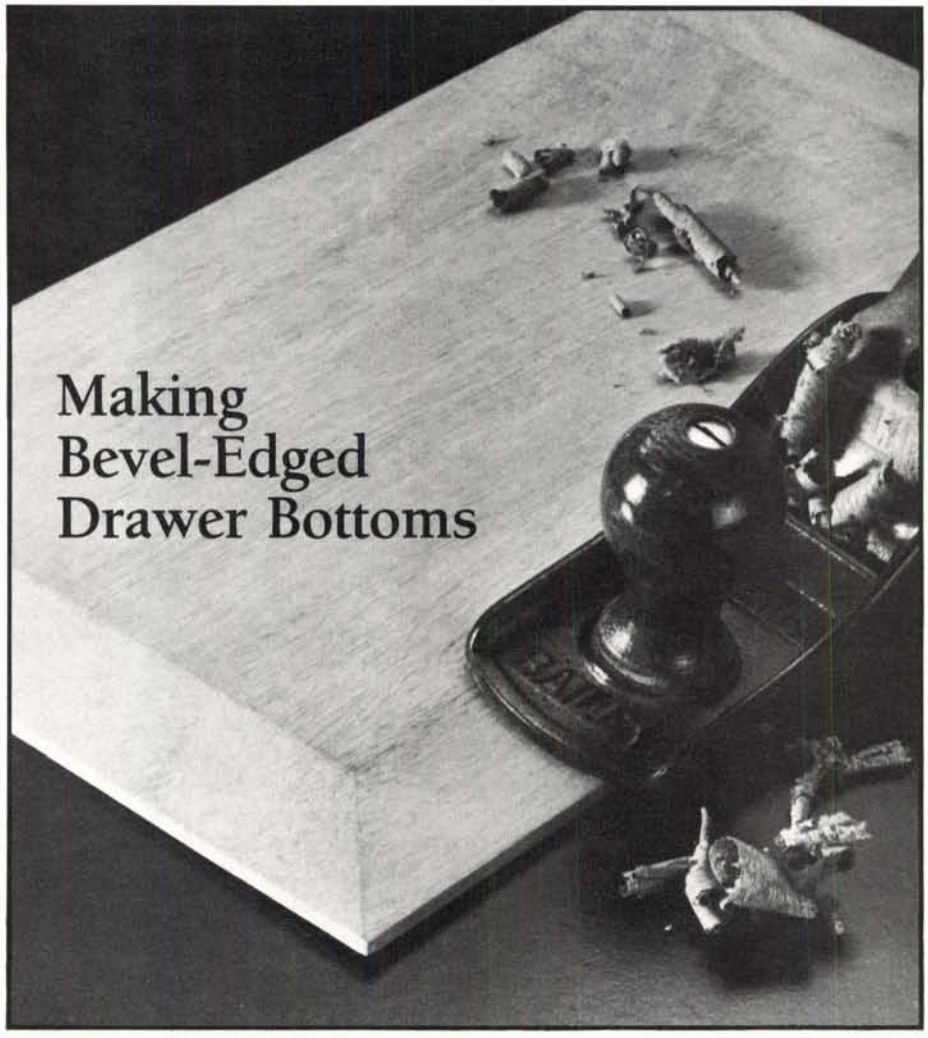
Step 3 — Whatever method you use to cut the tenon, the edges of the tenon must now be rounded to match the rounded mortise. This is a simple operation requiring only the chisel and some sandpaper. Undercut the tenon edges as shown in Fig. 7A, then pare these edges down with the chisel (7B), and finally use the sandpaper to round the tenon to match the radius of the mortise (7C). A rasp can also be used to round the edges, though the chisel and sandpaper technique produces superior results. Take care that you only radius the edges and do not remove any material that will affect the width of the tenon. The tenon width was established earlier in Step 2, and any shortening of this dimension will affect the fit of the tenon, resulting in a weaker, less stable joint. It is better to remove a little less material, test fit and then final size the tenon rather than attempting to remove all the material at once. A sharp chisel can be used to pare the tenon cheeks slightly if the fit is too tight.

Tips: When laying out both the mortise and tenon you may use either a marking gauge or a machinist's square and a *sharp* pencil. The sharp pencil is important since a thick pencil line can result in an inaccurate cut. Once you learn to use it, you will find the marking gauge, which is very accurate, to be an especially handy tool. For those who do a lot of mortise and tenon work, a special tenon marking gauge with two scribing spurs is recommended.

Note: Where a tenon or mortise is off-center, or when the mortise and tenon stock are of different thicknesses, use the old method of identifying all face sides of the stock with an X, and gauging work off the X side. Using an X to identify the face side of all members, no matter what technique you use, will help eliminate confusion later during assembly.

The Final Fit: An accurate fit of the mortise and tenon is obviously important, but first-time woodworkers often pose the question, "What is a good fit?" An ideal fit is one where the tenon can be hand-fitted into the mortise with very little resistance. A fit where the tenon slides easily into and out of the mortise is also acceptable so long as there is no slop. The application of glue will usually slightly swell the wood surfaces, providing a tight fit. The tenon should never fit so tightly that it must be hammered or forced into place, however. Such a situation will probably result in the mortise stock splitting and ruining the piece. Finally, the shoulders of the tenon should be fully seated flush against the mortise stock. Do not apply too much glue (a common mistake) since the excess glue will be forced into the bottom of the mortise, creating hydraulic back pressure that could prevent the tenon shoulders from fully seating. WWJ

Special Techniques



Making Bevel-Edged Drawer Bottoms

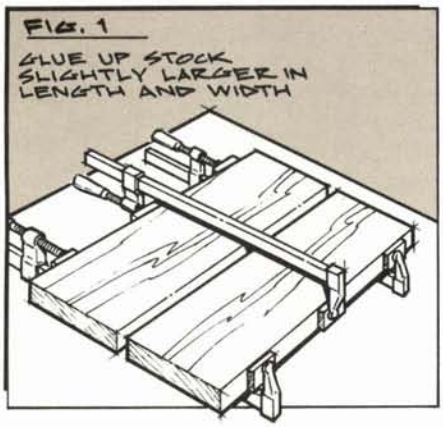
In the world of furniture construction and woodworking, as elsewhere, time and progress march inexorably forward. New ideas, new techniques, and new products are forever appearing. Plywood, one of the most significant "new" products, was actually first developed and used in the 1870's although it did not come into widespread use until after World War II.

Plywood solved many wood movement and construction problems, and its exceptional strength vs. thickness ratio made it an ideal substitute for many parts that were previously made from solid stock. One of the most common uses of plywood in furniture construction is for drawer bottoms.

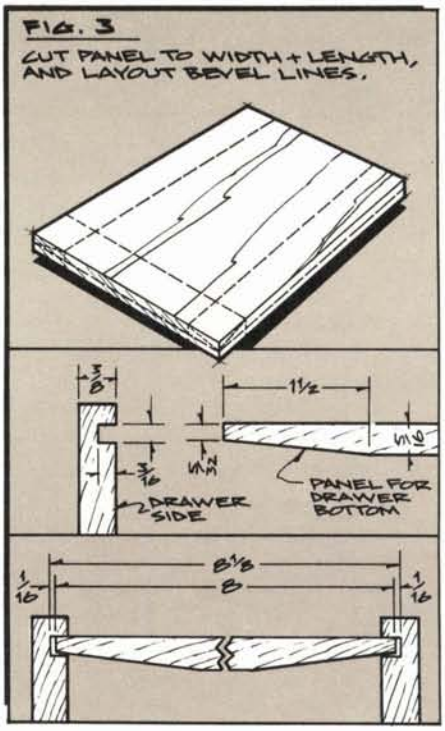
While there is nothing wrong with using plywood for drawer bottoms, the use of plywood in authentic period or reproduction pieces sometimes seems inconsistent with the intent of such work. Truly authentic work should be authentic throughout, right down to the last detail. When you are showing off a reproduction of a Colonial period chest, for instance, the appearance of 20th-century plywood in what is supposed to be a 17th-century piece can be disconcerting.

No doubt, the recent popularity of Colonial, Early American, and Shaker style furnishings has gone a long way toward reviving the nearly forgotten skill of hand planing bevel-edged drawer bottoms. This trend, coupled with the fact that the exquisite Shaker sewing desk (pages 27 through 32) displayed such handcrafted drawer bottoms, served as inspiration for covering this "old method" special technique.

The actual step-by-step technique of



using the smooth plane to make bevel-edged drawer bottoms is quite simple, the smooth plane being fast and a joy to use. While you may wish to take a little extra time laying out, marking, and getting everything just right, accomplished craftsmen of old probably spent no more than five to seven minutes at the most planing a single drawer bottom, relying on their experience rather than pencil marks and guide boards to achieve the proper bevel.



Start by edge-gluing sufficient stock to obtain the width required for the drawer bottom (Fig. 1). As with all edge-gluing operations, it's best to make the rough panel slightly wider and longer than necessary, then rip and crosscut it to final size after the glue-up and thickness planing.

Next, if the stock is not already planed to the final desired thickness, you will need to hand plane it down. This was the case with the $\frac{5}{16}$ in. thick Shaker sewing desk drawer bottoms. As shown in Fig. 2A, after clamping the stock securely using the bench dogs and vise, start by planing on a slight diagonal. With the plane iron set for a maximum cut, the diagonal slicing action of the plane will quickly remove the material. When you have reached the approximate final thickness, reset the plane iron for a shallow cut and plane with the grain (Fig. 2B) to final smooth the surface. *Note:* Secondary stock, often containing some knots, may need to be planed from several directions to avoid tear and chip out around the knots.

Now cut the panel to final length and width, and lay out the bevel lines. However, be sure to consider seasonal, environmental, and stock moisture

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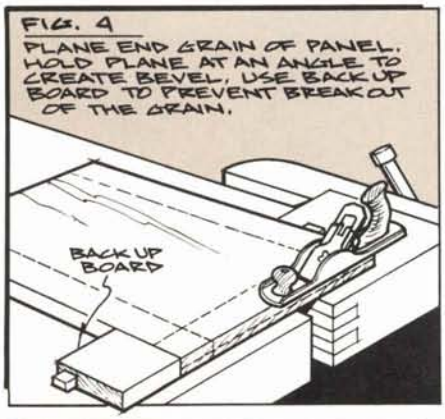

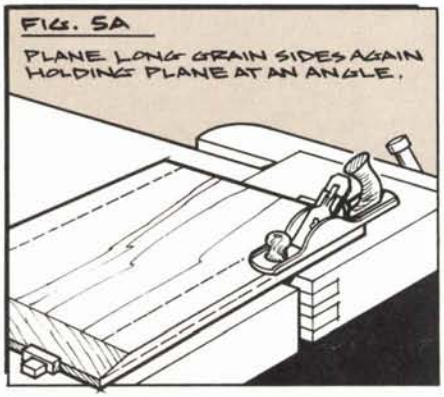

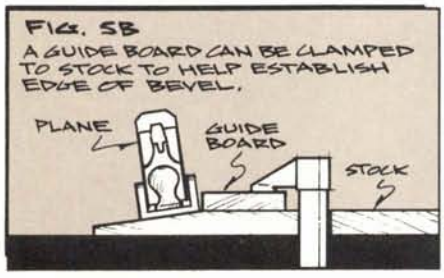

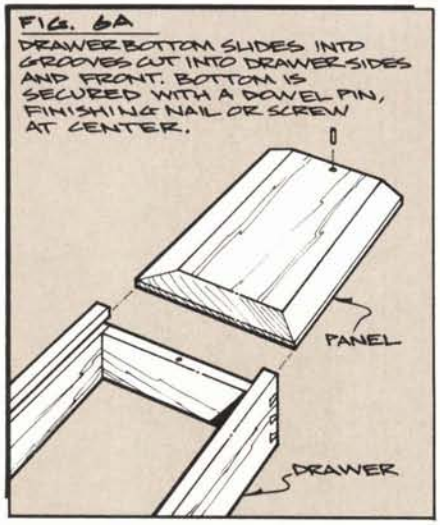

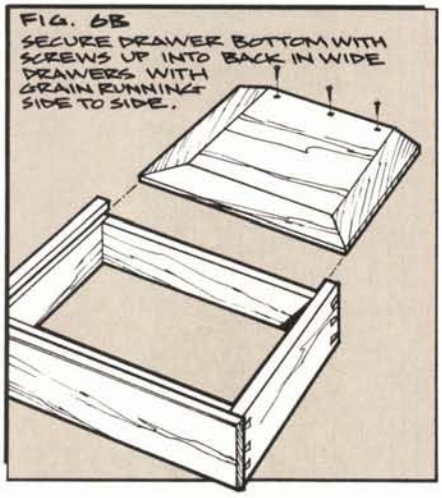

content factors when determining overall width (the measurement *across* the grain). For example, with a kiln-dried panel that is acclimated and installed during the summer, a time of relatively high humidity, there is no need to allow for expansion. Therefore, the panel width may be cut to fit the actual groove-to-groove dimension. In the Fig. 3 illustration, where the groove-to-groove distance is 8⅛ in., this would mean that the panel can also be cut about 8⅛ in. wide. The same kiln-dried panel installed during the low humidity winter months, however, must be sized to accommodate the inevitable expansion that will occur *once relative humidity* increases in the spring and summer. As shown in Fig. 3, across a width of about 8 in., at least 1/16 in. should be allowed on either side for expansion of the panel. With wider panels, try to allow a little more. Remember, taking wood movement into account and allowing for it will eliminate the problems of cracking and splitting that once plagued solid stock bottoms, and will prevent the drawer bottoms from dropping out or forcing the drawer carcase apart. As always, use only kiln or fully air-dried and acclimated stock.

Fig. 3 shows a typical drawer groove and panel bevel layout for the Shaker sewing cabinet. Note that the groove is usually half the drawer side thickness, and as wide as it is deep. Note also that the drawer bottom bevel tapers to about 1/32 in. *less* than the groove width. This is necessary to allow the beveled edge to fit into the groove. In a drawer with ½ in. thick sides and bottom, the bevel would taper to about 7/32 in. to fit into a ¼ in. deep by ¼ in. wide groove. A 1½ in. wide bevel is typical of most drawer bottoms, though this dimension can be altered if desired.

Now clamp the drawer bottom panel in place with a backup board (Fig. 4) to establish the end-grain bevel. The end-grain bevel is always cut first, since any tear out of the grain that might occur will probably be removed when the long grain bevel is cut next (Fig. 5A). Hold the plane at the approximate bevel angle, start at the edge, and work down to the desired final point. As shown in Fig. 5B, a guide board can be clamped to the stock to help establish an even bevel.

As we noted earlier, while this step-by-step technique will help you produce a good quality beveled drawer bottom, craftsmen of old simply established the bevels by eye. After a few tries, you too should be able to use the plane effectively without preliminary layout. The best procedure is to rough in the bevels, then test fit the bottom, and fine tune as needed. While the bevel angle and edge thickness will depend on the stock thickness and the width and depth of the groove, as a rule of thumb the drawer bottoms should fit fairly tight in summer and a little loose in winter.

Traditional drawer construction utilizing solid stock bottoms has the bottom being slid in from the back, and then fixed in place with pins, screws, brads, or glue. As shown in Fig. 6A, where the drawer is *deeper* than it is *wide,* you will want to run the grain of the bottom front-to-back. Where drawers are *wider* than they are *deep,* however, as shown in Fig. 6B, the long grain will run side-to-side. In the Fig. 6B arrangement, remember that the groove in the drawer front must accommodate whatever expansion/contraction may occur in the bottom. Use several screws or brads to reinforce the back edge, as illustrated, for added strength.

Note that the same general technique for applying a beveled edge to solid stock is also used to bevel the edges of the contemporary hall table on pages 50 though 52. WWJ

Shaker Sewing Desk

This fine example of a Shaker sewing desk was measured and photographed at Hancock Shaker Village in Hancock, Massachusetts. On the original, the legs and various frame members were made from maple, while the panels and drawers were made from pine stained a deep red. As a final finish, the Shakers used a clear varnish on the entire piece.

We included Fig. 1 in the artwork to show the basic framework of the piece. In order to show it with a minimum of confusion, we did not include the various panels, drawers, runners, guides, etc. The basic framework with all these parts added on is shown in Fig. 8. The point to keep in mind is that Fig. 1 is not intended as an assembly drawing; in fact, when the basic framework is glued-up later on, the panels must be assembled as part of that framework.

The two front legs (A and B) and the two back legs (C and D) can be made first. Rip stock to 1½ in. square before cutting each leg to the length shown in the bill of materials. Using the lathe, turn the bottom end of each leg to the dimensions specified in the turning detail. As indicated in the front elevation, note that the turning starts at a point 8¼ in. from the leg bottom.

Next, lay out the location of the various mortises that will need to be cut in each of the legs. To locate the mortises and to determine the dimensions of each one, you'll need to refer to the four elevation drawings in addition to Figs. 1 and 2. Lay out the mortises with care and double-check the size and location of each one. One miscalculation can ruin all the previous work *that went into the leg.* Once you are satisfied with the layout, use a sharp chisel to chop out each mortise. Later on, after the framework is dry

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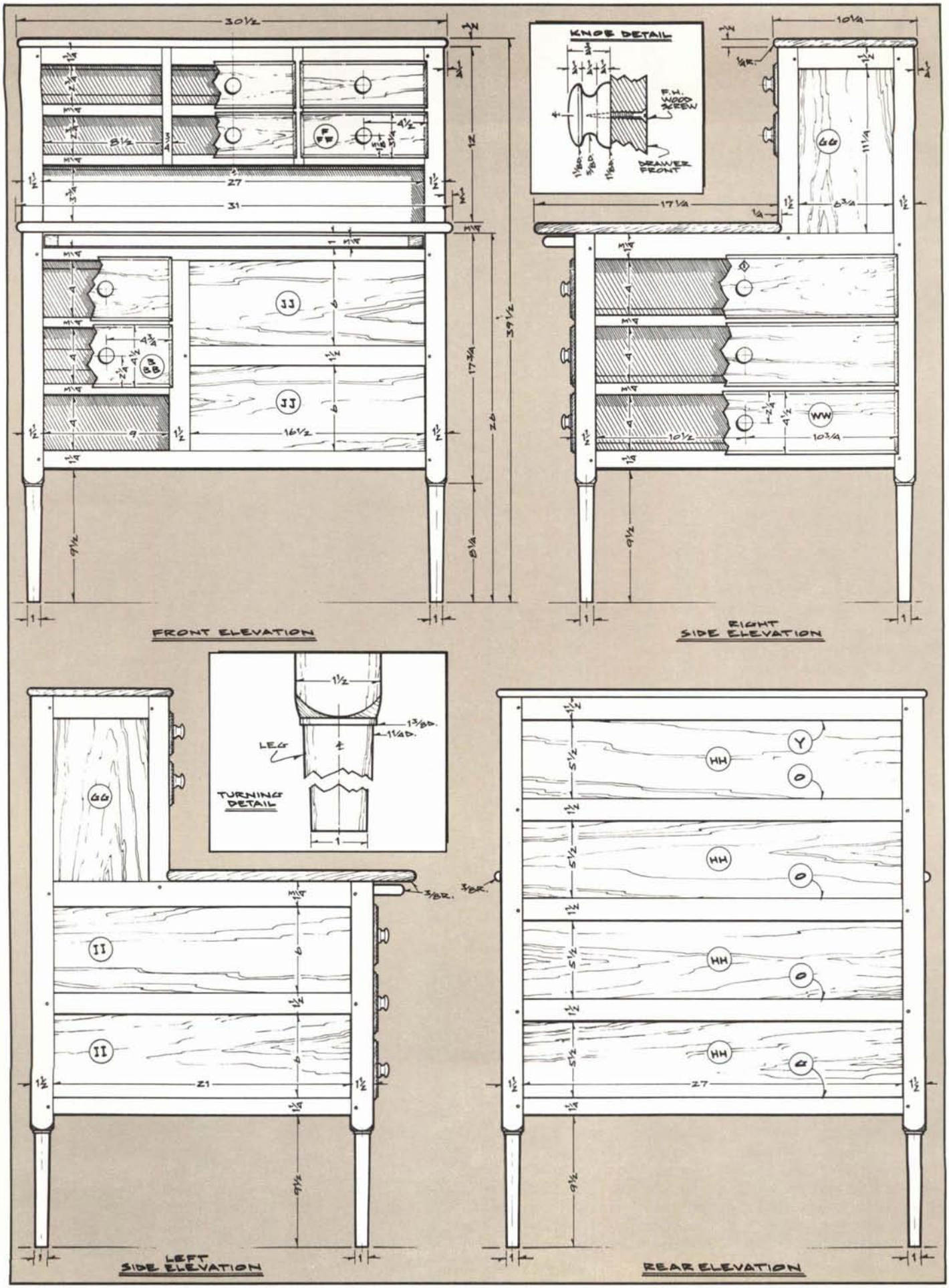
FRONT ELEVATION
KNOB DETAIL
RIGHT SIDE ELEVATION
TURNING DETAIL
LEFT SIDE ELEVATION
REAR ELEVATION

assembled, you'll need to lay out and cut additional mortises for parts DD, MM, and PP (see Fig. 8), but for now you will not need to deal with them.

