



Tools for Rehandling



Diagram of the wedge slot and end grain of ax handles.

Fastening Wedges

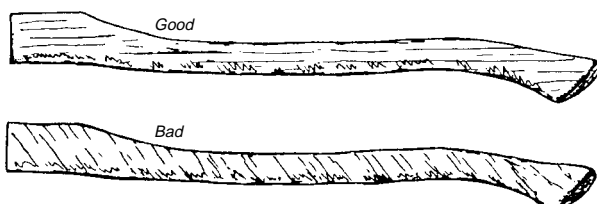
The best wedges for securing tool heads are hardwood or plastic. Plastic wedges are superior and maintain strong joints because they resist changes in moisture. Avoid metal wedges for fastening heads to handles; these crush and weaken handle wood and make broken handles difficult to remove by drilling.

Sometimes a handle may need only a new wedge because the handle was not broken but loosened. In this case, carefully drill out the old wedge; remove the handle; clean the slot; and replace the handle on the head.

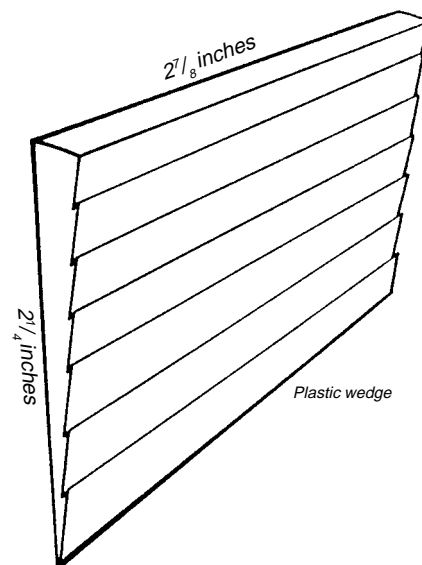
About Rehandling

Wood handles are common to most trail tools and are the most common type of replacement handle. Hickory makes the best handles for impact tools because it combines hardness and stiffness with excellent resiliency. For bent handles or simple handholds, ash is usually used.

When choosing tool handles, remember that straight grains offer maximum flexibility and strength. If possible, the grain should also be tight and knot-free, and it should run parallel to the wedge slot. Avoid coated handles. Painting or staining can hide flaws in materials or construction.



The grain of ax handles should run parallel to the wedge slot.



Plastic wedges work best for securing tool heads.

Rehandling Procedures

Regularly inspect all tool handles and replace any cracked, rough, or badly weathered handles as soon as possible. When a tool needs a new handle, follow this step-by-step procedure. We have selected ax handles as the example for this discussion, but the technique is adaptable to other trail tools:

- ❑ Clear the eye of the tool. To remove worn or broken handles from the eye of a tool, place it upright in a vise and drill several holes into the wood from the top. These holes relieve pressure on the wood inside the eye so it can be driven out with a hammer and punch. If heads are epoxy-bonded to handles, soak the head in boiling water to soften the bond.
- ❑ Size up the tool and match an appropriate handle to the head. All handles will need some reshaping by hand to fit the head. Be sure that the top of the handle will fill the eye of the tool in both length and width.
- ❑ Saw the handle to an approximately correct length. If the handle was not factory sawed to accept a wedge, remove the head, secure the handle, and carefully saw down about two-thirds the depth of the head.
- ❑ Inscribe two perpendicular centering lines across the length and width of the handle end inside the eye. You will use them as a guide/check for centering the handle in the eye later. Make an additional mark below the head and just above where the handle broadens to denote the final seat for the head.
- ❑ Slowly remove excess material from the handle using a spoke shave, wood rasp, or grinder.
- ❑ Fit the eye of the tool to the handle. Light tapping on the tool head will allow repeated removal of the handle without damaging the wedge slot. Continue shaving and fitting until the head rests squarely $\frac{1}{4}$ to $\frac{3}{8}$ inch above the final seating mark. Make sure that the head is straight on the handle.
- ❑ With tool head aligned perpendicular with the handle, draw a line across both sides of the handle at the final seating mark. Saw a shallow cut along these lines to create a square shoulder. Fit the tool head to rest lightly on this shoulder.
- ❑ With rasp and sandpaper, uniformly backslope the handle from the perimeter of the handle to where the head finally seats. Carefully smoothing the handle just below the head prevents splintering.
- ❑ Use a long tapered wedge that extends the full width of the slot to attach the head to the handle. Drive the wedge into the slot, and tap alternately on the wedge and the end of the handle until the striking tool bounces off each with equal force. Use epoxy to fill remaining voids between the handle and the eye and seal out moisture.
- ❑ After the epoxy sets, trim excess wood flush with the top of the head. A hacksaw works best here because the blade will not be dulled by the metal, and because the saw blade can be turned 90° on the frame.
- ❑ Remove any varnish or paint from the handle. A light coating of raw linseed oil regularly applied will protect against drying and cracking. Some woods workers recommend drilling short holes in the base of the handle and periodically filling them with linseed oil. The oil penetrates the entire handle through natural pores in the wood.
- ❑ A loose handle can be temporarily tightened in the field by soaking the head in water or linseed oil. The wood in the head swells to accommodate the fluid and fits tighter in the eye. Make permanent repairs as soon as possible.
- ❑ Handles may also be shaved to fit individual grips more comfortably to reduce impact shock and hand and arm cramps. When shaving handles, proceed slowly and carefully; it is better to remove too little wood and have to trim again than to remove too much and have a weak or unusable handle.



