

HOW TO MAKE AN ARROW

Fletching is a very old art and, necessarily, must have many empirical methods and principles involved. There are innumerable types of arrows, and an equal number of ways of making them. For an excellent description of a good way to make target arrows, the reader is referred to that chapter by Jackson in the book *American Archery*.

Having learned several aboriginal methods of fletching and studied all the available literature on the subject, we have adopted the following maneuvers to turn out standard hunting arrows: The first requisite is the shaft. Having tested birch, maple, hickory, oak, ash, poplar, alder, red cedar, mahogany, palma brava, Philippine nara, Douglas fir, red pine, white pine, spruce, Port Orford cedar, yew, willow, hazel, eucalyptus, redwood, elderberry, and bamboo, we have adopted birch as the most rigid, toughest and suitable in weight for hunting arrows. Douglas fir and Norway pine are best for target shafts; bamboo for flight arrows.

The commercial dowel, frequently called a maple dowel, is made of white birch and is exactly suited to our purpose. It may be obtained in quantities from dealers in hardwoods, or from sash and door mills. If possible, you should select these dowels yourself, to see that they are straight, free from cross-grain, and of a rigid quality. For hunting bows drawing over sixty pounds, the dowels should be three-eighths of an inch in diameter; for lighter bows five-sixteenths dowels should be used. They come in three-foot lengths and bundles of two hundred and fifty. It is a good plan to buy a bundle at a time and keep them in the attic to dry and season.

Where dowels are not obtainable, you can have a hickory or birch plank sawed up or split into sticks half an inch in diameter, and plane these to the required size, or turn them on a lathe, or run them through a dowel-cutting machine.

Take a dozen dowels from your stock and cut them to a length of twenty-eight and one-quarter inches, or an inch less or more according to the length of your arms. In doing this you should try to remove the worst end, keeping that portion with the straightest grain for the head of your shaft.

Having cut them to length, take a hand plane and shave the last six inches of the rear end or shaftment so that the diameter is reduced to a trifle more than five-sixteenths of an inch at the extremity.

Now comes the process of straightening your shafts. By squinting down the length of the dowel you can observe the crooked portions. If these are very bad, they should be heated gently over a gas flame and then bent into proper line over the base of the thumb or palm. A pair of gloves will protect the hand from burning. If the deviation be slight, then mere manual pressure is often sufficient. During this process the future arrow should be tested for

strength. If it cannot stand considerable bending it deserves to break. If it is limber, discard it.

Nocking the shaft comes next. Hunting arrows require no horn, bone, aluminum, or fiber nock. Simply place the smaller end of the shaft in a vise and cut the end across the grain with three hack saws bound together, your cut being about an eighth of an inch wide by three-eighths deep; finish it carefully with a file. Thus nock them all and sandpaper them smooth throughout, rounding the nocked end gracefully. To facilitate this process I place one end in a motor-driven chuck and hold the rapidly revolving shaft in a piece of sandpaper in my hand. When finished the diameter should be a trifle under three-eighths of an inch at the center and about five-sixteenths at the nock.

Mark them now, where the feathers and binding should go. At a point one inch from the base of the nock make a circular line, this is for the rear binding; five inches above this make another, this is for the feather; one inch above this make another, this is for the front binding; and an inch above this make another, this is for the painted ribbon.

Feathers come next, but really they should have come long ago. The best are turkey feathers, so we won't talk about any others. The time to get them is at Thanksgiving and Christmas. Then you should get on good terms with your butcher and have him save you a boxful of turkey wings. These you chop with a hatchet on a block, saving only the six or seven long pinions. Put them away with moth balls until you need them. Of course, if you cannot get turkey feathers when you want them, goose, chicken, duck, or plumes from a feather duster may be employed. Your milliner can tell you where to purchase goose feathers, but these are expensive.

Cutting arrow feathers is a pleasant occupation around the fire in the winter evenings, and the real archer has the happiness of making his tackle while his mind dwells upon the coming spring shooting. As he makes his shaft he wonders what fate will befall it. Will it speed away in a futile shot, or last the grilling of a hundred practice flights, or will it be that fortunate arrow which flies swift and true and brings down the bounding deer? How often have I picked up a shaft and marked it, saying, "With this I'll kill a bear." And with some I've done it, too!

So your feathers should be cut in quantity. This is the way you cut them: Select a good clean one, steady it between your palms while with your fingers you separate the bristles at the tip. Pull them apart, thus splitting the rib down the center. If by chance it should not split evenly, take your sharpened penknife and cut it straight.