Referring to Fig. 1, note that the legs have a ¼ in. deep by ¼ in. wide groove cut to accept the panels (see panel section-typical). Lay out the various groove locations on the legs, then use the router or, better yet, a router table to make the groove cuts. Use a ¼ in. straight bit and make the cut in two passes, with each cut removing ⅛ in. of stock.

Next, rip stock to thickness and width for parts E through Z plus BB (see Figs. 2 and 4). Refer to the bill of materials for the cut lengths of all these parts. Note that the lengths include a tenon or tenons to all these parts. Parts P, T, and U have a tenon on only one end, while all others have a tenon on each end. At this point, it would be a good idea to label each piece with its proper part number — it will come in handy later on.

Now, referring to the elevation drawings and to Figs. 1, 2, and 4, lay out the location of the various mortises in each of the parts. As with the legs, lay out each mortise with care and double-check the size and location of each one. Once all the mortises have been chopped out, cut the ¾ in. wide by ½ in. deep notches in parts V and W to accept parts AA.

The tenons can best be cut using the table saw with a dado head. Use a spacing block to establish the ½ in. tenon length (see page 22, Fig. 5B for a typical set-up) and set the dado head to make a ¼ in. deep cut. Make all the ¼ in. shoulder cuts first using Fig. 2 as a guide. Once all the ¼ in. deep cuts are made, raise the blade to ½ in. and make the ½ in. deep shoulder cuts.

Refer to Figs. 1 and 2 to lay out the location of the various ¼ in. deep by ¼ in. wide grooves. Cut them in the same manner used to cut the grooves on the legs.

Next, make parts AA (Fig. 7) and the four parts CC (Fig. 6). Use the dado head to cut the notches in parts AA and the tenons on each end of parts CC.

You'll need ⅜ in. thick stock to make the panels (parts GG, HH, II, and JJ). Most lumberyards don't carry ⅜ in. material, so you'll need to start with thicker stock and reduce it. Some lumberyards have thickness planers and are willing to plane stock to any thickness for a nominal charge. If your

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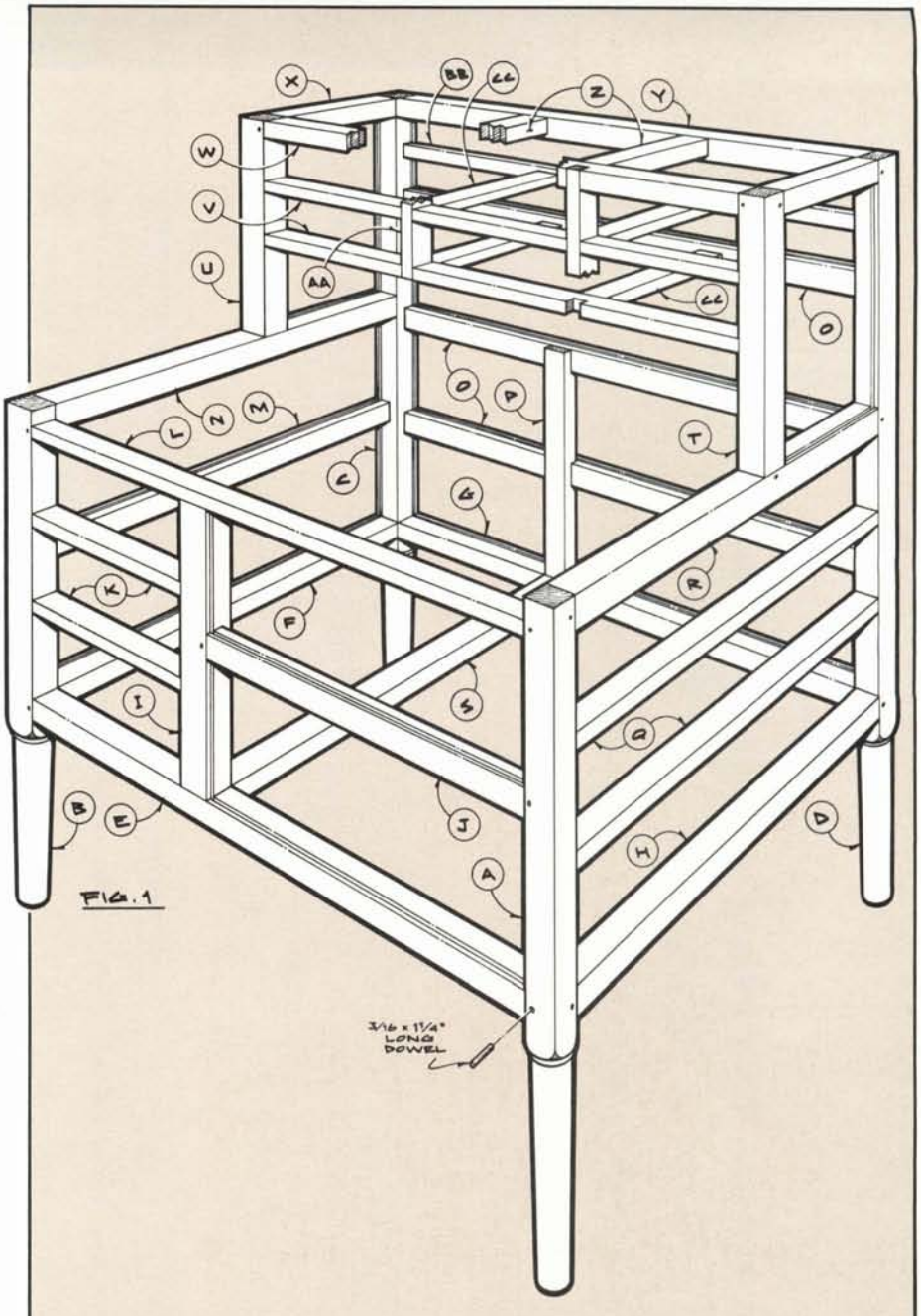
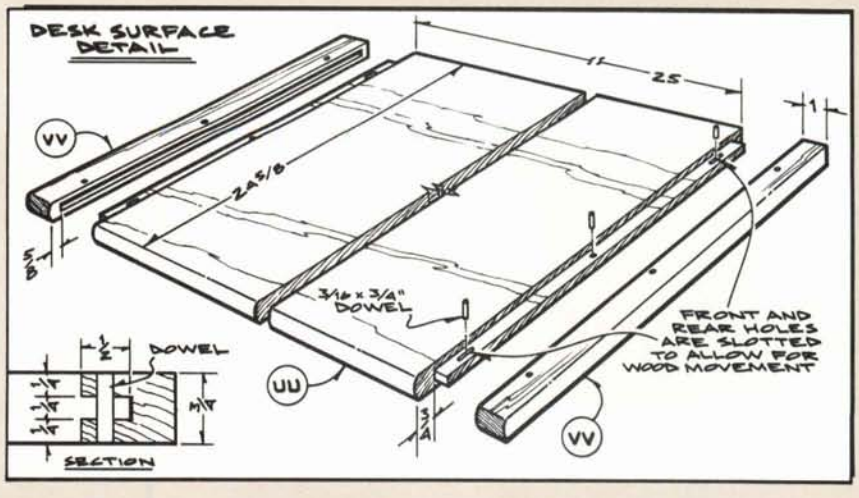
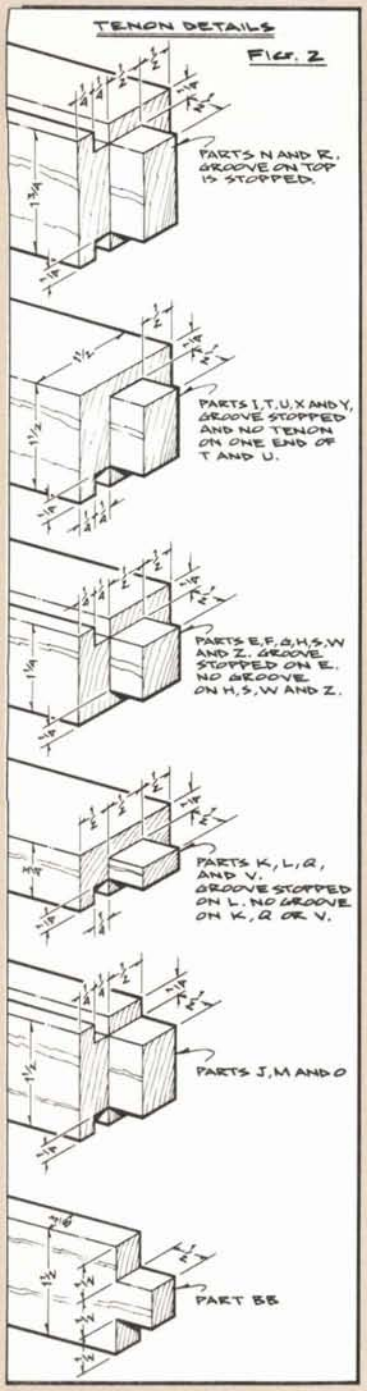
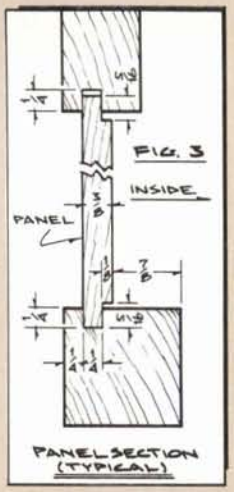
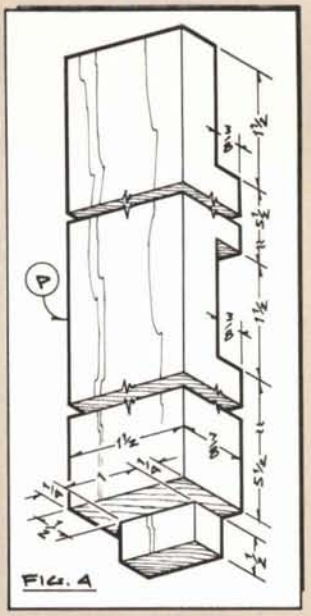
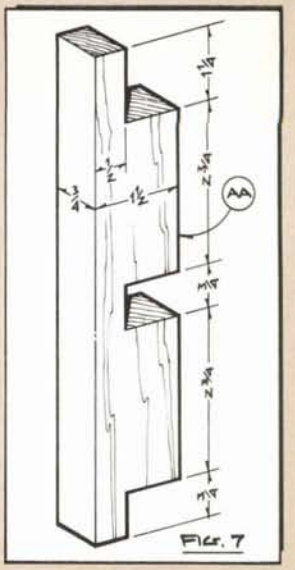


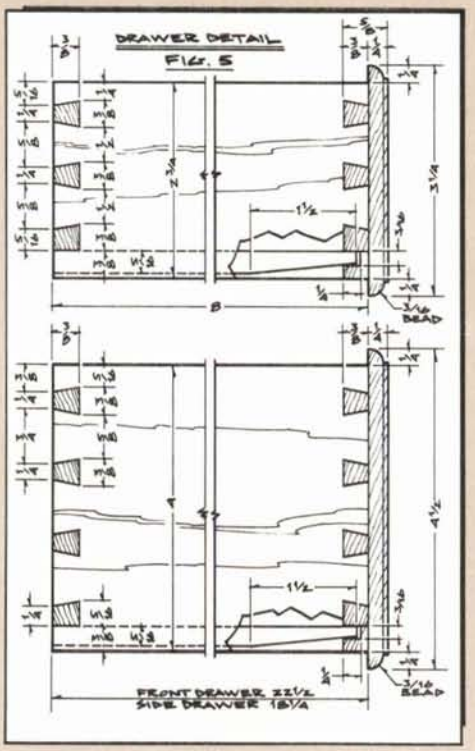


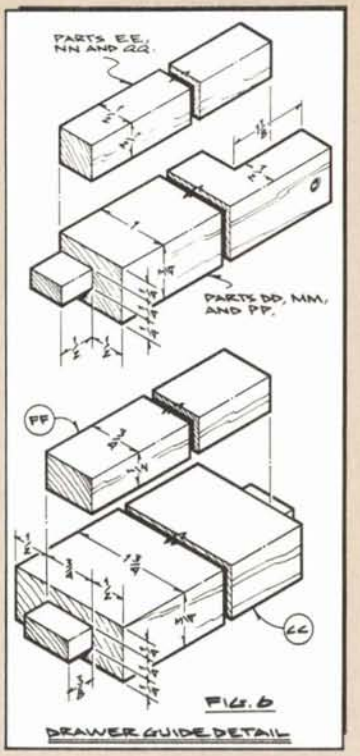








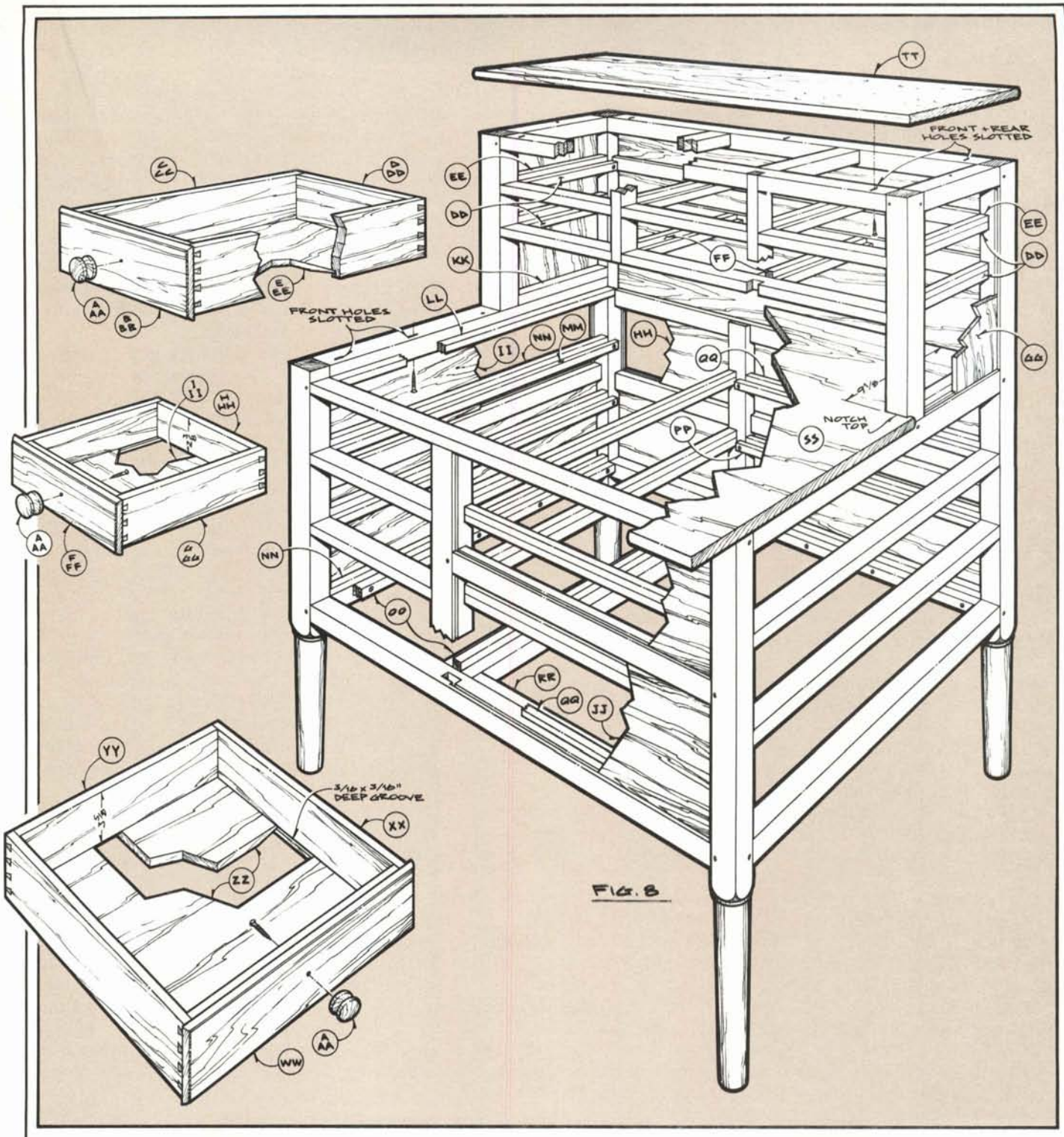




Bill of Materials
(all dimensions actual)

Part	Size	No. Req'd.
A	1½ × 1½ × 26	1
B	1½ × 1½ × 26	1
C	1½ × 1½ × 39	1
D	1½ × 1½ × 39	1
E	1¼ × 1½ × 28*	1
F	1¼ × 1½ × 22*	1
G	1¼ × 1½ × 28*	1
H	1¼ × 1½ × 22*	1
I	1½ × 1½ × 14½*	1
J	1 × 1½ × 17½*	1
K	¾ × 1½ × 10*	2
L	¾ × 1½ × 28*	1
M	1 × 1½ × 22*	1
N	1½ × 1¾ × 22*	1
O	1 × 1½ × 28*	3
P	⅞ × 1½ × 14½*	1
Q	¾ × 1½ × 22*	2
R	1½ × 1¾ × 22*	1
S	1¼ × 1½ × 22*	1
T	1½ × 1½ × 13¼*	1
U	1½ × 1½ × 13¼*	1
V	¾ × 1½ × 28*	2
W	1¼ × 1½ × 28*	1
X	1½ × 1½ × 7¾*	2
Y	1½ × 1½ × 28*	1
Z	1¼ × 1½ × 7¾*	2
AA	¾ × 1½ × 8¼	2
BB	⅜ × 1½ × 28*	1
CC	¾ × 1¾ × 8*	4
DD	¾ × 1 × 7¾*	4
EE	½ × ½ × 6¾	4
FF	½ × ¾ × 7¼	4
GG	⅜ × 7¼ × 11¾	2
HH	⅜ × 6 × 27½	4
II	⅜ × 6½ × 21½	2
JJ	⅜ × 6½ × 17	2
KK	¾ × ⅞ × 6¾	2
LL	¾ × ½ × 21	2
MM	¾ × 1 × 22	4
NN	½ × ½ × 21	6
OO	¾ × ½ × 21	2
PP	¾ × 1 × 17½	4
QQ	½ × ½ × 16½	6
RR	¾ × ½ × 16½	2
SS	¾ × 26⅜ × 31	1
TT	½ × 10¼ × 30½	1
UU	¾ × 24⅝ × 26*	1
VV	¾ × 1 × 24⅝	2
WW	⅝ × 4½ × 21½	3
XX	⅜ × 4 × 18¼	6
YY	⅜ × 3⅝ × 21	3
ZZ	5/16 × 18⅛ × 20⅝	3
AAA	see detail	12
BBB	⅝ × 4½ × 9½	3
CCC	⅜ × 4 × 22½	6
DDD	⅜ × 3⅝ × 9	3
EEE	5/16 × 8⅝ × 22⅜	3
FFF	⅝ × 3¼ × 9	6
GGG	⅜ × 2¾ × 8	12
HHH	⅜ × 2⅜ × 8½	6
III	5/16 × 7⅞ × 8⅛	6

*Includes tenons.



lumberyard doesn't do this, check some local millwork shops as they often offer this service.

Cut the panels to the overall length and width shown in the bill of materials, then use the table saw and dado head to cut the ⅛ in. deep by 5/16 in. wide rabbet (see Fig. 3) all around. The panel length and width dimensions given in the bill of materials do not allow any clearance inside the grooves. When the framework is dry assembled, you may find it necessary to lightly hand plane the panel edges to provide room for them to expand and contract with seasonal changes in humidity.

At this point, a dry assembly of all parts (A through Z, plus AA, BB, CC, GG, HH, II, and JJ) is in order. The dry assembly is important to insure that all parts fit up correctly. Since so many pieces are involved, a specific sequence of assembly must be followed. If you labeled each of the parts earlier, it will make this step somewhat easier.

Begin the dry assembly by putting together the front sub-assembly (parts A, B, E, K, L, I, J, and JJ). You may need a clamp or two between the legs to hold everything together. Next, as a second separate sub-assembly, join the back (parts C, D, G, O, P, BB, Y, and HH) again using clamps between the legs. Now, as a third separate sub-assembly join the upper drawer front face (part N, R, T, U, V, W, and AA).

To complete the dry assembly, join the front to the back by adding the up-

(continued on next page)

per drawer front face plus all the remaining front to back stretchers (parts F, H, M, Q, S, X, Z, CC, GG, and II). Add clamps as necessary to keep the assembly together while you check for general fit-up and squareness. While the framework is still dry assembled, lay out and mark the mortises to be cut for parts DD, MM, and PP (Fig. 6).

The framework can now be disassembled. Once taken apart, use a chisel to cut out the mortises for parts DD, MM, and PP.

All the disassembled parts can now be final sanded, finishing with 220 grit. The framework is now ready for final assembly glue-up. To final assemble the parts, follow the same sequence used for the dry assembly. And to provide the extra assembly time you'll need, be sure to use plastic resin glue. This glue, which is available at most hardware stores, comes in the form of a brown powder that is mixed with water just before assembly. Plastic resin glue dries slower than white or yellow glue, and that's helpful when you are facing a time consuming clamping operation like this one.