A—Size up the tool head and match it to the handle. Note that the handle protrudes excessively long through the head. Scribe it to be cut off.



C—A line has been scribed below the roughly-fitted handle. The line denotes the final shoulder upon which the head sets.



B—Saw the handle to about the correct length. The handle has been roughly fitted so the head slides to within about $\frac{1}{2}$ inch of the final seating position.



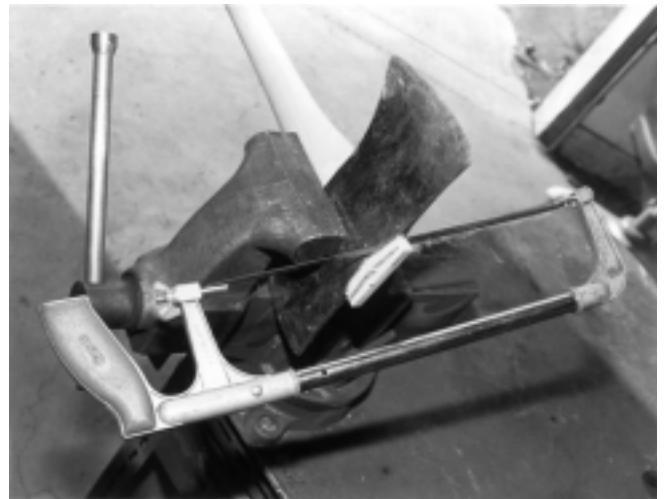
D—The tool head has been snug-fitted to the square seating shoulder. Note that there is about $\frac{1}{2}$ inch excess handle above the head.



E—All surfaces just below the handle should be sanded smooth before the head is placed to insert the wedge. The wedge has been started in kerf.



F—The wedge has been driven home with the alternate driving of the wedge and the end of the tool handle.



G—Use a hacksaw to trim off the excess handle and wedge flush with the tool head. Turn the saw blade 90° on the frame to facilitate the flush cut.



H—The finished mounted tool. The handle can be finish-sanded and oiled with raw linseed oil to protect against moisture.



Bibliography

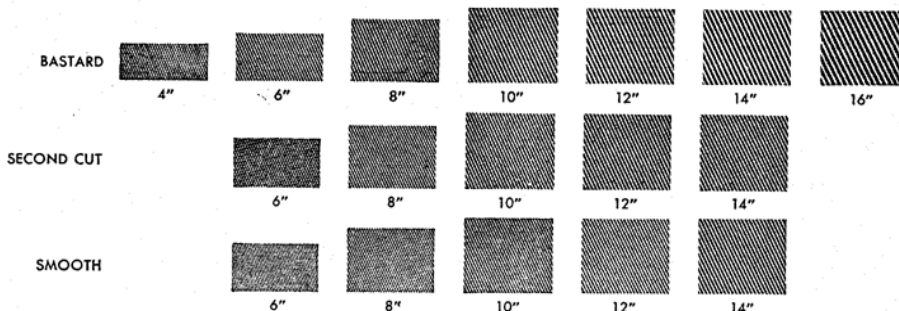
- Graves, W.D. *Sharpening Edge Tools*, Scientific American 108:143, Feb. 8, 1913.
- Jackson, Alberts and David Day. *Tools and How to Use Them*, Knopf, NY, 1978.
- Juranitch, John. *Sharpening Secrets of a Pro*, Popular Science, Feb., 1977.
- Kephart, Horace. *Camping and Woodcraft*, Macmillan Co., NY, 1978.
- Langsner, Drew. *Country Woodcraft*, Rodale Press, Emmaus, PA, 1978.
- Miller, Warren. *Crosscut Saw Manual*, Tech. Rep. 7771-2508-MTDC, USDA Forest Service, Missoula Technology and Development Center, Missoula, MT, 1978.
- New York Hand Tools Institute. *Proper Uses and Common Abuses of Striking and Struck Tools*, Hand Tools Institute, NY, 1973.
- Proudman, Robert D. *AMC Field Guide to Trail Building and Maintenance*, Appalachian Mountain Club, 1977.
- Sloane, Eric. *A Museum of Early American Tools*, Ballantine Books, NY, 1964.
- U.S. Department of Agriculture. *Handle on a Round Point*, 16-mm film, Washington, DC, 1959.
- U.S. Department of Agriculture. *Safety Depends on YOU*, 16-mm film, Washington, DC, 1959.
- U.S. Department of Agriculture. *Only a Bunch of Tools*, 16-mm film, Washington, DC, 1949.
- U.S. Department of Agriculture. *Sharp as a Razor*, 16-mm film, Washington, DC, 1967.
- USDA Forest Service. *Fireman's Handbook*, Pacific Southwest Region, 1937; and *Fireman's Handbook*, Northern Region, 1968.
- USDA Forest Service. *Health and Safety Code Handbook*, Washington, DC, June, 1979.
-