Have ready a little spring clip, such as is used to hold your cravat or magazine in a book store. One end of this is bent about a safety-pin so that it can be fastened to your trousers at the knee. Now you have a sort of knee vise to hold your feather while trimming it. Place the

butt of the rib in the jaws of the clip and shave it down to the thickness of a thirty-second of an inch. Make this even and level so that the feather stands perpendicular to it. With a pair of long scissors cut off the lateral excess of rib on the concave side of the feather. This permits it to straighten out.

At the same stage cut the feather roughly to shape; that is, five inches long, half an inch at the anterior end, an inch wide posteriorly, and having an inch of stem projecting at each extremity.

For this work you must keep your pocket-knife very sharp. With practice you should cut a feather in two or three minutes.

Donnan Smith, a worthy archer and a good fletcher, has devised a spring clamp which holds the feather while being cut. It is composed of a strong binder clip to which are soldered two thin metal jaws the size and shape of a properly cut feather. Having stripped his feather, he clamps it rib uppermost between the jaws and trims the rib with a knife, or on a fast-revolving emery stone, or sandpaper disc. This accomplished, he turns the feather around in the clamp and cuts the bristles to the exact shape of the metal jaws with a pair of scissors. It is an admirable method.

Some fletchers cut their feathers on a board by eye with only a knife. James Duff, the well-known American maker of tackle, learned this in the shop of Peter Muir, the famous Scotch fletcher.

If you wish to dye your feathers it may be done by obtaining the aniline dye used on wool. Adding about 10 per cent of vinegar to the aqueous solution of the stain, heat it to such a temperature that you can just stand your finger in it. Soak your feathers in this hot solution, stir them for several minutes, then lay them out on a piece of newspaper to dry in the sun. Red, orange, and yellow are used for this purpose; the former helps one to find a lost arrow, but all colors tend to run if wet, and stain the clothing.

Having prepared a sufficient quantity of feathers, you are ready to fledge your shaft. Select three of a similar color, strength, and from the same wing of the bird. With a stick, run a little liquid glue along the rib of each and lay it aside. Along the axis of your arrow run three parallel lines of glue down the shaftment. The first of these is for the cock feather and should be on a line perpendicular to the nock. The other two are equidistant from this. A novice should mark these lines with a pencil at first.

Now comes a difficult task, that of putting on the feathers. Many ways and means have been devised, and in target arrows nothing is better than just sticking them on by hand. Some have used clamps, some use pins, some lash the feathers on at the extremities with thread, and then glue beneath them. We take the oldest of all methods, which is shown in the specimens

of old Saxon arrows rescued from the Nylander boat in Holland, [Footnote: See *Archer's Register* of 1912.] also depicted in many old English paintings--that of binding the feathers with a piece of thread running spirally up the shaft between the bristles.

Starting at a point six inches from the nock, set your thick end of the rib in position on the lines of glue. Hold the shaft under your left arm while with the left thumb, forefinger, and middle finger steady the feathers as they are respectively put in place. With one end of a piece of cotton basting thread in your teeth and the spool in your right hand, start binding the ribs down to the arrow shaft. After a few turns proceed up the shaftment, adjusting the feathers in position as you rotate the arrow. Let your basting thread slip between the bristles of the feather about half an inch apart. When you come to the rear end, finish up with several overlapping turns and a half-hitch. Line up your feathers so that they run straight down the shaftment and are equidistant. Of one thing be very sure--see that your feather runs a trifle toward the concave side, looking from the rear, and that the rear end deviates quite perceptibly toward this direction. This insures proper steering qualities to your arrow. Set it aside and let it dry.

When all are dry, remove the basting thread and trim the ribs to the pencil marks, leaving them about three-quarters of an inch long. Bevel their ends to a slender taper.

The next process is that of binding the feathers in position. The material which we use for this purpose is known as ribonzine, a thin silk ribbon used to bind candy boxes. In the absence of this, floss silk may be employed. Cut it into pieces about a foot long. Put a little liquid glue on the space reserved for binding and, while revolving the shaft under your arm, apply the ribbon in lapping spirals over the feather ribs. Cover them completely and have the binding smooth and well sized in glue. The ribbon near the nock serves to protect the wood at this point from splitting. When dry, clean your shaft from ragged excess of glue with knife and sandpaper, and finish up by running a little diluted glue with a small brush along the side of the feather ribs to make them doubly secure.

Now comes the painting.

We paint arrows not so much for gayness, as to preserve them against moisture, to aid in finding them when lost, and to distinguish one man's shaft from another's.