Glue and clamp the front subassembly first (don't forget the panels), then check for squareness and set aside to dry. Repeat this process for the back and the upper drawer front face sub-assemblies, again checking for squareness. When dry, complete the assembly by joining the front, back, upper drawer front face, and the remaining front to back stretchers and panels. Square everything up and allow to dry thoroughly.

Lay out and bore holes for the 3/16 in. diameter by 1¼ in. long tenon dowel pins (see Fig. 1 and elevation views). Cut the pins slightly long, then glue them in place and sand flush. Also, referring to Fig. 8, lay out and bore the various holes in parts N, R, W, X, and Y that will be used later on to attach parts SS and TT. Note that some of these holes are slotted to allow parts SS and TT to expand and contract with seasonal changes in humidity. A slotted hole can be made by boring a ¼ in. diameter hole and elongating it with a rattail file.

Referring to Fig. 6 and the bill of materials, cut drawer guides DD, EE, FF, MM, NN, PP, and QQ to thickness, width, and length. On parts DD, MM, and PP, note that a tenon is cut on one end while a notch is cut on the other. Also, using the bill of materials as a guide, cut parts KK, LL, OO, and RR *to size. Before* cutting any of the above parts though, be sure to first take the actual measurements from the assembled framework. Due to minor construction variances, the actual dimensions may change slightly.

The various drawer guides can now be assembled as shown in Fig. 8. The 1⅛ in. long notch on the back end of parts DD, MM, and PP allows the tenon to be inserted in the mortise without interference. The notch is then glued and screwed in place.

The sliding desk surface (see detail, page 29) consisting of parts UU and VV can be made next. Part VV, called a breadboard end, helps to keep the desk surface flat while providing a finished look to the ends. It's a technique common to many Early American and Shaker pieces.

Cut part UU to overall length and width from ¾ in. thick stock, then use the table saw and dado head to cut the tenons on each end. Cut parts VV to size, then use a router table with a ¼ in. diameter straight bit to cut the ½ in. deep mortise. Make the cut in four passes, each pass removing ⅛ in. of stock. Note that to accommodate seasonal movement the mortise is cut longer than the tenon is wide.

Once the mortises and tenons are cut, dry assemble part UU to parts VV, using pipe clamps to hold them together. Now, bore the three 3/16 in. diameter dowel pin holes, then remove the pipe clamps and separate the parts. Using a rattail file, elongate the two end holes in each tenon as shown. Reassemble the parts, then apply glue to the 3/16 in. dowel pins and drive them in place. Remember, only the pins are glued, not the mortise and tenon joints.

Final sand parts UU and VV, then cut a ¾ in. by ¾ in. by 12 in. long cleat and screw it to the underside of part UU, flush with the back edge. When part UU is installed, the cleat will act as a stop to keep the desk surface from sliding out.

Next, glue up stock for parts SS and TT. After cutting both parts to final length and width, lay out the location of the cutout and notch on each back corner of part SS (see elevation views and Fig. 8). The cutout should be cut so that the back of part SS fits between parts T and U and extends all the way back to panel HH.

Final sand parts SS and TT before applying two coats of a good penetrating oil as a final finish. Parts UU and VV can be finished at the same time.

Part TT can now be installed using wood screws driven up through the slotted holes in parts W, X and Y. Place parts UU and VV in position on the frame, then add part SS by driving screws up through parts N and R. Driving the screws in such tight quarters is a chore that can be greatly simplified if you have a ratchet wrench with a screwdriver blade attachment. If you don't have one, you'll probably find it necessary to crank the handle of a short screwdriver with an adjustable wrench or pair of pliers. Once part SS is added, cut and fit parts KK which serve as filler blocks.

The drawers are made as shown in Figs. 5 and 8. The solid stock drawer bottoms are made following the procedure described in our Special Techniques column on pages 24 through 26. All drawers have the same knob (AAA) which is turned to the dimensions shown in the knob detail. A flathead wood screw driven through the inside of the drawer front holds the knob in place.

The original desk had a brass lock on the upper right side drawer. If you can't get a lock locally, one can be purchased from Carolina Craftsmen, 975 South Avocado Street, Anaheim, CA 92805. Order part number S-2. The diamond shaped escutcheon measures ¾ in. across the points and 1 in. top to bottom. Cut it from .032 in. thick brass stock, then bore the keyhole and file the slot. Two small brass brads will secure it to the front.

All unfinished surfaces can now receive two coats of penetrating oil. Allow to dry, then buff with a soft cloth for a warm satin finish. A thin coat of beeswax on the drawer guides will help the drawers slide easily. WWJ

Garden Bench and Table

This handsome bench and table set is an adaptation of traditional English garden style furniture. While the projects were designed to be used outdoors, they're refined enough in appearance to be at home inside as well.

Our bench/table set was crafted of clear premium grade redwood (at a material cost exeeding $200). However, by purchasing construction grade redwood you may well cut that cost in half. There will be some knots in the construction grade material, but these can be worked around, or the knotty boards may simply be discarded.

If you opt for the construction grade redwood, all parts except for the legs, corner brace and chair arm may be obtained from 2 × 4 stock, thicknessed, ripped and crosscut as needed. The table legs and front bench legs can be cut from 4 × 4 stock, the bench back legs from 4 × 6 stock, and the chair arms and corner brace from 2 × 6 stock. The back and seat slats are resawed from 4 × 4 stock.

We selected redwood for this project because it is an easy-to-work material with good decay resistance when properly treated. An even better choice, if you have access to it, would be teak. While teak from a hardwood retailer will probably be somewhat more expensive than redwood, by purchasing the teak from a marine construction supplier you may find the actual price differential to be negligible. Teak is very hard, heavy and has excellent water and moisture resistance due to the natural oils in the wood. These same characteristics make teak virtually impossible to machine with standard High Speed Steel (HSS) cutters, however, so you will need all carbide knives, blades, and bits for the planer, table saw, and router. Other hard-

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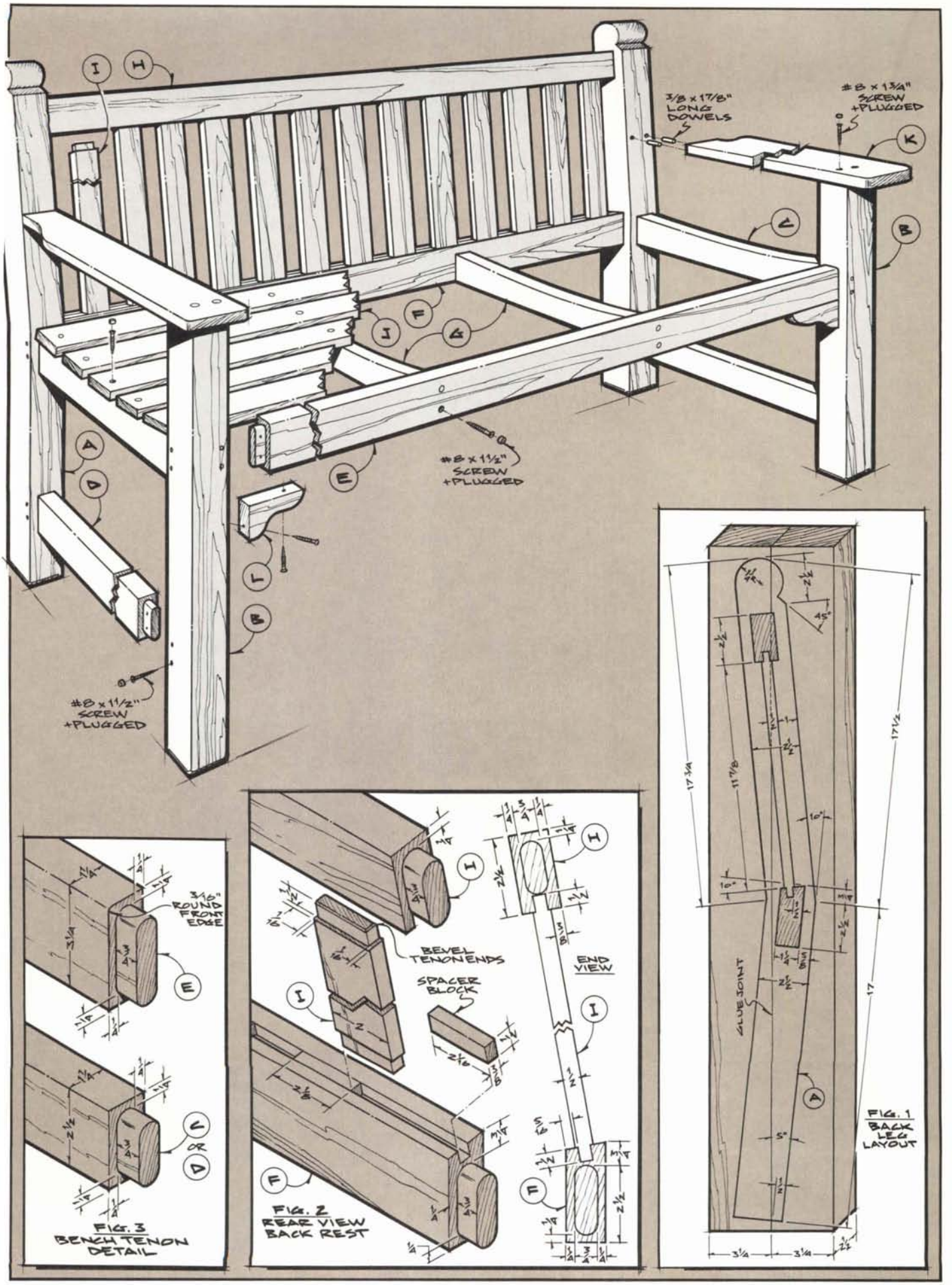
I
H
3/8 x 17/8" LONG DOWELS
#8 x 1¾" SCREW +PLUGGED
K
V
B
J
F
G
#8 x 1½" SCREW +PLUGGED
E
A
D
L
B
#8 x 1½" SCREW +PLUGGED
¼" ROUND FROM EDGE
E
V
D
FIG. 3 BENCH TENON DETAIL
I
BEVEL TENON ENDS
SPACER BLOCK
END VIEW
F
FIG. 2 REAR VIEW BACK REST
45°
GLUE JOINT
A
5°
FIG. 1 BACK LEG LAYOUT

woods such as cherry, oak, or walnut could also be used if you intend the set exclusively for indoor use.

For exterior use, a good waterproof adhesive such as plastic resin glue is recommended. With teak use epoxy, wiping the mating surfaces of the glue joints with acetone first to clean away oils that could impede adhesion.

Bench

A good place to start is with the bench back leg (A). If you must glue up stock to obtain the necessary width, the back leg layout detail (Fig. 1) shows the ideal location of the glue line. Referring to the back leg detail, lay out and then band saw the back leg profile. Clean up the band saw marks with the disk sander.

Next cut the front legs (B) to size, and thickness plane stock for the various rails (E, F, and H) and stretchers (C, D, and G), which are all cut from 1¼ in. thick material. The front rail and all the stretchers may also be ripped to width and crosscut to overall length, however the tenons on these pieces are not cut until after their corresponding mortises have been machined. Note that a 3/16 in. radius round-over is applied to the top edge of the front rail.

The ¾ in. wide mortises in the front and back legs to accept the stretchers and rails are bored out on the drill press, using a ¾ in. diameter Forstner bit. For more information on cutting both the mortise and tenon, refer to the Woodworking Basics feature on pages 20 through 23. The stretcher and rail

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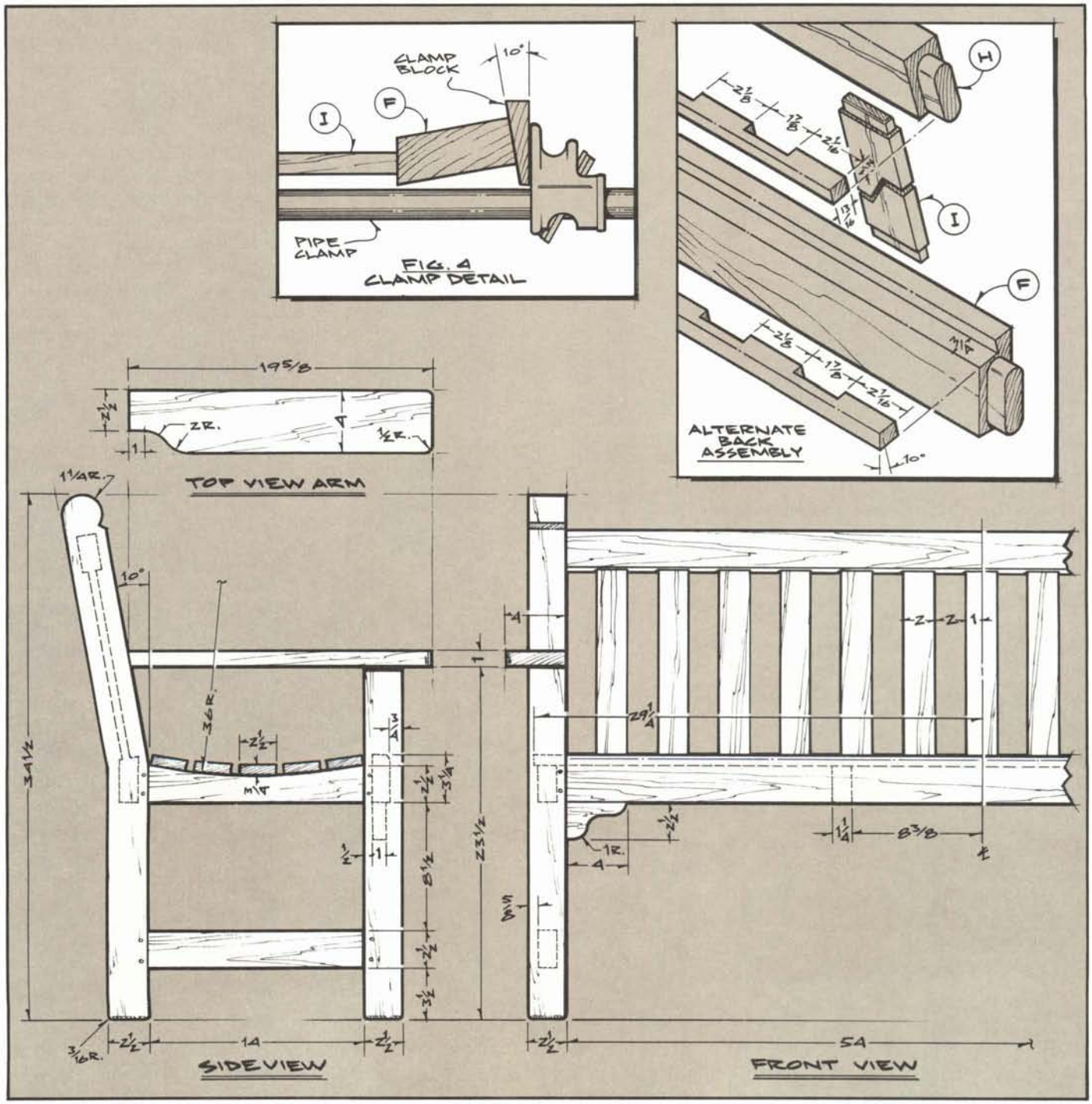


tenons are also cut now (see Fig. 3 tenon details).

To make the back and top rails (F and H), allow a little extra material width on what will be the grooved edge of the stock. Make the top rail about 2¾ in. and the bottom rail 3½ in. This extra width will enable you to cut the grooves, assemble the spacer blocks, and then make the final rip cuts establishing the 10-degree bevel on the back rail and the square edge on the top rail. Following this sequence will insure that the spacer blocks are perfectly flush with the grooved edges of the top and back rails. The rail tenons (Fig. 2) are cut and fit before the groove and final rip cuts are made.

The dado head is used to cut the ⅜ in. wide slat grooves in the top and back rails. For the top rail, if your stock is 2¾ in. wide, set the dado for a ¾ in. deep cut. To cut the back rail groove, first refer to the back leg and Fig. 2 end view details, and pencil the groove location on the end of the back rail. Now incline the dado head 10 degrees and adjust the dado head height and rip fence as needed to proper position, matching the penciled groove. A test cut on a piece of scrapwood will insure accuracy.

After establishing the slat grooves in the top and back rails, cut 28 spacer blocks. While the Fig. 2 spacer block detail shows the final ½ in. block height, start with the spacers slightly oversize or about ¾ in. high. Note that while the spacers are shown as 2⅛ in. long, the end spacers must be 2 1/16 in. long. Use a steel measuring tape to lay out the location of these spacer blocks, and then glue them in place. Now rip cut the top rail to width, and establish the 10-degree bevel on the back rail. The spacer blocks serve to locate the back slats and fill spaces that would otherwise accumulate moisture.

In order to lay out the 36 in. radius on the end and center stretchers (C and G), tie a string to a pencil so there are 36 in. in between the pencil and the end of the string. Tack the end of the string at a point perpendicular to the centerpoint of the stretcher (clamped crossways on the workbench) and scribe the seat curve radius. Band saw and then belt sand to smooth the curve.

Also cut the back slats (I) and seat slats (J) to size, and use the dado head to establish the ⅜ in. by 1⅞ in. by ½ in. long tenons on the ends of the back slats. The arm (K) and corner brace (L) can also be made at this time. Refer to the arm top view for the arm profile, and to the bench front view for the corner brace profile. The band saw is used to cut both these profiles, after which they must be sanded smooth.

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
	Bench		
A	Back Leg	see back leg layout	2
B	Front Leg	2½ × 2½ × 23½	2
C	End Stretcher	1¼ × 2½ × 15½*	2
D	Bottom Stretcher	1¼ × 2½ × 15½*	2
E	Front Rail	1¼ × 3¼ × 55½*	1
F	Back Rail	1¼ × 3¼ × 55½*	1
G	Center Stretcher	1¼ × 2½ × 15⅛	2
H	Top Rail	1¼ × 2½ × 55½*	1
I	Back Slat	½ × 2 × 12⅞*	13
J	Seat Slat	¾ × 2½ × 58½	5
K	Arm	1 × 4 × 19⅝	2
L	Corner Brace	1 × 2½ × 4	2
	Table		
A	Leg	2 × 2 × 15	4
B	End Apron	1¼ × 3 × 11½*	2
C	Side Apron	1¼ × 3 × 51½*	2
D	Stretcher	1¼ × 2 × 11	2
E	Frame End	1 × 2¼ × 13*	2
F	Frame Side	1 × 2 × 55½	2
G	Rail	1 × 2 × 52½*	5

*Length includes tenons.

To assemble the bench, start by joining the front and back legs with the end and bottom stretchers. Next, complete the back assembly, consisting of the top and back stretchers and slats. As shown in Fig. 2, the slat tenon ends are beveled slightly, which helps them fit into the top and back rails. First glue and insert all the slats into the back rail. To add the top rail, you must start at one end, and gradually fit the top rail into place by positioning one slat at a time. After all the slats have been started into the top rail, the completed back assembly can be forced up tight with bar clamps. As illustrated in the Fig. 4 clamping detail, you will need to pre-cut some 10-degree clamp block wedges to back up the lower edge of the back rail. *Note:* You will need to work quickly in order to complete the back assembly before the glue sets up. Having a friend help out with the assembly is strongly recommended.