Appendix—American Pattern Files

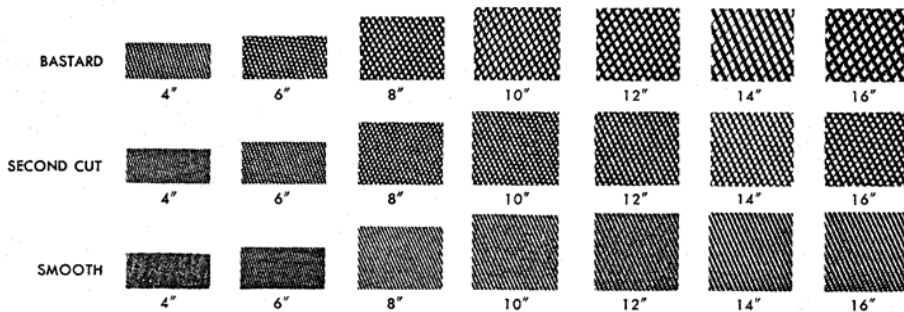
MILL FILES

The following illustrations show the actual coarseness of Mill files.



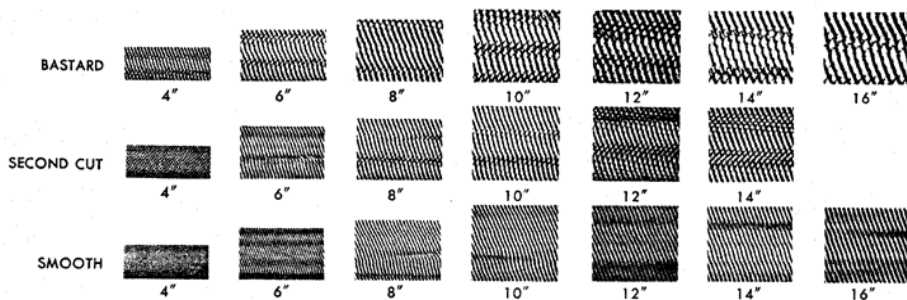
FLAT FILES

The following illustrations show the actual coarseness of Flat files.



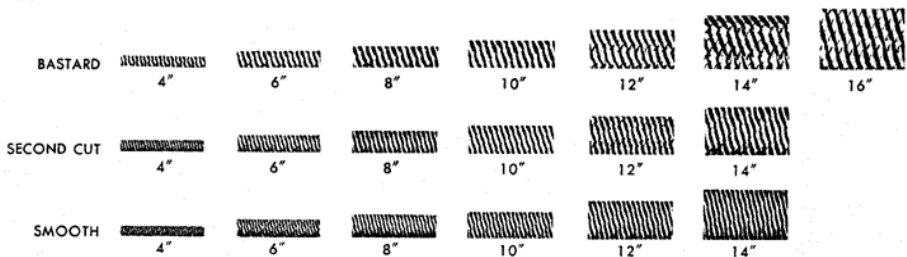
HALF ROUND FILES

The following illustrations show the actual coarseness of Half Round files.



ROUND FILES

The following illustrations show the actual coarseness of Round files.