Chinese vermilion and bright orange are colors which are most discernible in the grass and undergrowth. With a narrow brush, paint between your feathers, running up slightly on to the rib, covering the glue. If your silk ribbon binding is a bright color--mine is green--you can leave it untouched. We often paint the nock a distinguishing color to indicate the type of head at the other end, so that in drawing the shaft from the quiver we can know beforehand what sort it will be. The livery should be painted in several different rings. My own colors are red, green, and white.

One or two coats are applied according to the fancy of the archer. The line between the various pigments should be striped with a thin black ring.

Unless you use a lathe to hold your arrows in the painting process, you can employ two wooden blocks or rests, one having a shallow countersunk hole on its lateral face to hold the nock while rotating, the other having a groove on its upper surface. Clamp these on a bench, or on the opposite arms of your easy chair before the fire, and you can turn your shafts slowly by hand while you steady your brush and apply the paint in even rings.

At this stage I have added a device which seems to be helpful in nocking arrows in the dark, or while keeping one's eye on the game. Having put a drop of glue on the ribbon immediately above the nock and behind the cock feather, I affix a little white glass bead. One can feel this with his thumb as he nocks his arrow, when in conjunction with knots on his string, he can perform this maneuver entirely by touch.

The paint having dried, varnish or shellac your arrow its entire length, avoiding, of course, any contact with the feathers. In due time sandpaper the shaft and repeat the varnishing. Rub this down with steelwool and give it a finishing touch with floor wax.

Here we are ready for the arrow-heads.

We use three types of points. The first is a blunt head made by binding the end of the shaft with thin tinned iron wire for half an inch and running on solder, then drilling a hole in the end of the shaft and inserting an inch round-headed screw. In place of soldered wire, one can use an empty 38-caliber cartridge, either cutting off the base or drilling out the priming aperture to admit the screw. This type of arrow we use for rough practice, shooting tin cans, trees, boxes, and other impedimenta. It makes a good shaft for birds, rabbits, and small game.

A second type of head we use is made of soft steel about a sixteenth of an inch thick. We cut it with a hack saw into a blunt, barbed, lanceolate shape having a blade about an inch long and half an inch wide, also a tang about the same length and three-eighths of an inch wide.

This we set into a slot sawed in the arrow in the same plane as the nock, and bind the shaft with tinned wire, number 30, soldered together. The end of the shaft has a gradual bevel where it meets the lateral face of the head.

This is a sturdy little point and will stand much abuse. We use it for shooting birds, squirrels, and small vermin.

But the point that we prefer to shoot is the old English broad-head. Starting from small dimensions, we have gradually increased its size, weight and strength and cutting qualities

till now we shoot a head whose blade is three inches long, an inch and a quarter wide, a trifle less than a thirty-second thick. It has a haft or tubular shank an inch long. Its weight is half an ounce. The blades are made of spring steel. After annealing the steel we score it diagonally with a hack saw, when it may be broken in triangular pieces in a vise. With a cold chisel, an angular cut is made in the base to form the barbs. With a file and carborundum stone, they are edged and shaped into blades as sharp as knives. Soft, cold drawn steel will serve quite as well as spring steel for these blades, but it does not hold its edge. It may be purchased at hardware supply depots in the form of strips an inch and a half wide, by one-thirty-second thick, and is much easier to work than the tempered variety.

Then taking three-eighths number .22 gauge steel or brass tubing, we smash it to a short bevel on the anvil, file off the corners and cut it to a length of an inch and three-quarters. This makes the haft or socket. Fixing a blade, barbs uppermost in the vise, this tubing is driven lightly into position, the filed edges of the beveled end permitting the blade to be held between the sides of the tubing. A small hole is drilled through the tubing and blade, and a soft iron wire rivet is inserted. The blade is held over a gas flame while the joint between it and the tubing is filled with soft soldering compound and ribbon solder.

The heated head is plunged into water and later finished with file and emery cloth. The whole process of making a steel broad-head requires about twenty minutes. Every archer should manufacture his own. Then he will treat them with more respect. Very few artisans can make them, and if they can, their price is exorbitant.

Be sure that your heads are straight and true. To set them on your shaft, cut the wood to fit, then heat a bit of ferrule cement and set them on in the same plane as the nock. In the absence of ferrule cement, which can be had at all sporting goods stores, one can use chewing gum, or better yet, a mixture of caoutchouc pitch and scale shellac heated together in equal parts. Heat your fixative as you would sealing wax, over a candle, also heat the arrow and the metal head. Put on with these adhesives, it seldom pulls off. In the wilds we often fix the head with pine resin. Glue can be used, but it is not so good.