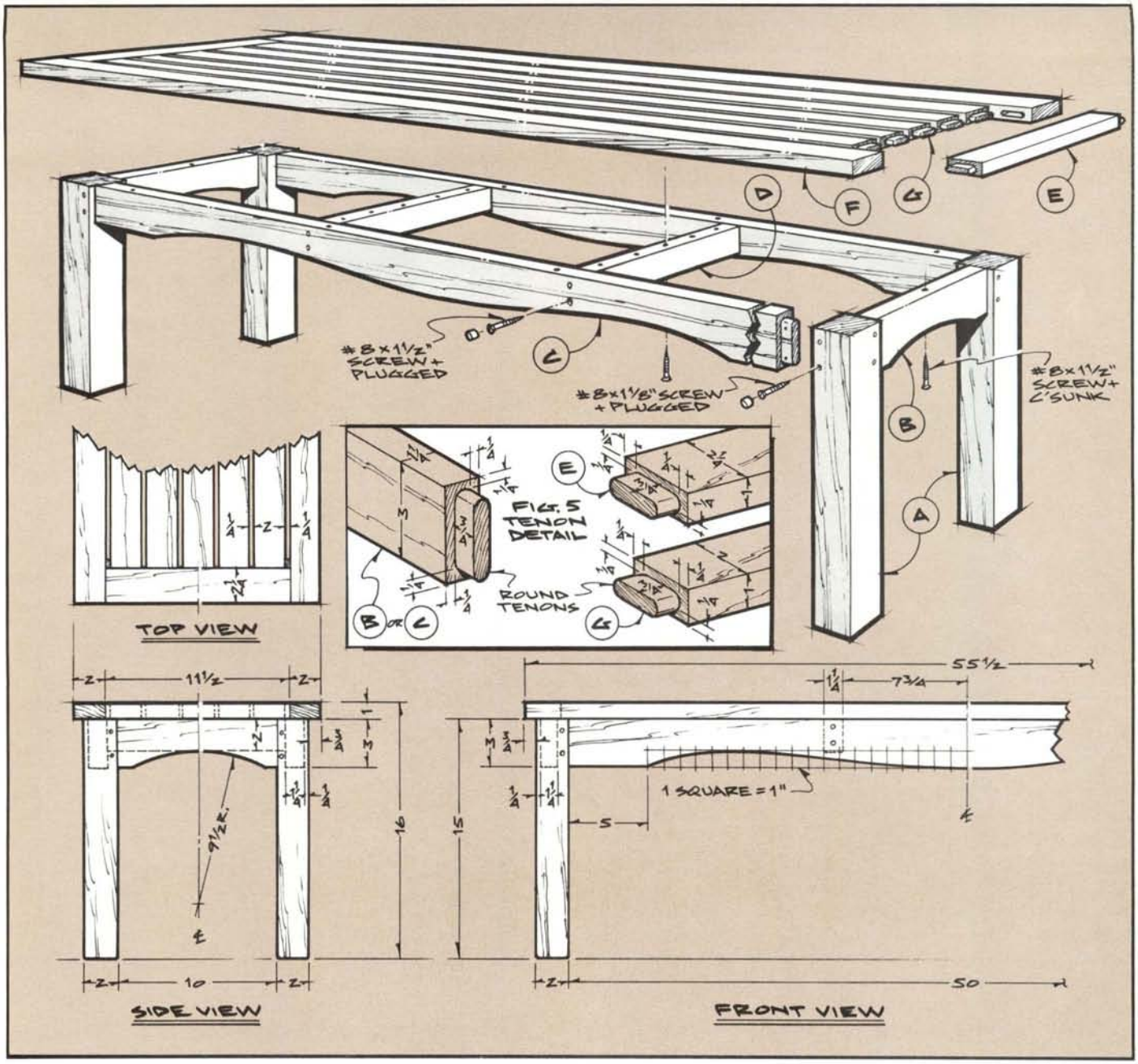
Now join the two leg assemblies with the back assembly and front rail. Add the center stretchers, corner brace, and seat slats, as shown. Installation of the arms completes the bench. We recommend waterproof epoxy, both for the arm dowels and the various screw plugs. While we cut our plugs using the drill press and a ⅜ in. diameter plug cutter, ⅜ in. diameter dowel stock cut to length and stained as needed to match could also be used.

Bench Assembly Note: Since the mortises in the back legs to accept the top and back rail tenons are machined before the back assembly is completed, the fit of the back assembly to the back legs may be tricky. If necessary, pare the tenons as needed to ease the fit and accommodate any inconsistency. An alternate method that would insure an exact fit is to machine these mortises after the back assembly is completed. While tenons are traditionally cut *after* the mortises, the standardized ¾ in. wide tenons used on the bench construction should enable you to achieve an accurate fit even though the mortises for the tenons on the back and top rails will be cut *after* the tenons.

Alternate Back Assembly: A simpler back assembly is to rabbet the back and top rails as shown, and mount the slats using notched retainer strips (see alternate back assembly detail). Note that with the lower strip, the 10-degree bevel is cut after the notches are established. The advantage in this alternate method is that the back slats are added *after* the bench is assembled, eliminating any problem in gluing up and then fitting the back assembly to the back legs.

Table

The table construction is very simple and straightforward. Cut the legs (A), aprons (B and C) and stretchers (D) to length and width. The ¾ in. thick apron tenons and the corresponding mortises in the legs are made following the same technique as used for the bench. The 9½ in. radius on the end aprons (use string and pencil technique as explained with the bench instructions) and the side apron profile (see



front view grid) are band sawed *after* the tenons on the ends of these pieces have been cut.

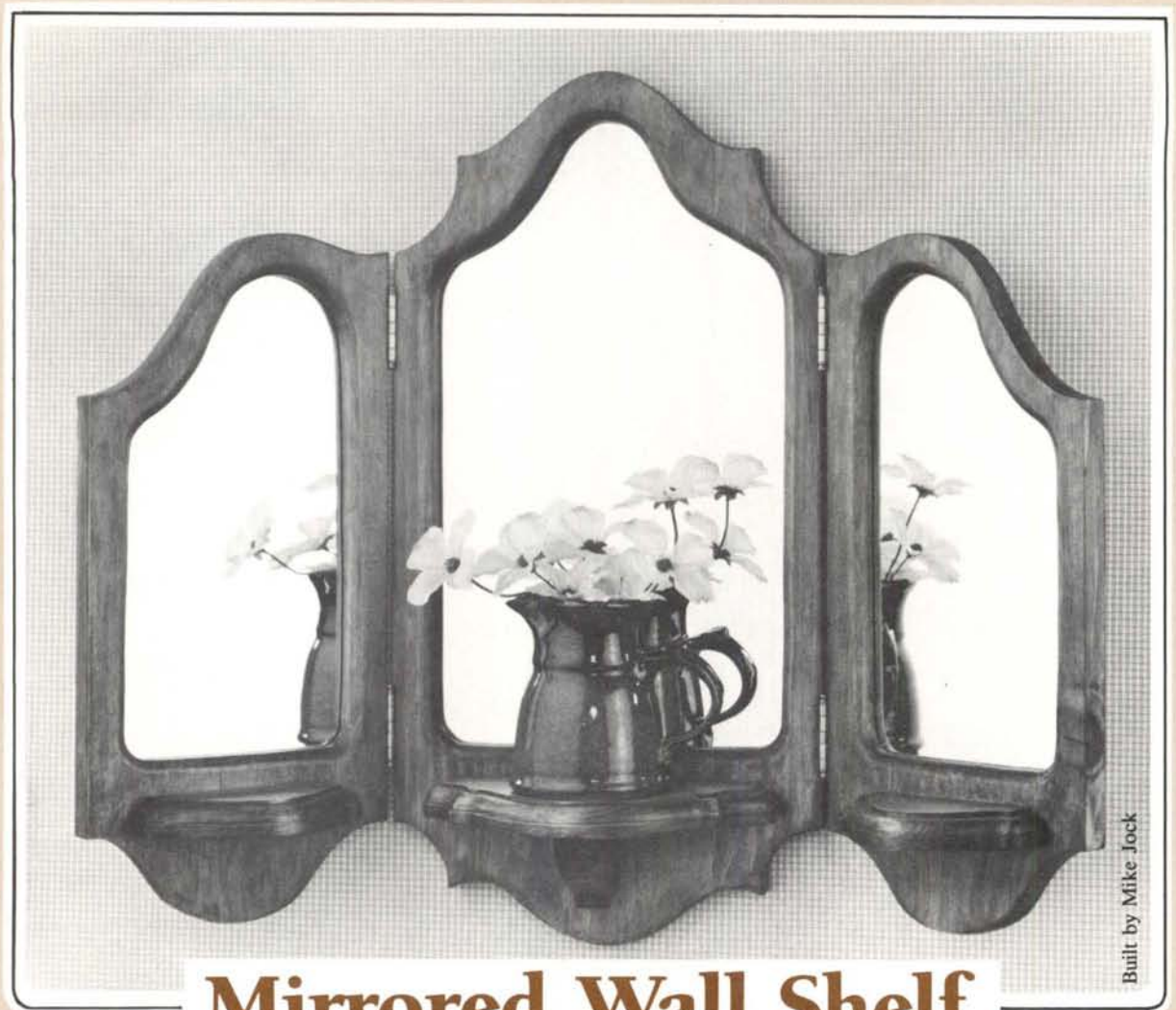
Assemble the table frame, using countersunk screws as shown to mount the stretchers and reinforce the mortise and tenon joints. Start by assembling the legs and end aprons, join these assemblies with the side aprons, then add the stretchers. As with the bench, waterproof epoxy is used to secure the screw plugs.

Now make the tabletop, which is essentially a large frame with rails. The same mortise and tenon technique shown in the Woodworking Basics feature, and used earlier, is employed here. As shown in the Fig. 5 tenon detail, note, however, that the various frame end, frame side and rail mortises and tenons are ½ in. thick, as opposed to the ¾ in. thick tenons used earlier. To assemble the top frame, first mount the frame ends on the rails, then add the frame side pieces. The tabletop is secured as shown in the exploded view with screws inserted up through countersunk screw holes in the end aprons and stretchers.

After applying a 3/16 in. diameter radius to the bottom end of the bench and table legs (to reduce the chance of chipping), you may final sand both projects. We recommend just breaking all sharp edges and corners to eliminate the chance of splinters and to reduce any discomfort such edges could cause.

Finishing

To provide our bench and table with maximum weather and decay resistance, we applied two generous coats of Cuprinol brand wood preservative. While the Cuprinol may be brushed on, a more effective and much quicker method is to simply spray it on with a common pump-type garden sprayer. The fine spray insures total coverage, laying on an even, heavy coat. After allowing to penetrate fully, apply the second coat. *Note:* By re-applying the Cuprinol once a year, you can be assured of long trouble-free service regardless of exposure to the elements. Of course, as with all finishing products, wear appropriate protective clothing, use a particulate vapor mask, and apply only in a well ventilated work area — preferably outdoors. WWJ



Built by Mike Jock

Mirrored Wall Shelf

One weekend in the shop should be all that's needed to complete this piece. The two ends, which are hinged to the center, can be pivoted to any angle up to 90 degrees. We made ours from pine and then stained it, but any wood will work well with this piece.

Begin by making the center frame (A) and the two end frames (B). Using ¾ in. thick stock, cut the three parts to overall length and width, then transfer the profile of each inner and outer curve (see front view) from the grid pattern to the stock.

The inner curve should be cut first. To establish the ½ in. radius at each lower corner, use a 1 in. diameter drill bit to bore a hole at the corners as shown. Now, with the holes bored, use a saber saw to cut out the inner curve, taking care to stay slightly on the waste side of the line. Once cut out, sand the sawn edge exactly to the line.

Note that the front of each inside curve is radiused to ¼ in. while the back has a ⅜ in. by ⅜ in. rabbet. Cut the radius first using a router and a bearing-guided ¼ in. radius bit. Don't cut the rabbet first. If you do, you won't have any stock to serve as a bearing surface for the radius bit.

To cut the rabbet use a ⅜ in. bearing-guided rabbeting bit. The bit will create rounded corners at the bottom so you'll need to cut them square with a chisel. Next, use a ruler and sharp pencil to lay out the straight lines of the mirror at the top of each frame. (These lines are shown as dotted lines in the front view). Now, use the chisel to expand the rabbet to the marked layout lines.

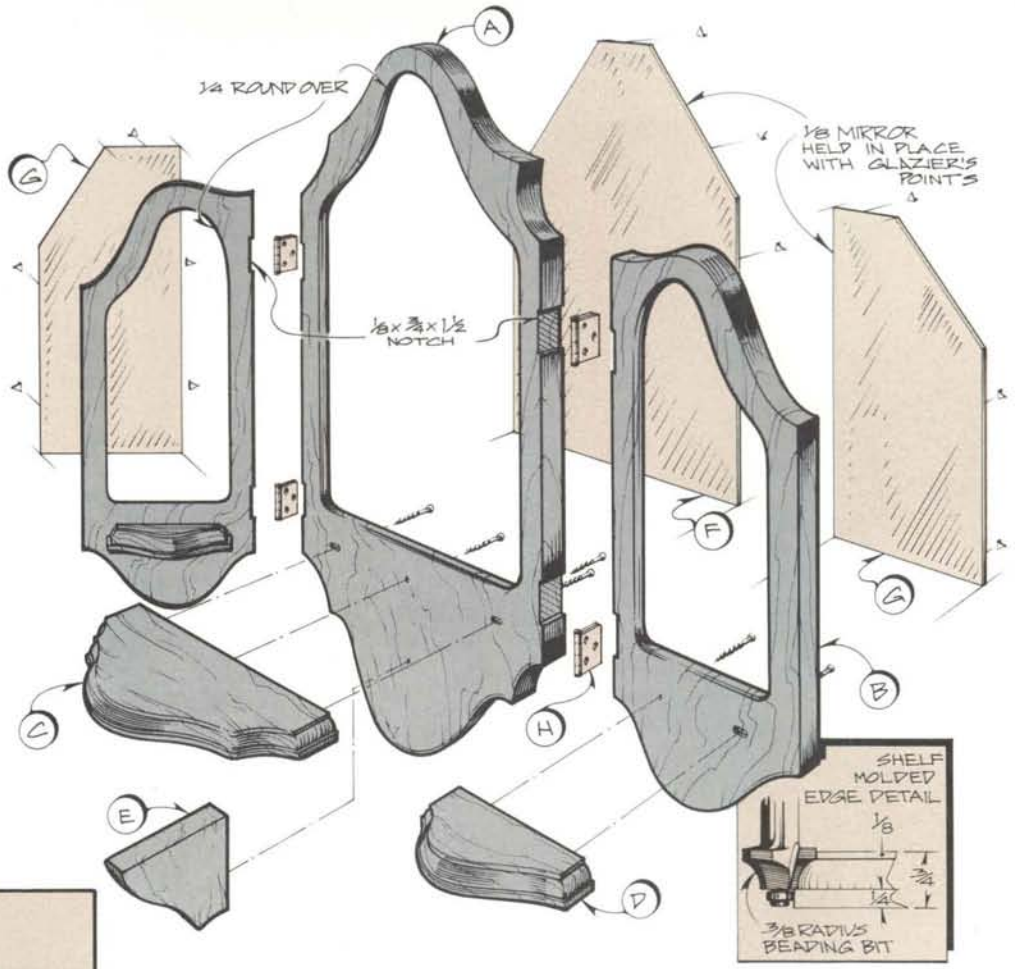
The saber saw can now be used to cut the previously marked outside profile. As before, cut a bit on the waste side of the line, then sand to the line. The ⅛ in. deep by ¾ in. wide by 1½ in. long hinge notches can be cut by hand with a chisel or by using the table saw dado head.

Next, cut the center and end shelves (C and D), and the support (E) to overall length and width from ¾ in. thick stock. Transfer the curved profiles shown in the top and side views to the stock, then cut out and sand smooth. Use a router and a ⅜ in. radius bearing-guided beading bit to apply the molded edge to the center and end shelves (see shelf molded edge detail).

Final sand all parts, then assemble as shown with 1½ in. long number 8 flathead wood screws. Do not use any glue as the frames need to expand and contract with seasonal changes in humidity. To permit the movement, the center frame has a pair of slotted holes, while each end frame has a single slotted hole. Once assembled, we applied two coats of Minwax's Colonial Maple Wood Finish followed by an application of their Antique Oil.

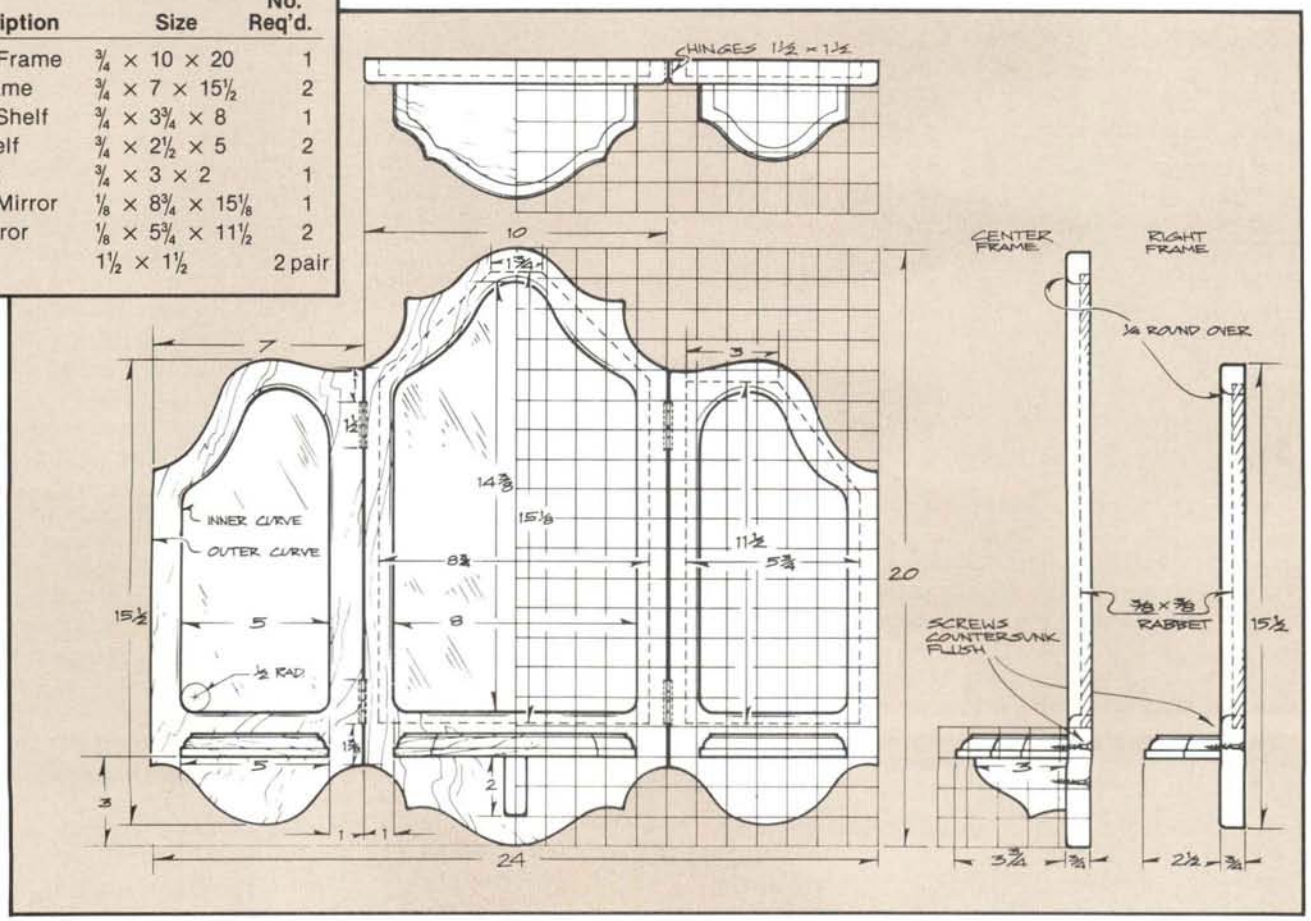
The mirror stock can be bought at just about any glass shop, and most will cut it to shape for a nominal charge. Use glazier's points to secure the glass in the rabbet, but be careful not to score the silver on the back of the glass when you install the points. If you do, it will show on the front of the mirror. The addition of a pair of brass butt hinges completes the project.

WWJ

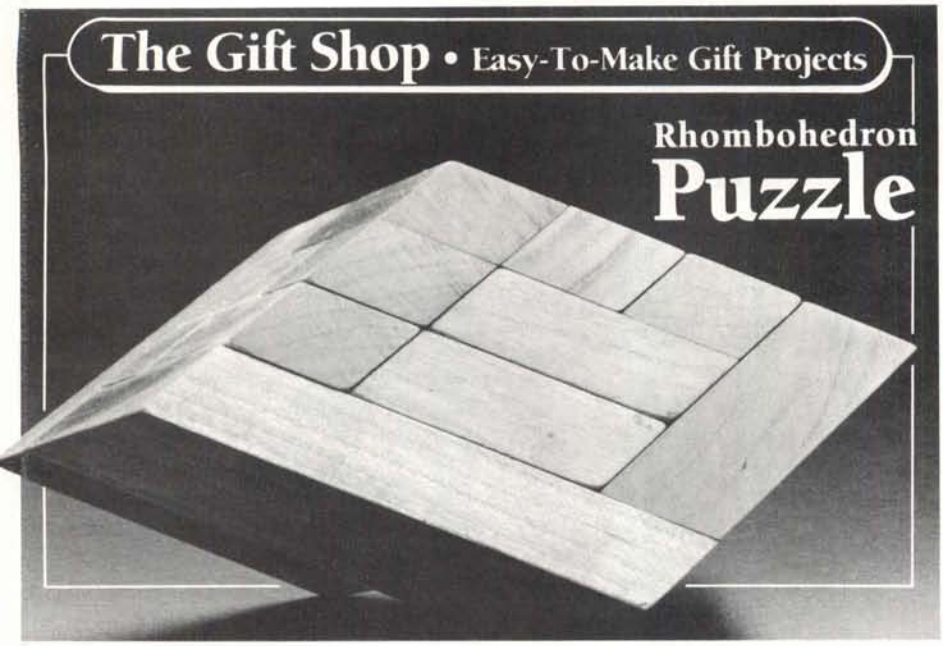


Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Center Frame	¾ × 10 × 20	1
B	End Frame	¾ × 7 × 15½	2
C	Center Shelf	¾ × 3¾ × 8	1
D	End Shelf	¾ × 2½ × 5	2
E	Support	¾ × 3 × 2	1
F	Center Mirror	⅛ × 8¾ × 15⅛	1
G	End Mirror	⅛ × 5¾ × 11½	2
H	Hinge	1½ × 1½	2 pair



Rhombohedron Puzzle



Occasionally things are every bit as difficult as they appear to be. This particular puzzle has tempted us for some time, serving alternately as a paperweight, desk sculpture (assembled) or desk nuisance (disassembled).