A dze hoe	19	Folding pruning saw	10	Pruning saw	10
Anvil lopping shears	23	Fulcrum	21,32,34	Prying bars	22,32
Arc-ground saw	7	G loves	5,9,15,27,31,41	Pulaski	17,39
Asymmetric crosscut saw	6	Goggles	17,18,41	R aker teeth	8
Axes	14,15,25,37	Grass hook	28	Rasp	43
B ank blades	24	Grass nail	27	Rasp cut	39
Bark spuds	35	Grass whip	28	Rehandling	42
Bars	22,32	Grinders	18,38,40	Round file	47
Bastard cut file	39	Grinding wheel	40	S afety	5,6,14,17,18,21,24,26,31,41
Bastard file	23,25,26,40,47	Grindstone	38	Sandstone wheel	38,40
Bench grinder	40	Grub hoe	17,19	Sandvik ax	25
Bevel angle	40	Grubbing tools	17-19	Saw	6
Bevel edge	29,38,41	H ammers	29,31	Scythe	27
Blade bevel	38	Hammering tools	29	Segment-ground saw	7
Block and tackles	32	Hand chain saw	8	Shaping tools	38-41
Bow saw	8,9	Hand drilling hammer	29	Sharpening	9,11,15,17-19,21,22,26,27,35,38,40
Broadaxes	14,36,37	Handles	10,14,19,30,42	Sharpening stone	41
Brush axes	25	Hand pruner	32	Sharpening tools	38,41
Brush cutters	24	Hatchet	15	Shears	23
Brushing tools	23-36	Hauling tools	32,34	Sheaths	5,6
Bucking crosscut saw	6	Hazel hoe	19	Shovels	21
Bush hook	24	Hewing	36	Sickle	28
C ant hook	33	Hoes	17-19	Single-bit ax	14
Carpenter's adze	36,37	Hook-type lopping shears	23	Single jacking	29
Clamp-type bow saw	8	J am pike	33	Sledge hammer	29
Chisel tip	18	K erf	8	Snath	27
Clearing knife	25	Kinking	8	Stone sledge	29
Combi tool	17,18	Knuckle guard	39,40	Storing saws	7
Combination tool	17,18	L evers	13,21,31,32	Swan neck hoe	20
Corn knife	27	Lifting tools	32,34	Swedish brush ax	25
Council bank blade	25	Limbing	9-11	Symmetric crosscut	6
Crescent-ground saw	7	Log dogs	37	T ackle	32
Crosscut saw	8	Lopping shears	23	Tamping bar	22
Crosscut sheath	7	Lubricating	8,9,41	Tamping tools	22
Crowbar	32	M achete	26	Taper-ground crosscut saw	6
Cutter mattock	19	Mattocks	19	Telescoping tree pruner	12
Cutting adze	36,37	Mauls	29	Timber carrier	34
D igging bar	22	McLeod	18	Tobacco knife	27
Digging tools	21	Mill file	39,47	Tongs	34
Double-bit ax	14	N ailing hammer	31	Transporting tools	5,7,10,15,17,21-23,27,34,35
Double-edge pruners	10	Nib	27	Tree pruner	11
Double jacking	29,31	Notching	8,15	Tree trimmer	15
Draw hoe	20	P eavy	33	U nderbucking	8
Drawknife	35	Peeling spud	35	Undercutting	8
Driving sledge	29	Peeling tools	35-37	Utility saw	11
E lectric bench grinder	40	Pick	18,21	W edges	8,13,42
Engineer's hammer	30	Pick mattock	19	Weed cutter	26-28
Entrenching tool	17	Plumb-hammer hatchet	16	Weed hook	28
F astening wedges	42	Pole pruner	11,12	Weed knife	26,28
Feathers	29	Pole saw	11	Wheelbarrow	33
Felling crosscut saw	6	Pounding tools	29-31	Whetstone	18,23,26,28,34,35,41
File brush	40	Pruners	10,23	Woodsmen's Pal	26
Files	15,18,21,23,25,38,39				
Fire hose saw sheath	7				
Flat-ground crosscut saw	6				

Library Card

Hallman, Richard G. 1988. Handtools for trail work. Tech. Rep. 8823-2601-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 49 electronic p.

Describes the handtools commonly used by Forest Service trail crews for sawing, chopping, grubbing, digging and tamping, brushing, pounding and hammering, lifting and hauling, peeling and shaping, sharpening, and rehandling. Includes many illustrations of the tools.

Keywords: axes, hammers, hand tools, saws, sharpening, tools.

Additional single copies of this document may be ordered from:

USDA Forest Service, MTDC
Building 1, Fort Missoula
Missoula, MT 59804-7294
Phone: (406) 329-3900
Fax: (406) 329-3719
IBM: pubs/wo,mtdc
E-mail: pubs_wo,mtdc@fs.fed.us

An electronic copy of this document is available on the Forest Service's FSWeb intranet at:

<http://fsweb.mtdc.wo.fs.fed.us>

For further technical information, contact Gary Hoshide at the address above.

Phone: (406) 329-1029
Fax: (406) 329-3719
IBM: ghoshide/wo,mtdc
E-mail: ghoshide_wo,mtdc@fs.fed.us