Having brought your arrows to this stage, the next act is to trim the feathers. First run them gently through the hand and smooth out their veins; then with long-bladed scissors cut them so that the anterior end is three-eighths of an inch high, while the posterior extremity is one inch. I also cut the rear tip of the feather diagonally across, removing about half an inch to prevent it getting in the way of the fingers when on the string.

Mr. Arthur Young cuts his feathers in a long parabola with a die made of a knife blade bent into shape. These things are largely a matter of taste.

Look your arrows over; see that they are straight and that the feathers are in good shape, then shoot them to observe their flight. Number them above the ribbon so that you can keep record of their performances. The weight of such an arrow is one and one-half ounces.

The small blunt, barb-headed arrows we often paint red their entire length. Because they are meant for use in the brush, they are more readily lost; the bright color saves many a shaft.

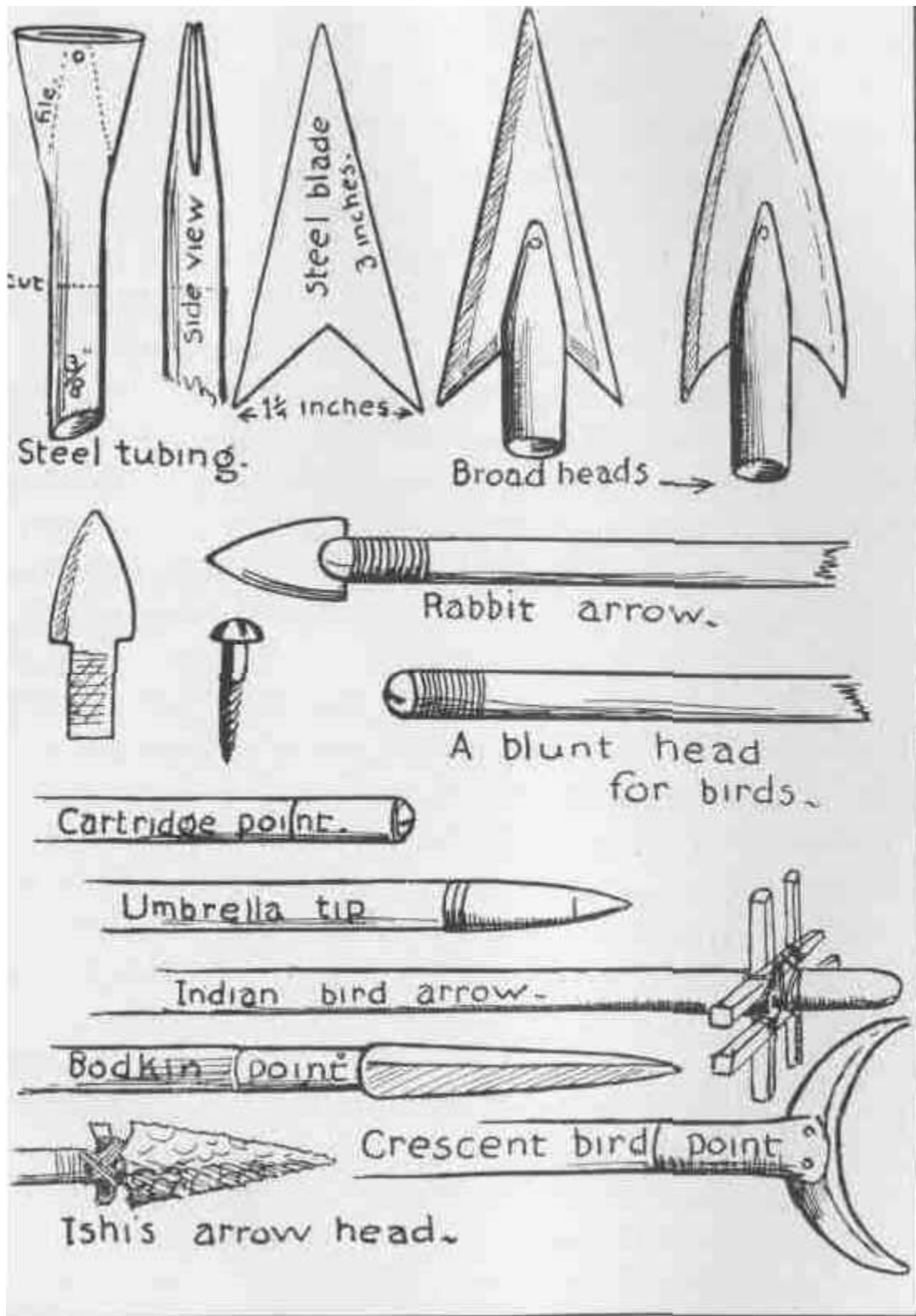
To make a hunting arrow requires about an hour, and one should be willing to look for one almost this time when it is lost. Finding arrows is an acquired art. Don't forget the advice of Bassanio: "In my school days when I had lost one shaft, I shot his fellow of the self-same flight, the self-same way, with more advised watch to find the other forth; and by adventuring both, I oft found both."