As the puzzle shape is technically a rhombohedron, we've nicknamed it "Rhombo" — an appropriate moniker.

The puzzle's individual component pieces are not difficult to cut. The challenge lies in the accurate table saw setups and in the solution to the puzzle.

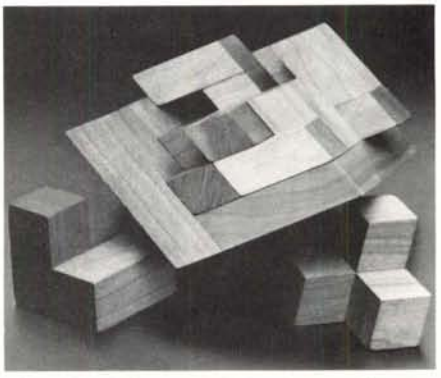
First, some words of caution. Puzzles must, by their nature, be exact. This is especially true of Rhombo, where any error in one piece will be magnified by the succeeding pieces. Simply put, measurements must be "right on". Do not be confused by apparently inconsistent dimensions. The width of the base stock, for example, is 2⅝ in. *on a straight plane across the grain* (see rip cutting detail No. 3), while the *end* dimension of the same stock, after the base pieces have been crosscut (at the 70-degree angle), will be 2 13/16 in. (see puzzle base). Our best advice is to follow the illustrated rip and crosscutting details carefully. Take time with each table saw setup, since accurate alignment of the rip fence and precise location of the crosscut settings are vital.

As shown in step 1 of the rip cutting detail, all the puzzle piece stock, plus the base stock, is obtained from a single 5½ in. wide by 36 in. long hardwood board. We used cherry, but any hardwood will do so long as the stock is straight and clear grained.

Start by inclining the blade 30 degrees, as illustrated, and establish the first bevel cut. Now readjust the fence, as shown in step 2, to rip a strip measuring ⅞ in. wide across the top plane. This single 36 in. long strip will provide more than enough stock for all the puzzle pieces. Finally, as illustrated in the third step, reset the fence to rip stock for the 2⅝ in. wide base pieces.

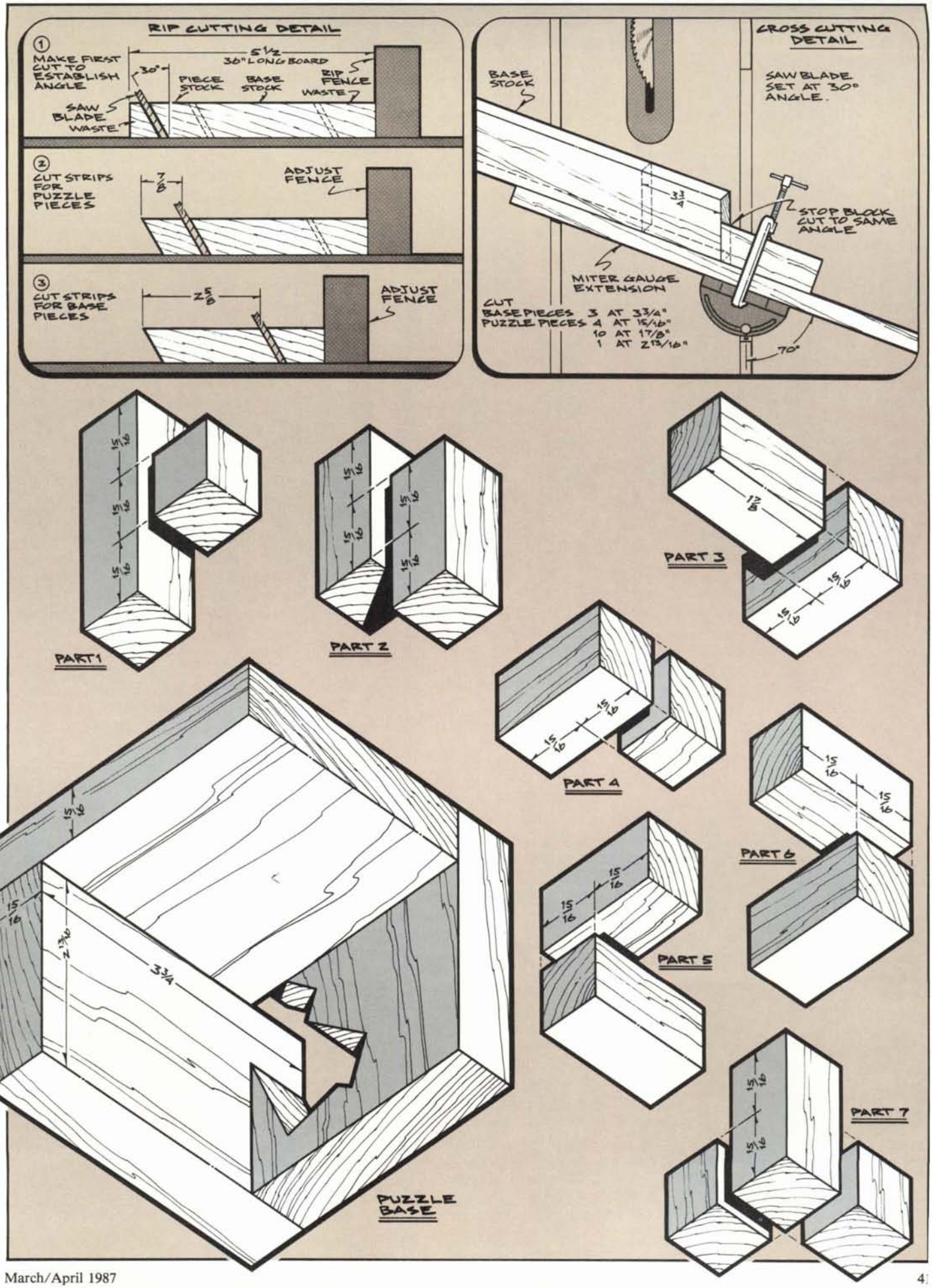
Now, using the miter gauge set at the 70-degree angle shown, and equipped with an extension, and with the table saw blade still set at 30 degrees (see crosscutting detail), cut the various base and puzzle pieces. As illustrated, you will need a stopblock cut to the same bevel angle as the base and puzzle pieces. To obtain this stopblock and to establish the initial bevel on the end of the base stock, crosscut an approximately 4 in. long section from the base stock. Then rip the back edge of this piece at 90 degrees so it may be clamped securely to the miter gauge as shown. Now clamp the stopblock in place to cut the three 3¾ in. long base pieces. Next, with the same miter gauge and blade angle settings, reposition the stopblock to cut the four smallest puzzle pieces, all measuring 15/16 in. *along each surface.* Relocate the stopblock and cut the ten pieces measuring 1⅞ in. long, and relocate once more to cut the single 2 13/16 in. long piece. For each cut, take care to position the stock being cut properly so the beveled end *always* fits up flush and tight with the corresponding beveled end on the stopblock. *Tips:* For each new rip fence setup when ripping, and for each new stopblock setup when crosscutting, test the accuracy of the setting with some scrap stock first before committing your project stock. As noted earlier, the setups must be perfect. Since only the very lightest sanding (with 320 wet-or-dry paper) is permitted, you will need your finest multi-tooth blade in order to achieve the smoothest and cleanest cuts possible. *Safety Note:* As a safety precaution when crosscutting the puzzle pieces — especially the four smallest pieces which measure only 15/16 in. — use a push stick, and not your fingers, to hold the piece being cut. We found that an ordinary pencil with the eraser end anchoring the puzzle piece worked well. After each cut, turn the table saw *off,* and do *not* attempt to back the miter gauge and stock up through the turning blade. Even the slightest shift in the piece could result in the blade catching and hurling it back at you!

We used cyanoacrylate wood glue (also called "super" or "crazy" glue) to assemble the puzzle base and parts,



since it dries quickly. Assemble the base first, and then use it as a "form" to help align the pieces in their proper orientation during glue-up. The puzzle parts are glued up by applying a drop of cyanoacrylate to the appropriate mating surfaces (use an X to identify these mating surfaces). Hold the pieces being glued in the correct orientation with mild finger pressure for about 30 seconds, to insure that all surfaces are perfectly flush and properly aligned. By gluing up parts 3, 4, and 7 first, these parts can be used as an aid to help align and locate the pieces for the remaining parts. Remember, accuracy in the assembly of the parts and base is every bit as critical as accuracy in the machining of the pieces. *Note:* Wax the inner planes of the assembled base, and any piece surfaces that may inadvertently come into contact with the cyanoacrylate, to prevent accidental adhesion from excess glue squeeze-out. Acetone is used to wipe down the waxed surfaces, prior to finishing.

Two generous coats of penetrating oil, hand rubbed to a satin glow, completes the project. If the solution to Rhombo has you confounded (and well it may), turn to page 53. WWJ


RIP CUTTING DETAIL
1
MAKE FIRST CUT TO ESTABLISH ANGLE
5 1/2
30" LONG BOARD
30°
PIECE STOCK
BASE STOCK
RIP FENCE WASTE
SAW BLADE WASTE
2
CUT STRIPS FOR PUZZLE PIECES
7/8
ADJUST FENCE
3
CUT STRIPS FOR BASE PIECES
2 5/8
ADJUST FENCE
CROSS CUTTING DETAIL
SAW BLADE SET AT 30° ANGLE.
BASE STOCK
3 3/4
STOP BLOCK CUT TO SAME ANGLE
MITER GAUGE EXTENSION
70°
CUT
BASE PIECES 3 AT 3 3/4"
PUZZLE PIECES 4 AT 15/16"
10 AT 1 7/8"
1 AT 2 13/16"
15/16
PART 1
PART 2
PART 3
1 7/8
PART 4
PART 5
PART 6
PART 7
2 13/16
3 3/4
PUZZLE BASE

Wood Sawyer Whirligig

photo by Cherry Tree Toys

Based on traditional whirligig folk art, this sawyer will "work up a storm" when the wind blows.

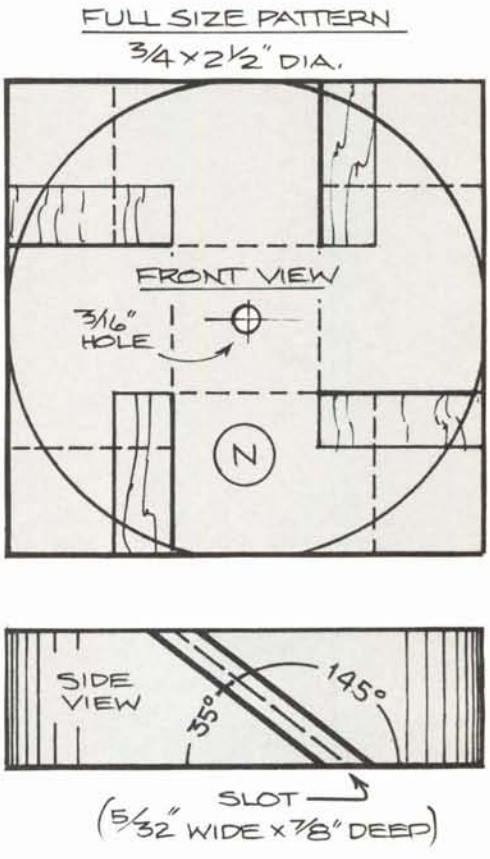
Using the grid pattern as a guide, lay out and cut the various sawyer parts, and the saw and sawbuck. Note that the sawyer's body and the saw are ½ in. thick plywood, while the remaining body parts, shed, shed roof, and sawbuck are ¼ in. thick plywood. Make the remaining wooden parts as shown, referring to the log detail for the log dimensions, and to the full-size pattern for the propeller hub layout. The blade slots in the propeller hub are cut using a dovetail or back saw while the hub is still square.

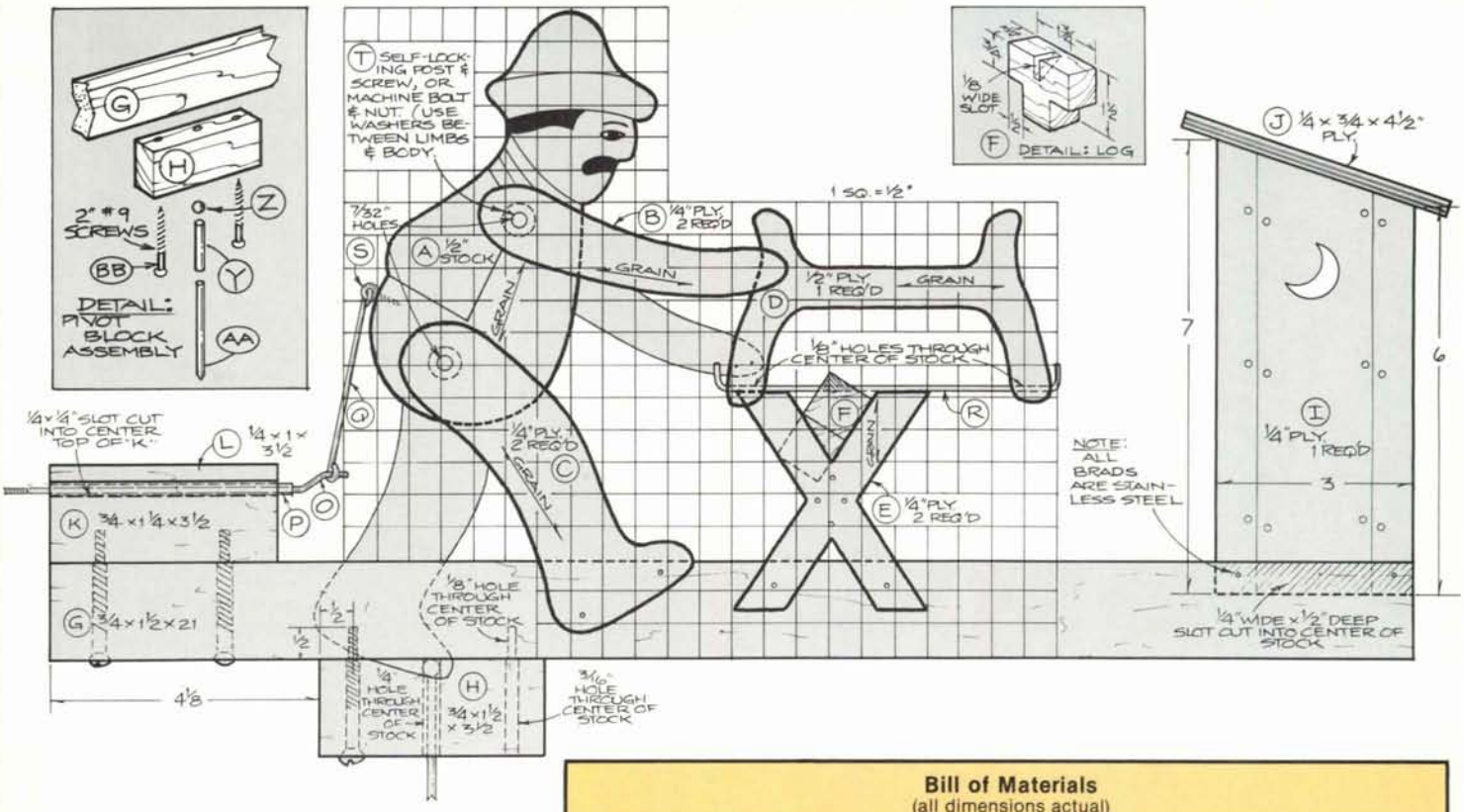
Whirligigs are easy and fun to make, and locating the various wires, screws, copper tubing, and other necessary hardware should not be a problem. Most woodworkers typically have such items readily available in their shop or can obtain them at a local hardware store. However, as an aid to those who may have difficulty locating the hardware, we have provided a reference list for parts N - CC. All these items (including the propeller hub) are available from Cherry Tree Toys, Inc., Belmont, OH 43718, who also provided us with the plans for the whirligig.

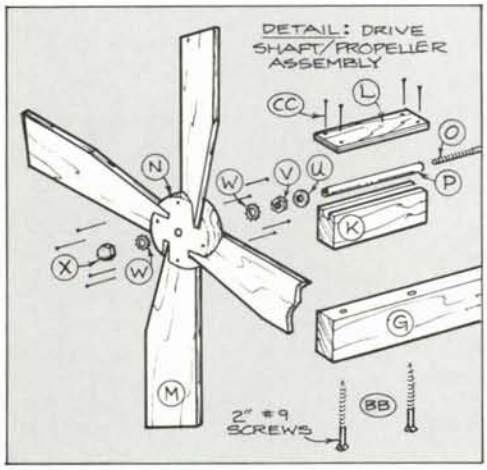
Refer to the drive shaft/propeller and pivot block exploded view details as needed for these specific assemblies. While you may paint the whirligigs as shown in the color photo, experimenting with your own color scheme and personalizing your sawyer may be more fun.

We recommend a drop of oil or some silicone spray on the various drive shaft, pivot, and friction points. Some fussing will probably be needed to obtain the smoothest action. If you are having a problem getting it to work properly, try relocating the screw eye or altering the length of the piston wire (from the drive shaft to the screw eye). *Note:* The drive shaft is grooved where the piston wire wraps around, so the wire will not slip off. If you make the drive shaft yourself, use a small needle file to shape this shallow groove.

Be sure to locate the sawyer in an open area some distance from the house to best take advantage of prevailing wind currents. WWJ

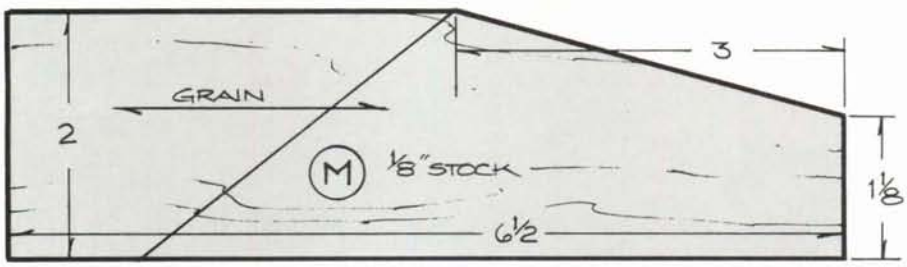






Bill of Materials
(all dimensions actual)

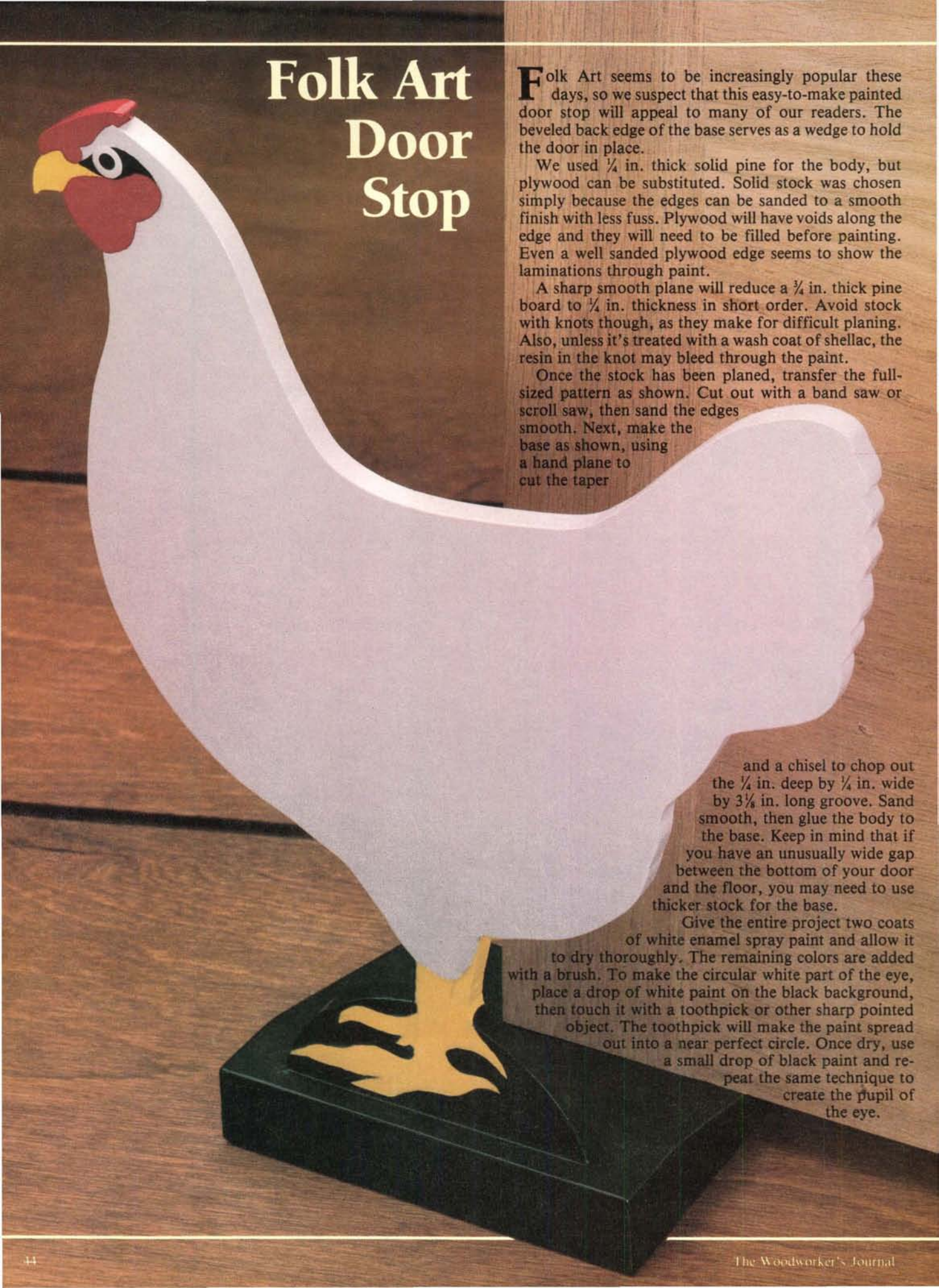
Part	Description	Size	No. Req'd.
A	Body	see grid	1
B	Arm	see grid	2
C	Leg	see grid	2
D	Saw	see grid	1
E	Sawbuck	see grid	2
F	Log	3/4 × 1 1/2 × 1 3/4 (see detail)	1
G	Base	3/4 × 1 1/2 × 21	1
H	Pivot Block	3/4 × 1 1/2 × 3 1/2	1
I	Shed	1/4 × 3 × 7	1
J	Shed Roof	1/4 × 3/4 × 4 1/2	1
K	Drive Shaft Block	3/4 × 1 1/4 × 3 1/2	1
L	Block Cap	1/4 × 1 × 3 1/2	1
M	Blade	1/8 × 2 × 6 1/2	4
N	Propeller Hub	3/4 × 2 1/2 dia. (see full-size pattern)	1
O	Drive Shaft	.167 dia. × 6 in. long wire (threaded 1 in.) brass	1
P	Drive Shaft Tube	1/4 O.D. (.192 I.D.) × 3 3/4 long brass	1
Q	Piston Wire	.081 dia. × 3 5/8 brass	1
R	Saw Blade Wire	.081 dia. × 6 in. brass	1
S	Screw Eye	5/8 long brass	1
T	Self Locking Post & Screw	(shaft) .2 dia. × 1 1/16 long brass	2
U	Washer	.437 O.D. × .210 I.D. brass	5
V	Nut	#10-32 brass	1
W	Lock Washer	.405 O.D. × .2 I.D. bronze	2
X	Acorn Cap Nut	#10-32 brass	1
Y	Pivot Tube	1/4 dia. × 1 1/2 brass	1
Z	Pivot Bearing	1/4 dia. brass	1
AA	Pivot Nail	.177 dia. × 5 in. stainless steel	1
BB	Screw	2 in. long slotted round head #9 brass	4
CC	Brad	5/8 in. long #18 stainless steel	32



Reference List of Parts Available From Cherry Tree Toys

WWJ Part Letter	Cherry Tree Toys Part Number	Price
N	930	$1.80
O	921	1.00
P	917	.80
Q	919	.25
R	924	.25
S	914	.25
T	908	.65 ea.
U	910	.10 ea.
V	912	.15
W	911	.15 ea.
X	913	.40
Y	916	.40
Z	909	.20
AA	918	.65
BB	907	.25 ea.
CC	904	50/$2.00

Folk Art Door Stop



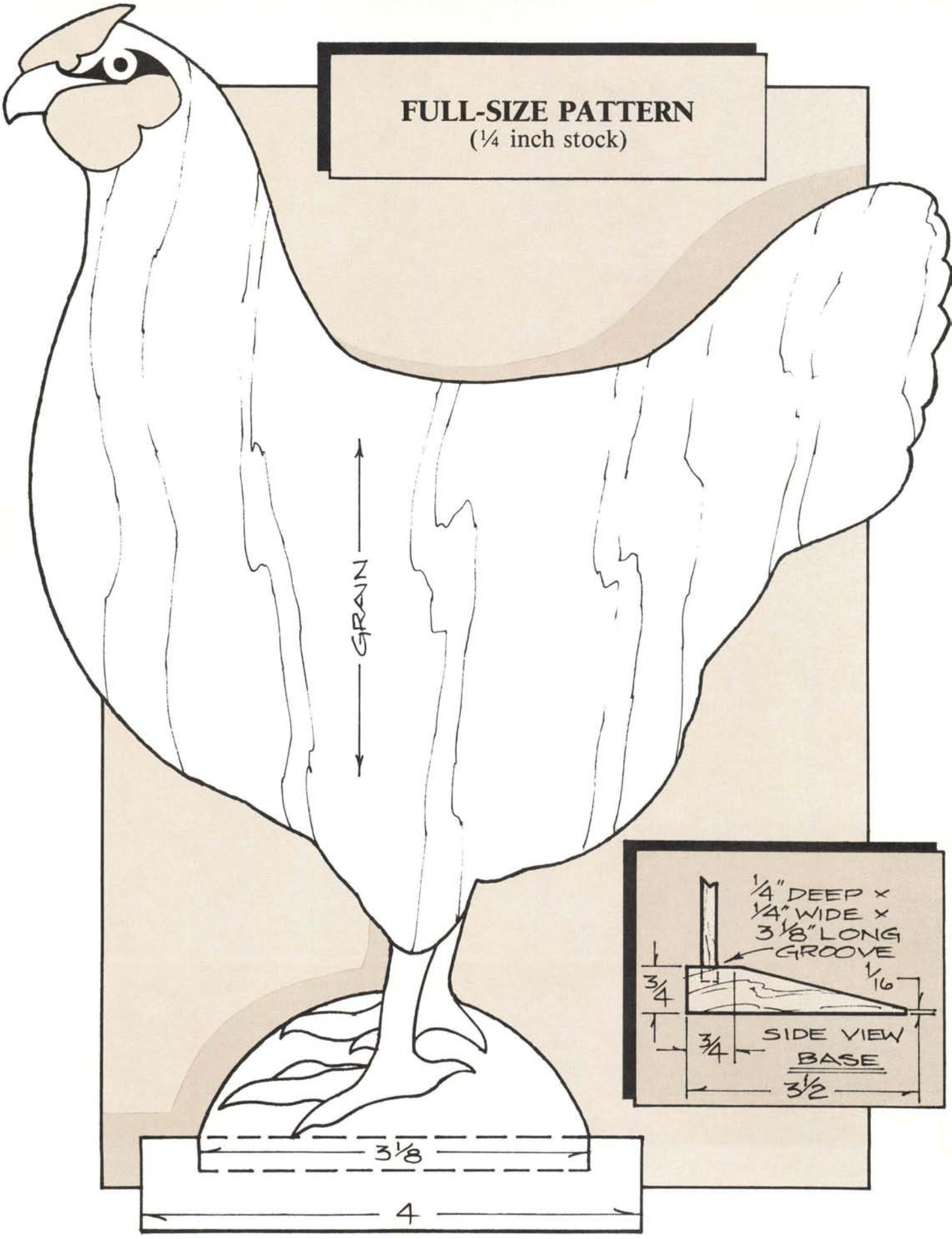
Folk Art seems to be increasingly popular these days, so we suspect that this easy-to-make painted door stop will appeal to many of our readers. The beveled back edge of the base serves as a wedge to hold the door in place.

We used ¼ in. thick solid pine for the body, but plywood can be substituted. Solid stock was chosen simply because the edges can be sanded to a smooth finish with less fuss. Plywood will have voids along the edge and they will need to be filled before painting. Even a well sanded plywood edge seems to show the laminations through paint.

A sharp smooth plane will reduce a ¾ in. thick pine board to ¼ in. thickness in short order. Avoid stock with knots though, as they make for difficult planing. Also, unless it's treated with a wash coat of shellac, the resin in the knot may bleed through the paint.

Once the stock has been planed, transfer the full-sized pattern as shown. Cut out with a band saw or scroll saw, then sand the edges smooth. Next, make the base as shown, using a hand plane to cut the taper and a chisel to chop out the ¼ in. deep by ¼ in. wide by 3⅛ in. long groove. Sand smooth, then glue the body to the base. Keep in mind that if you have an unusually wide gap between the bottom of your door and the floor, you may need to use thicker stock for the base.

Give the entire project two coats of white enamel spray paint and allow it to dry thoroughly. The remaining colors are added with a brush. To make the circular white part of the eye, place a drop of white paint on the black background, then touch it with a toothpick or other sharp pointed object. The toothpick will make the paint spread out into a near perfect circle. Once dry, use a small drop of black paint and repeat the same technique to create the pupil of the eye.


FULL-SIZE PATTERN
(¼ inch stock)
GRAIN
¼" DEEP x
¼" WIDE x
3⅛" LONG
GROOVE
1/16
¾
¾
SIDE VIEW
BASE
3½
3⅛
4

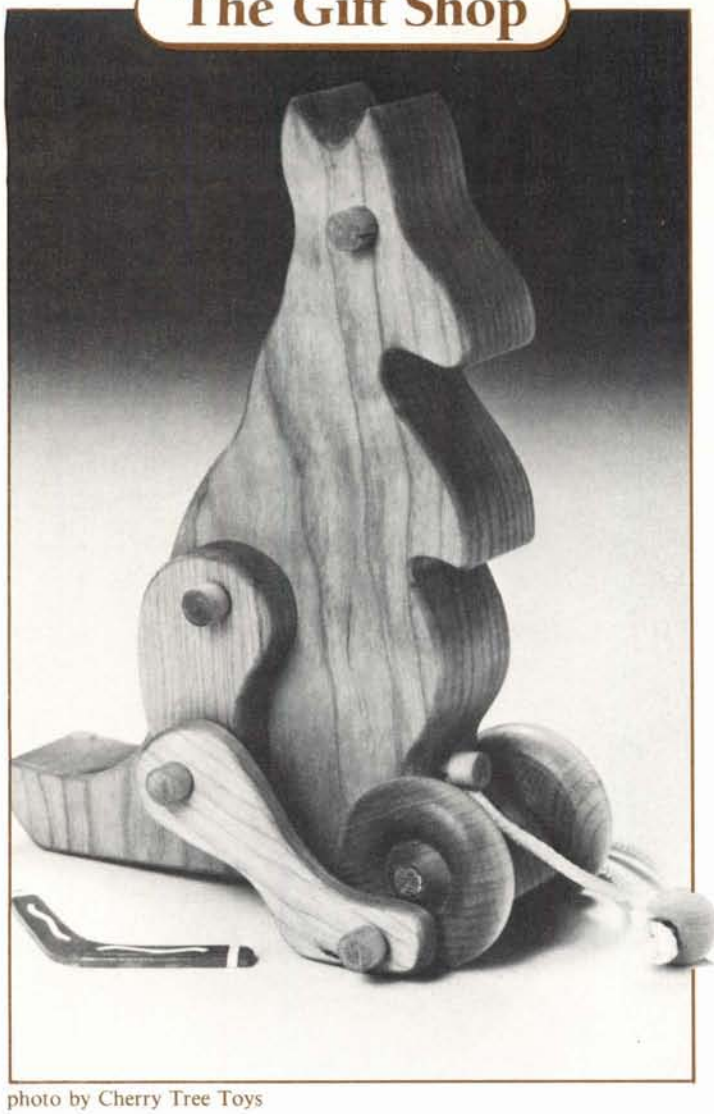


photo by Cherry Tree Toys

Kangaroo Pull Toy

This sturdy wooden kangaroo pull toy should be a big hit with 1-3 year olds. The simple wheel/leg/thigh linkage produces an interesting animation as the kangaroo is pulled along — a sure delight for the little ones.

Our kangaroo is crafted in cherry, a close-grained, durable hardwood ideal for toys, which typically must withstand considerable abuse. A 1¾ in. thick by 8½ in. wide by 10½ in. long section of board will provide sufficient stock for the body (A), thighs (B), and legs (C).

Begin by laying out a 1 in. grid pattern on the stock. Referring to our grid pattern, now transfer the profile of the kangaroo body to your stock. Transferring the profile to the grid pattern on your stock is really quite easy if you take it one grid at a time. Once the transfer is complete, your kangaroo should appear identical to the illustration.

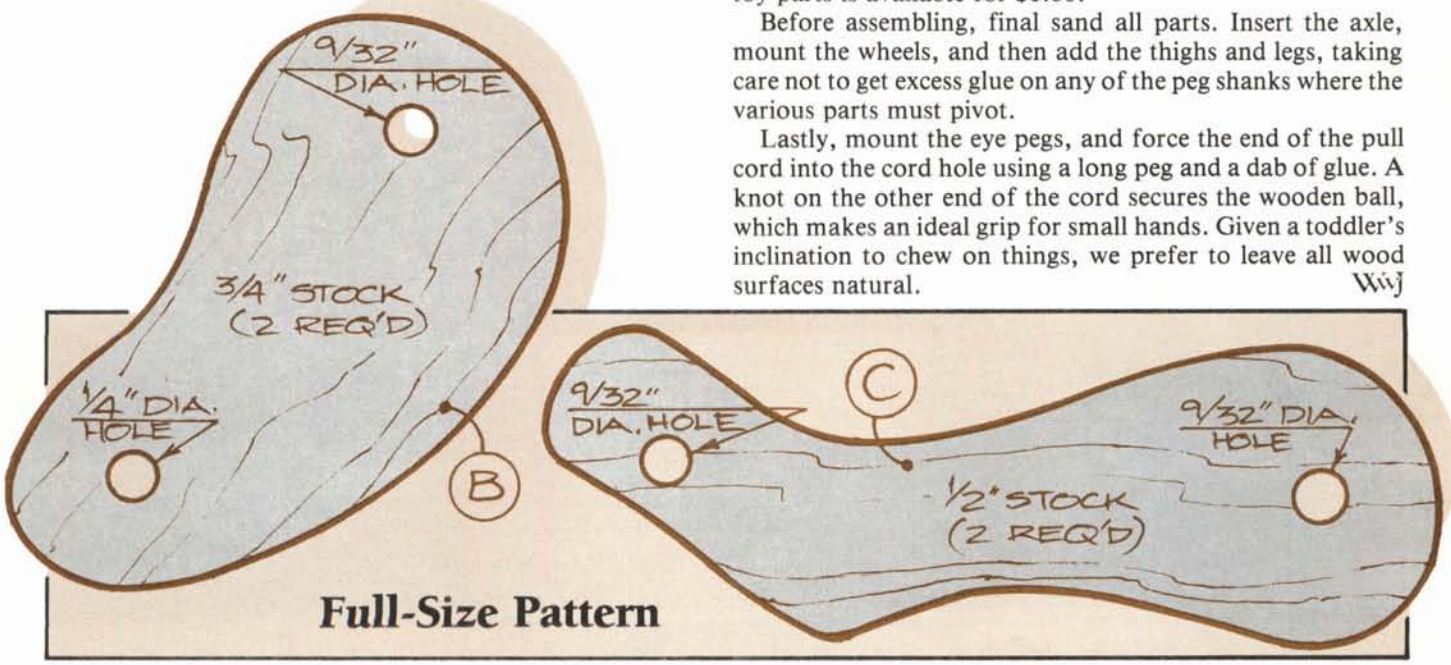
Next to the kangaroo body, lay out the profile of the thighs and legs. There is sufficient room, and you need only trace one thigh and one leg (see full-size patterns), since these parts are ¾ in. and ½ in. thick respectively and will later be resawed from the 1¾ in. thick stock.

Now use either the band saw or a saber saw to cut out the body, thigh, and leg profiles. A narrow blade in the band saw is best, since saber saws will have some difficulty managing the 1¾ in. thick stock. Resaw the thighs and legs, leaving a little extra, and then hand plane or sand to achieve their respective final thicknesses. Locate the various holes in the body, thighs, legs, and wheels, using the illustrated patterns as a guide, and then drill them out either with the drill press or by hand. Note that the axle hole in the body is 7/16 in. diameter to permit free movement of the ⅜ in. diameter axle shaft. Also note that both holes in the legs and the uppermost hole in the thighs are 9/32 in. diameter to permit free movement around the ¼ in. diameter pegs. These extra tolerances are important or there will be friction which will impede the animated motion of the kangaroo. The additional diameter of the cord mounting hole is required to accommodate both the cord and the peg.

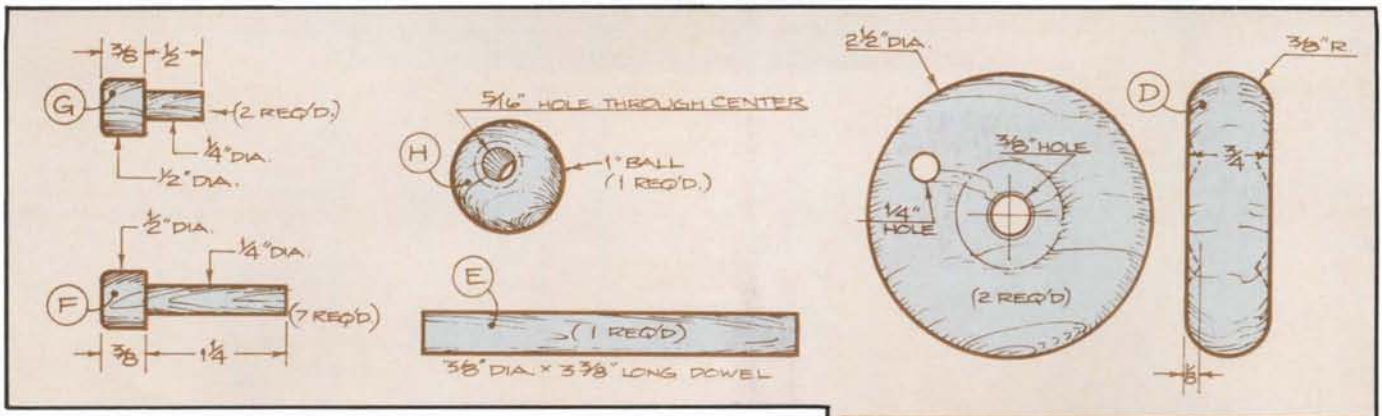
The various small parts, including the wheels (D), axle (E), pegs (F and G), ball (H) and pull rope (I) can either be made as shown, or ordered from Cherry Tree Toys, P.O. Box 369, Belmont, OH 43718. The design for the kangaroo is courtesy of Cherry Tree Toys, and their catalog listing other plans and toy parts is available for $1.00.

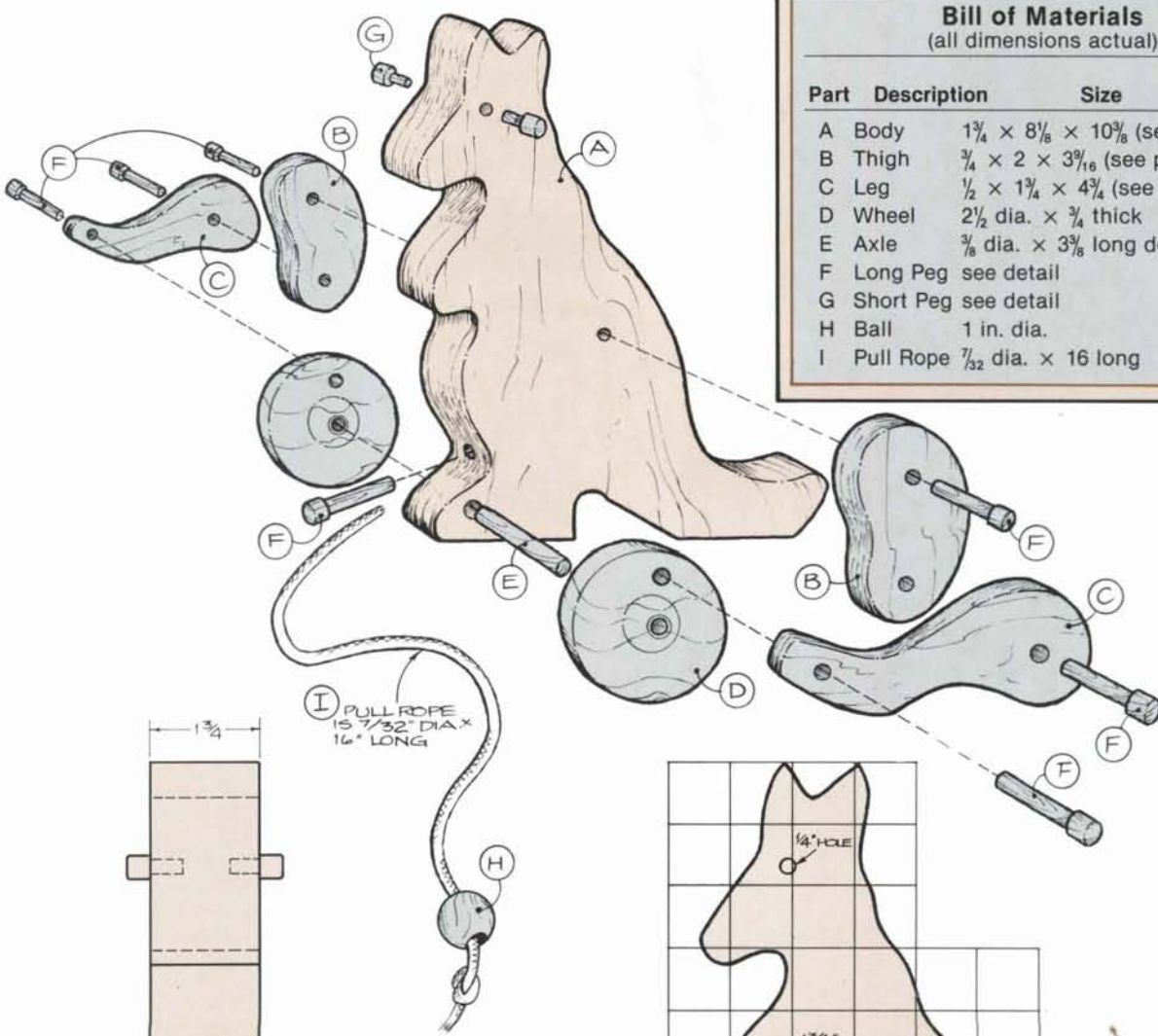
Before assembling, final sand all parts. Insert the axle, mount the wheels, and then add the thighs and legs, taking care not to get excess glue on any of the peg shanks where the various parts must pivot.

Lastly, mount the eye pegs, and force the end of the pull cord into the cord hole using a long peg and a dab of glue. A knot on the other end of the cord secures the wooden ball, which makes an ideal grip for small hands. Given a toddler's inclination to chew on things, we prefer to leave all wood surfaces natural. WWJ



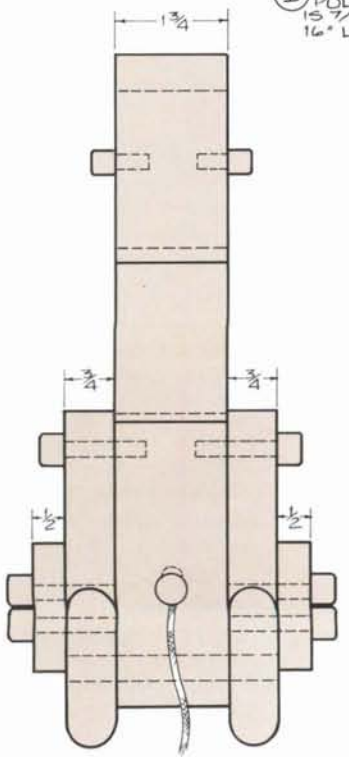
Full-Size Pattern

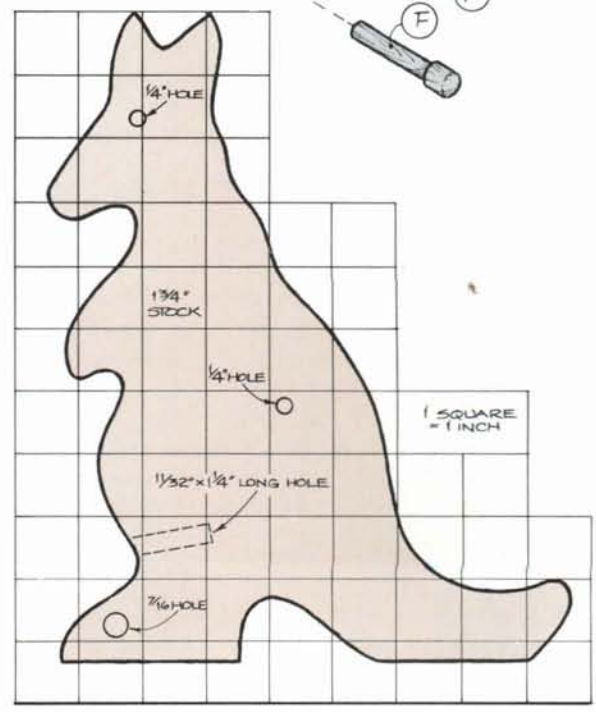




Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Body	1¾ × 8⅛ × 10⅜ (see grid)	1
B	Thigh	¾ × 2 × 3⁹⁄₁₆ (see pattern)	2
C	Leg	½ × 1¾ × 4¾ (see pattern)	2
D	Wheel	2½ dia. × ¾ thick	2
E	Axle	⅜ dia. × 3⅜ long dowel	1
F	Long Peg	see detail	7
G	Short Peg	see detail	2
H	Ball	1 in. dia.	1
I	Pull Rope	7⁄32 dia. × 16 long	1





Built by Mike Jock

Early American Wall Shelf

Easy-to-build wall shelves have traditionally been among our most popular projects. A piece such as this is well within the capability of the novice woodworker, and would even make an ideal first project. Except for the ⅛ in. thick plywood drawer bottoms, the entire piece is crafted from solid pine.

The wall shelf we show is made from ½ in. thick stock. If you don't have a thickness planer or can't find a source for ½ in. material, you may need to have ¾ in. thick stock milled down to ½ in. at your local lumberyard. Although we chose to build this piece from ½ in. thick stock because it lends the project a lighter look, another alternative would be to simply use ¾ in. stock. Take note, however, that various dimensions will change if you opt for the ¾ in. thick material.

Begin by getting out stock for parts A through J. After cutting all parts to overall length and width, refer to the various grid patterns and lay out the profiles of the sides and back. Mark out the shelf dado locations on the sides, set the dado head for a ½ in. wide by ¼ in. deep cut, and establish the shelf dadoes. Using the same dado head setting, cut the ¼ in. deep by ½ in. wide divider dadoes, and establish the rabbets on the ends of the drawer sides and front. The table saw is also used to cut the ⅛ in. wide by ¼ in. deep drawer bottom grooves in the drawer front and sides. The router, a straight cutter, and the edge guide are used to rabbet the shelf sides as shown to accept the back.

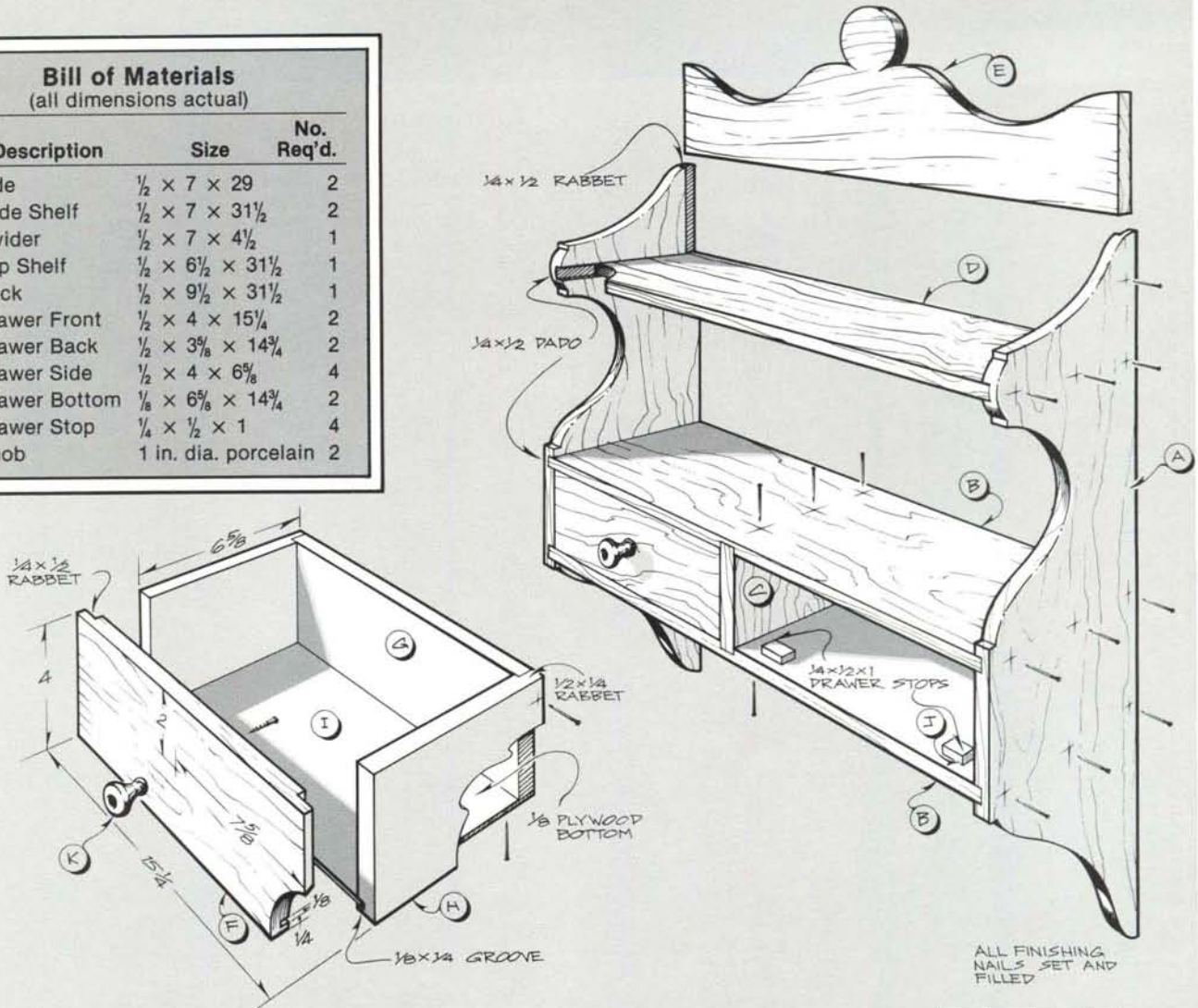
Now, use either the band saw or a saber saw to cut out the curved profiles of the sides and back. Sand as necessary to remove the saw marks, and glue and assemble the sides, shelves, divider, and back as shown. We added finishing nails, set and filled, for extra strength.

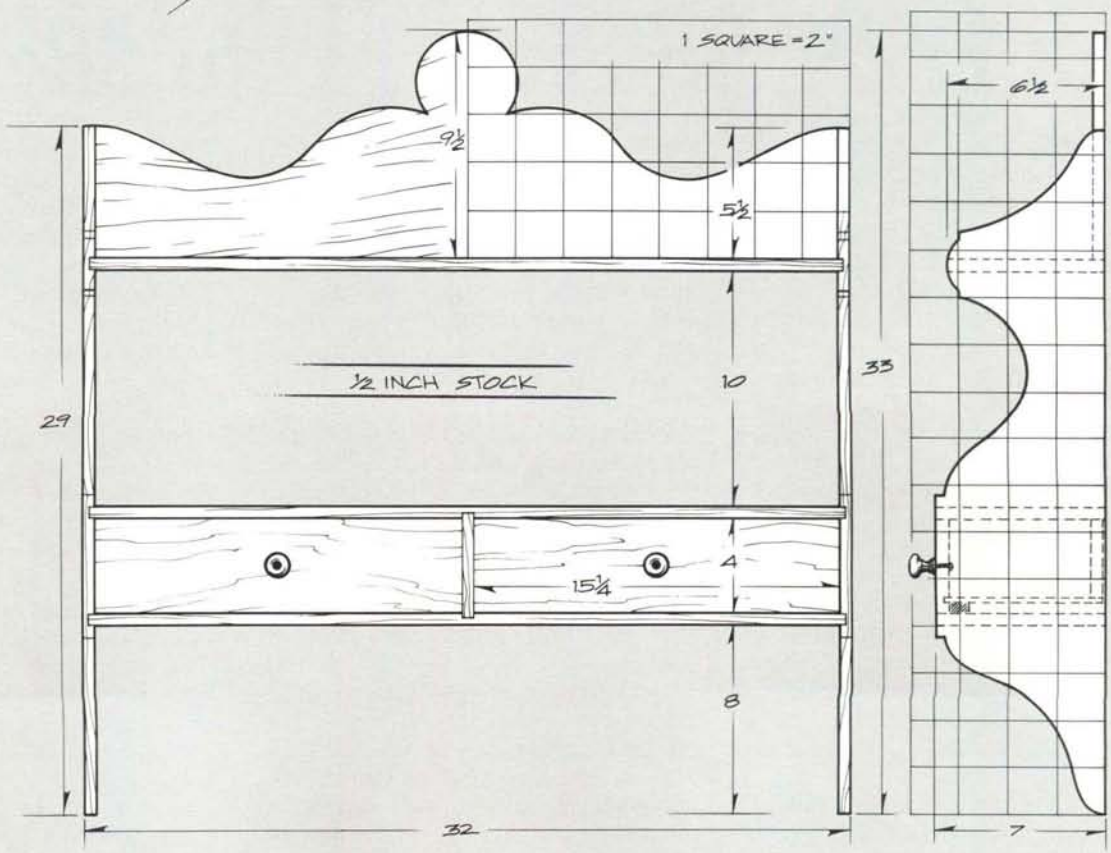
Assemble the drawers as indicated, using glue and finishing nails. Several finishing nails inserted through the drawer bottom up into the drawer back will anchor the bottoms along the back edge. As you will note from the bill of materials, the drawers are dimensioned full-size for the actual opening, and must be sanded slightly to permit ease of operation. We did allow for an ⅛ in. space at the drawer back, however. The drawer stops, which are mounted next, will keep the drawers flush with the shelf front, while the ⅛ in. space will insure that they do not bump against the wall when being closed.

After a final sanding to soften sharp edges, apply stain if desired, and finish to suit. We prefer penetrating oil, but lacquer or polyurethane will also be fine. The 1 in. diameter porcelain drawer knobs are a common item available at most hardware stores. They provide just the right touch to accent this project. WWJ

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Side	½ × 7 × 29	2
B	Wide Shelf	½ × 7 × 31½	2
C	Divider	½ × 7 × 4½	1
D	Top Shelf	½ × 6½ × 31½	1
E	Back	½ × 9½ × 31½	1
F	Drawer Front	½ × 4 × 15¼	2
G	Drawer Back	½ × 3⅝ × 14¾	2
H	Drawer Side	½ × 4 × 6⅝	4
I	Drawer Bottom	⅛ × 6⅝ × 14¾	2
J	Drawer Stop	¼ × ½ × 1	4
K	Knob	1 in. dia. porcelain	2





designed and built by Dennis Preston

Contemporary Hall Table

This classic piece combines elements of Shaker and Danish modern design to produce an attractive table that is at home in most any decor. While it could serve as either a hall or sofa table, designer/builder Dennis Preston notes that it is in fact used as a desk by his daughter.

Crafted in cherry, the table features traditional mortise and tenon and dovetail joinery throughout. The pinned apron tenons are a handsome detail, and the bevel-edged top lends the piece a certain lightness.

Start by ripping and jointing to width stock for the top (A), legs (B), aprons (C, D, F), stretchers (E, J), dividers (G), drawer runners (H), spacers (I), and cleat/guides (K). Also select stock for the drawer fronts (N, Q), which should be cut from a continuous piece of stock for the best visual effect.

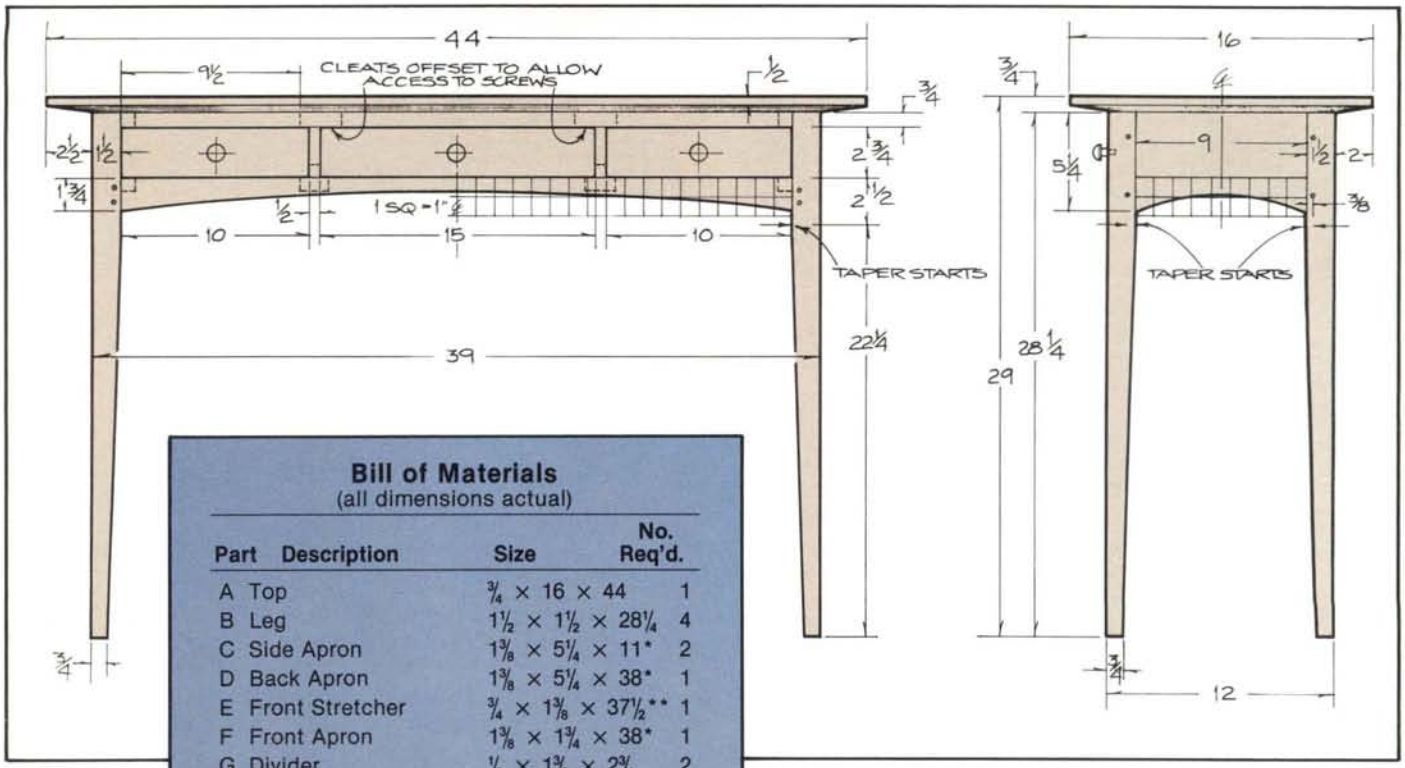
You will need to edge-glue several boards to get the width needed for the top, unless you have a source for 16 in. wide stock. After edge-gluing and clamping the top, set aside to dry while you work on the table frame. Keep in mind that while interesting figure and grain may be desirable in the top, the legs — where strength is important — should be cut from fairly straight, clear stock.

The various mortises in the legs should be laid out and cut before the leg tapers are established, since the stock is easier to clamp while square. Note that the various apron mortises will be cut through where they meet. As shown in the top view detail, all apron mortises and the dovetail for the front stretcher are slightly off-center to provide a ⅛ in. apron inset all around.

Next, cut the aprons, stretchers and drawer runners to length, allowing for the tenons and dovetails. These joints are cut and fitted before cutting the various apron curves. Note that while the tenon ends are mitered where they meet, the miters are in fact cut back slightly to prevent the tenons from bottoming and thereby possibly not fitting flush at the shoulders (see top views). Use the dado head to rip the spacer groove in part H, and don't forget to cut the mortises in the front and back aprons and front stretcher to accept the tenons on the drawer runners and top stretchers. When laying out for the top stretchers, take note that they are positioned off-center toward the midpoint of the desk. This is to provide clear access to the slotted top mounting screw holes during assembly (see front view).

With all joints cut and test-fitted, use the table saw tapering jig to cut the leg tapers which, as shown, start about 6 in. down from the top of the legs. Next, refer to the grid patterns and lay out and cut the apron curves.

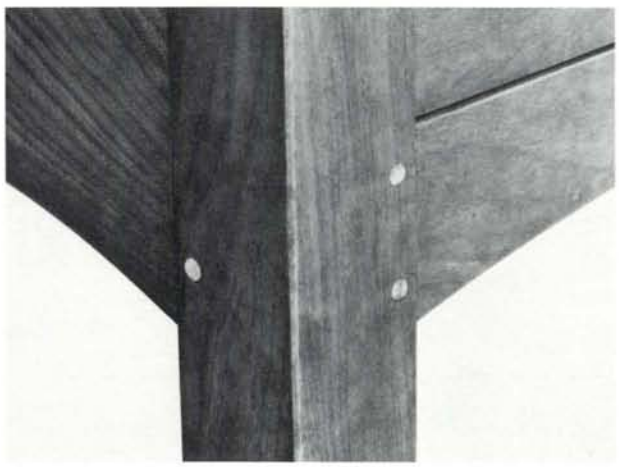
While the table assembly can be handled a number of ways, the best procedure is to assemble sections rather than attempt the whole at one



Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Top	¾ × 16 × 44	1
B	Leg	1½ × 1½ × 28¼	4
C	Side Apron	1⅜ × 5¼ × 11*	2
D	Back Apron	1⅜ × 5¼ × 38*	1
E	Front Stretcher	¾ × 1⅜ × 37½**	1
F	Front Apron	1⅜ × 1¾ × 38*	1
G	Divider	½ × 1⅜ × 2¾	2
H	Drawer Runner	¾ × 1½ × 10½*	2
I	Spacer	½ × ¾ × 9	2
J	Top Stretcher	¾ × 2¼ × 10½*	2
K	Cleat/Guide	¾ × ¾ × 9	4
L	Drawer Side	½ × 2¾ × 10⅛	6
M	Center Drawer Back	½ × 2¾ × 15	1
N	Center Drawer Front	¾ × 2¾ × 15	1
O	Center Drawer Bottom	¼ × 9⅝ × 14½	1
P	Side Drawer Back	½ × 2¾ × 10	2
Q	Side Drawer Front	¾ × 2¾ × 10	2
R	Side Drawer Bottom	¼ × 9⅝ × 9½	2
S	Knob	1 in. dia. × 1½ long	3

*Length includes tenons.
**Length includes dovetails.



time. Start by assembling the two back legs and back apron, and the front legs, front apron and front stretcher. Join these two assemblies with the side aprons, drawer runners, and top stretchers. Finally, add the dividers, spacers, and cleat/guides to complete the table frame.

As illustrated, all the mortise and tenon apron joints are reinforced with ⅛ in. diameter dowel pins. The addition of these dowel pins, besides providing extra strength, produces a nice visual detail, highlighting the construction.

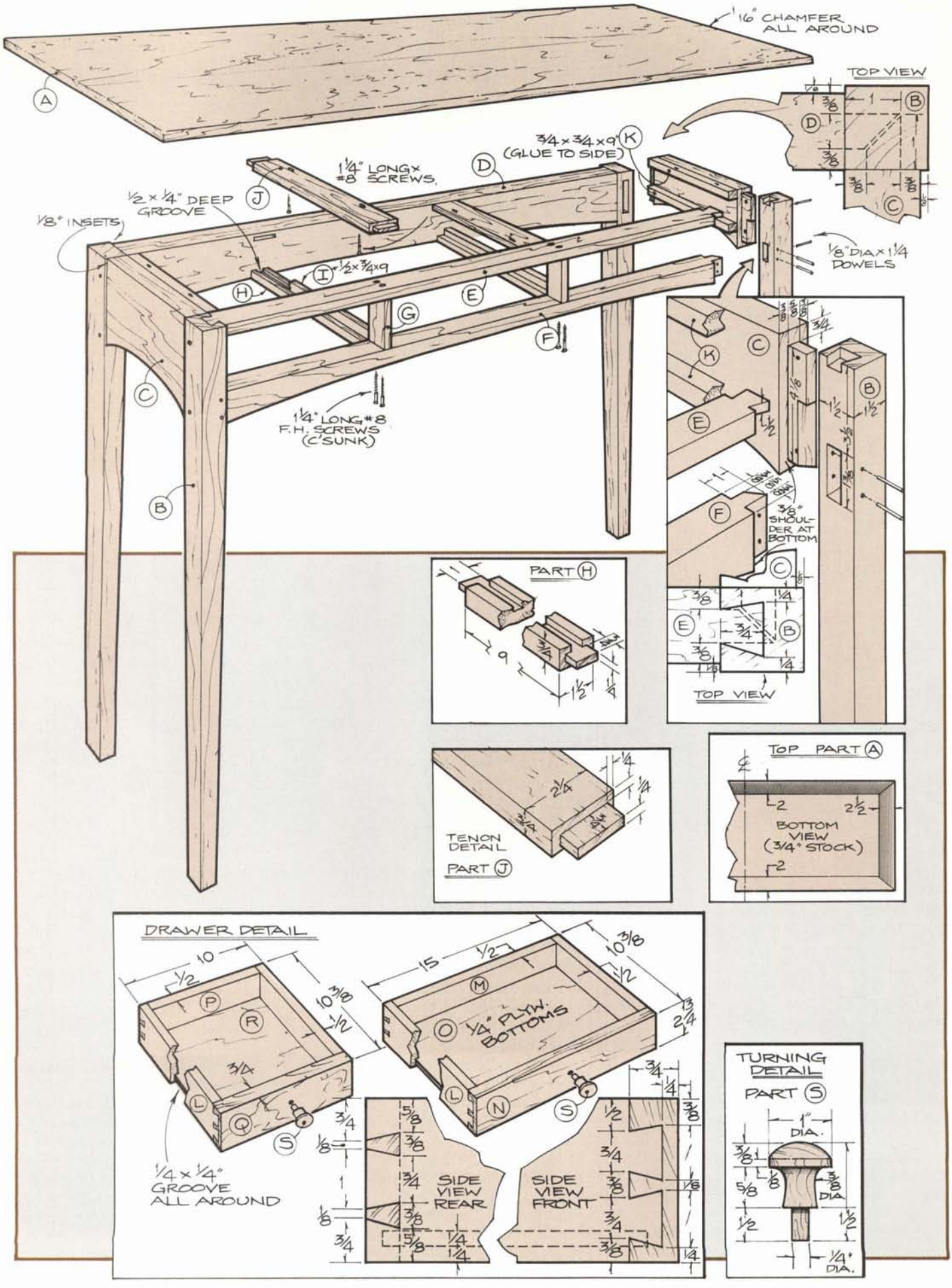
You will want to make and fit the drawers before mounting the top. While the drawer fronts are solid cherry, the remaining drawer parts (L, M, P) can be a secondary wood such as poplar. Since the dovetail layout for all the drawers is the same, you may want to make a template to help speed the dovetail layout. The dado head can be used to cut the ¼ in. by ¼ in. grooves in the drawer fronts, back and sides to accept the ¼ in. thick plywood drawer bottoms (O, R).

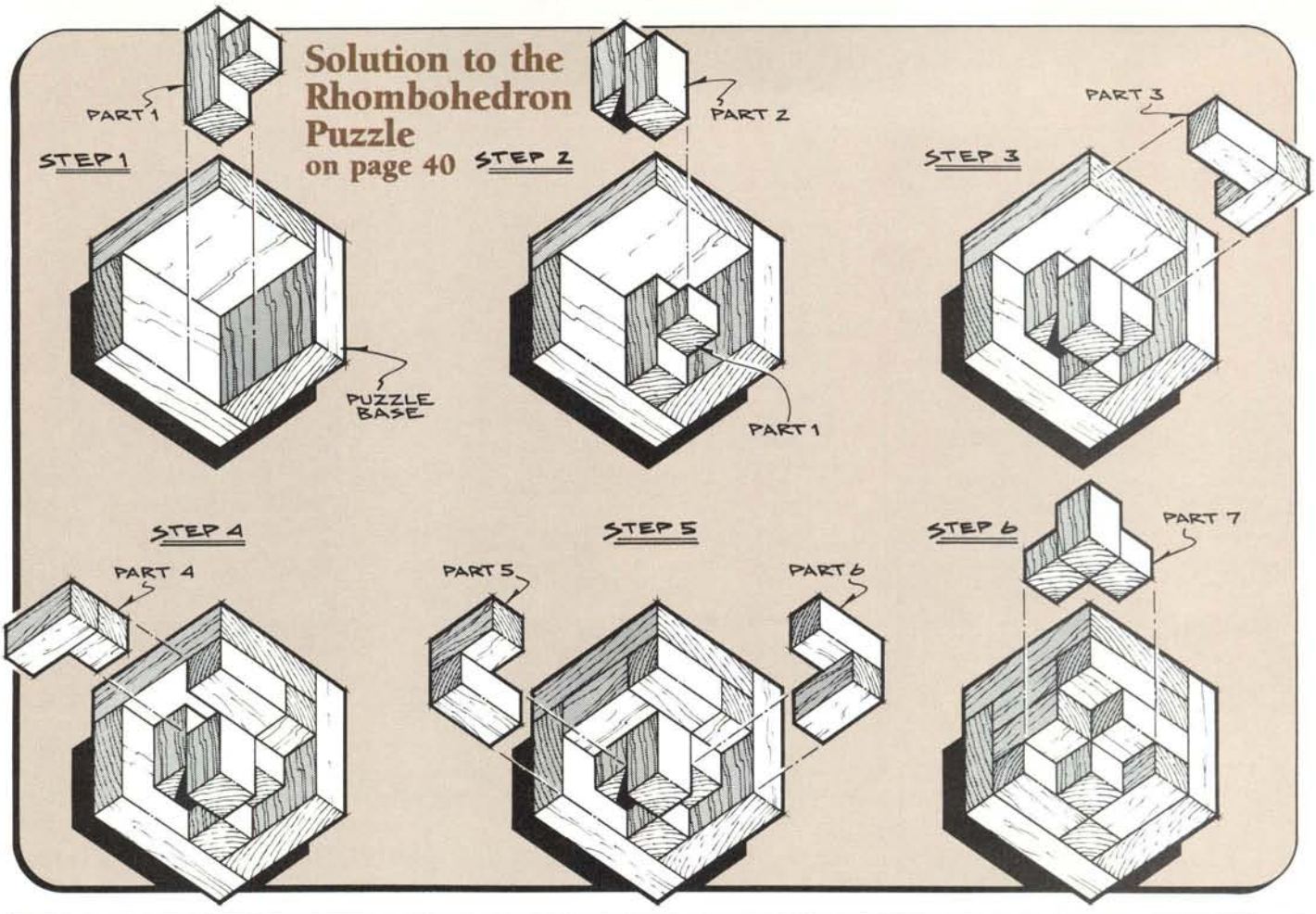
After the drawers are glued up (check for squareness), they must be final fitted. Since the bill of materials drawer stock dimensions *do not* allow for clearance, lightly sand or hand plane as needed to get a smooth, easy drawer movement. The drawer knobs (S) may be turned as shown (see knob detail) from scrap.

The tabletop is now hand planed to establish the 2½ in. tapers on either end and the 2 in. tapers on the front and back. The Special Techniques feature on pages 24 through 26, detailing how to hand plane bevel-edged drawer bottoms, should be of some help here, since the tabletop is just a larger version of a bevel-edged drawer bottom. After centering, mount the top with 1¼ in. long number 8 flathead wood screws inserted up through the slotted holes in the top stretchers and cleats.

Assembly Tip: You may want to temporarily clamp the ¾ in. by ¾ in. by 9 in. guides (K) in position to help fit the drawers, but do not permanently glue them in place until *after* the top is mounted. This will provide you with clear access to the slotted screw holes in the cleats (same part number as guides) and facilitate the top assembly.

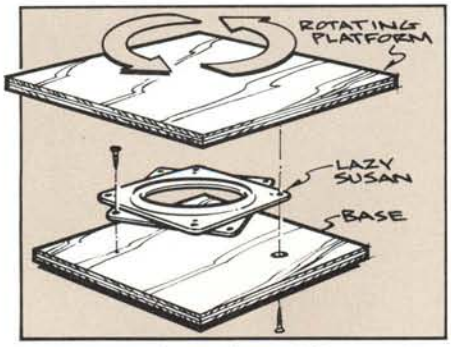
Final sand, then finish the table with two coats of Watco Clear Oil, topped off with a hand-rubbed application of paste wax. Paraffin wax on the drawer guides will help reduce friction and wear on these surfaces. WWJ


1/16" CHAMFER ALL AROUND
A
TOP VIEW
B
D
C
3/4 x 3/4 x 9" (GLUE TO SIDE)
K
1 1/4" LONG x #8 SCREWS
D
J
1/2 x 1/4" DEEP GROOVE
1/8" INSETS
I 1/2 x 3/4 x 9
H
G
E
F
1/8" DIA x 1 1/4 DOWELS
1 1/4" LONG #8 F.H. SCREWS (C'SUNK)
C
B
K
C
B
E
F
3/8" SHOULDER AT BOTTOM
E
C
B
TOP VIEW
PART H
9
TENON DETAIL
PART J
TOP PART A
BOTTOM VIEW (3/4" STOCK)
DRAWER DETAIL
P
R
Q
L
S
M
O 1/4" PLYW. BOTTOMS
L
N
S
1/4 x 1/4" GROOVE ALL AROUND
SIDE VIEW REAR
SIDE VIEW FRONT
TURNING DETAIL
PART S
1" DIA.
3/8 DIA.
1/4" DIA.



Shop Tips

A simple turntable made up of two pieces of particleboard, with a lazy Susan bearing in between, makes it easier when I finish a project with spray lacquer. The turntable enables



me to rotate the project while spraying. This eliminates the need to pick up and turn the project, or to have to try and move around the piece.

David Miller, Annville, Penn.

It is often desirable to cushion tabletop items such as trivets, tape dispensers, or small boxes. As an easy and inexpensive alternative to cork or felt, try using 100 percent silicone sealant conveniently sold in a squeeze tube at any hardware store. I apply a few dabs or lines on the bottom of the item and then place it on a flat surface with a piece of wax paper underneath. The weight of the object levels out the coating as it dries.

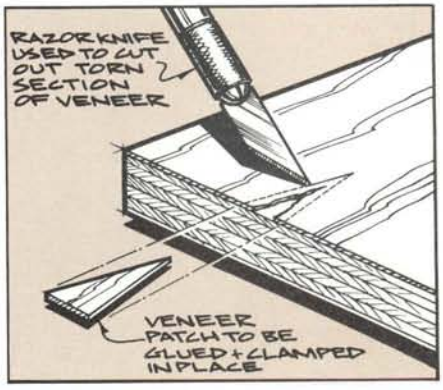
Juan Christian, Brush Prairie, Wash.

It's a simple matter to make imitation cut nails. File the heads of any size flathead nails to an irregular rectangle, then put them in a jar with some salt, vinegar, and a little water. After a few days the nails will rust and darken, looking very much like old cut nails.

Donald A. Keiser, Saginaw, Mich.

A thin coat of paraffin wax applied to the surface of a jointer infeed table will help stock slide smoothly. However, don't wax the outfeed table because you'll run the risk of getting wax on an area of the stock that may be glued later on — and glue won't stick to wood that's waxed.

Veneered plywood sometimes tears when cut on the table saw. However, the damage can be effectively corrected if you use a razor knife to cut out a



triangular shape of veneer as shown, then cut a matching piece to serve as a patch. The triangular shape makes the patch less noticeable than a square or rectangular shape.

The Woodworker's Journal pays $25 for reader-submitted shop tips that are published. Send your ideas (including sketch if necessary) to: ***The Woodworker's Journal,*** *P.O. Box 1629, New Milford, CT 06776, Attention: Shop Tip Editor.*

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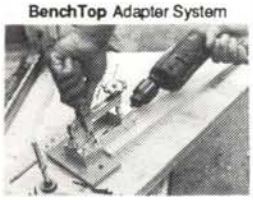

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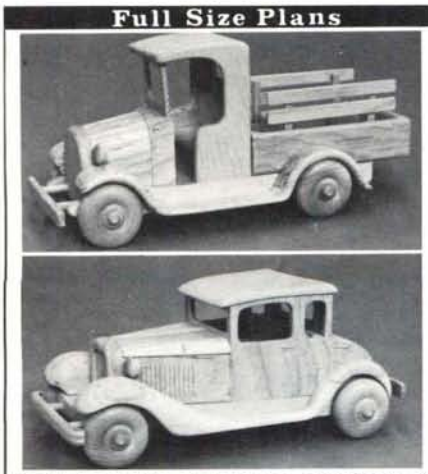

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Queen Anne Lowboy, Television/VCR Stand, Early American Pine Corner Cupboard, Toy Tool Set, Windspinner, Woodchopper Whirligig, Chinese Puzzle, Cut-off Jig, Blanket Chest, Shaker Harvest Table, Blacksmith's Tool Tray, *Articles:* A Guide to Photographing Your Work; Applying Shellac and Lacquer; Sharpening Plane Blades and Chisels; Installing Machine Woven Cane; American Queen Anne, 1715-1755; General Woodworking Suppliers.

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Colonial Schoolmaster's Desk, Contemporary Sideboard, Mahogany End Table, Victorian Hall Tree, Cutlery Wall Cabinet, Swing-out Plant Hanger, Prancing Horse Silhouette, Block Puzzle, Iron Caddy, Toy Ironing Board, Early American Water Bench, Wooden Smooth Plane, Shaker Sewing Box, *Articles:* A Craft Fair Visit; How to Use Stick Shellac; A Guide to Circular Saw Blades; Making Bent Laminations; Country Colonial Furniture.

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Freestanding Shelf System, Chippendale Bachelor's Chest, Oriental Serving Tray, Country Bench, Antique Knife Tray, Tape Dispenser, Valentine Box, Toy Tow Truck & Car, Shaker Drop-leaf Table, Shop-made Bow Saw, Child's Settle Bench, Plate Shelves, *Articles:* On Getting Paid for Your Work; Weaving a Fiber Rush Seat, Part II; Table Saw Crosscutting: Techniques & Tips; Router-Lathe Fluting: A Shop-made Approach; Chippendale Furniture; Special Section: Back Issue Index.

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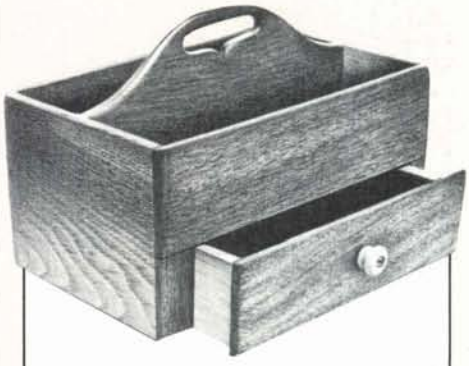
Vol. 10 No. 6 Nov-Dec '86

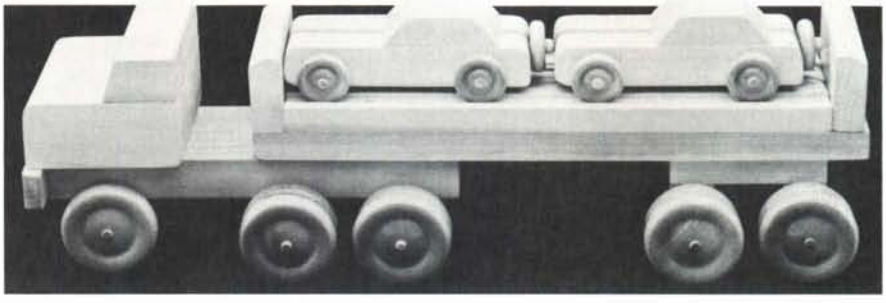
Early American Hamper, Cube Table, Rabbit Pull Toy, Old-Time Sled Wall Shelf, Cassette Tape Holder, Dog/Cat Bed, Vanity Mirror, Early American Washstand, Router Table, Victorian Sleigh, *Articles:* Wholesale and Discount Sources of Supply; Sandpaper Abrasives; Using the Router Table; The Mitered Bead Frame and Panel; Clock Parts Suppliers.



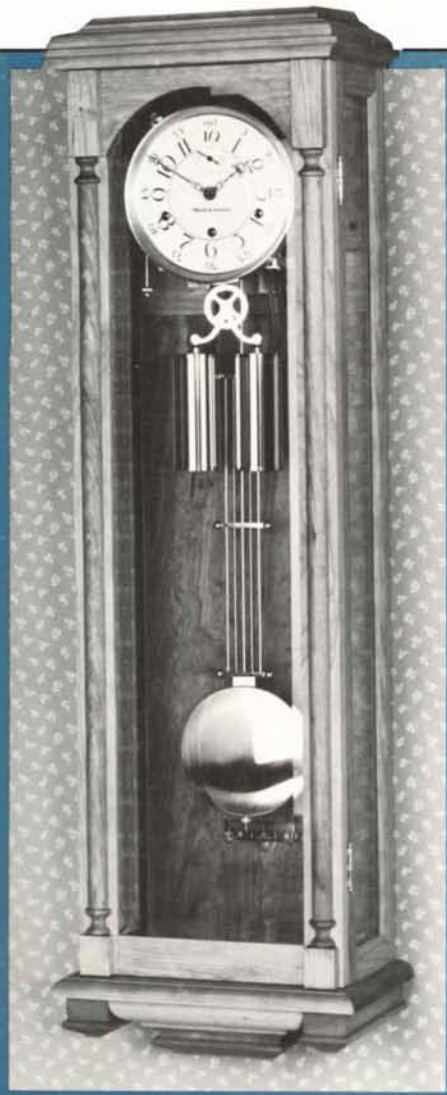
Antique Knife and Fork Tray J/F '86

Vol. 11 No. 1 Jan-Feb '87

Shaker Blanket Chest, Glass-Top Dining Table, Dovetailed Stool, Jewelry Box, Door Harp, Toy Firetruck, Canada Goose Mobile, Balancing Sawyer Folk Toy, Early American Style End Table, Jointer Push Board, *Articles:* Direct Mail Promotions — Defining the Market for Your Work; Old Wood; The Mortise and Tenon, Part I; Combination Hand/Router Dovetailing; Special Section: Back Issue Index.



Toy Car Carrier J/F '84



Vienna Regulator Clock

Next issue

Here are a couple of the projects we've lined up for the May/June 1987 issue of

The Woodworker's Journal

Medicine Cabinet

. . . . . and more