If, indeed, the shaft cannot be found, then give it up with good grace, remembering that after all it is pleasant work to make one. Dedicate it to the cause of archery with the hope that in future days some one may pick it up and, pricking his finger on the barb, become inoculated with the romance of archery.

When an arrow lodges in a root or tree, we work the head back and forth very carefully to withdraw it. A little pair of pliers comes in very handy here. If it is buried deeply we cut the wood away from it with a hunting knife. Blunt arrows, called bird bolts by Shakespeare, are best to shoot up in the branches of trees at winged and climbing game.

In our quivers we usually carry several light shafts we call eagle arrows, because they are designed principally for shooting at this bird.

Once while hunting deer, and observing a doe and fawn drinking at a pool, we saw a magnificent golden eagle swoop down, catch the startled fawn and lift it from the ground. Mr. Compton and I, having such arrows in our quivers, let fly at the struggling bird of prey. We came so close that the eagle loosened the grip of his talons and the fawn dropped to earth and sped off with its mother, safe for the time being.



ARROW HEADS OF VARIOUS SORTS USED IN HUNTING

Often we have shot at hawks and eagles high up in the air, where to reach them we needed a very light arrow, and they have had many close calls. For these we use a five-sixteenths dowel, feather it with short, low cut parabolic feathers and put a small barbed head on it about an inch in length. Such an arrow we paint dark green, blue, or black, so that the bird cannot discern its flight.

It is great sport to shoot at some lazy old buzzard as he comes within range. He can see the ordinary arrow, and if you shoot close, he dodges, swoops downward, flops sidewise, twists his head round and round, and speeds up to leave the country. He presents the comic picture of a complacent old gentleman suddenly disturbed in his monotonous existence and frightened into a most unbecoming loss of dignity.

Eagle arrows can be used for lofty flights, to span great canyons, to rout the chattering bluejay from the topmost limb of a pine, and sooner or later we shall pierce an eagle on the wing.

We make another kind of shaft that we call a "floo-floo." In Thompson's *Witchery of Archery* he describes an arrow that his Indian companion used, which gave forth such a fluttering whistle when in flight that they called it by this euphonious name. This is made by constructing the usual blunt screw-headed shaft and fledging it with wide uncut feathers. It is useful in shooting small game in the brush, because its flight is impeded and, missing the game, it soon loses momentum and stops. It does not bound off into the next county, but can be found near by. As a rule, these are steady, straight fliers for a short distance.

In finishing the nock of an arrow, it should be filed so that it fits the string rather snugly, thus when in place it is not easily disturbed by the ordinary accidents of travel. Still this tightness should be at the entrance of the nock, while the bottom of the nock is made a trifle more roomy with a round file. I file all my nocks to fit a certain two-inch wire nail whose diameter is just that of my bowstring.

After arrows have been shot for a time and their feathers have settled, they should again be trimmed carefully to their final proportions. The heads, if found too broad for perfect flight, should be ground a trifle narrower.

When hunting, one does well to carry in his pocket a small flat file with which to sharpen his broad-heads before shooting them. They should have a serrated, meat-cutting edge. Even carrying arrows in a quiver tends to dull them, because they chafe each other while in motion. From time to time you should rub the shafts and heads with the mixture of cedar and linseed oil, thus keeping them clean and protected from dampness.

On a hunting trip an archer should carry with him in his repair kit, extra feathers, heads, cement, a tube of glue, ribonzine, linen thread, wax, paraffin, sandpaper, emery cloth,

pincers, file and small scissors. With these he can salvage many an arrow that otherwise would be too sick to shoot.

Extra arrows are carried in a light wooden box which has little superimposed racks on which they rest and are kept from crushing each other.

As a rule, nothing does an arrow so much good as to shoot it, and nothing so much harm as to have it lie inactive and crowded in the quiver.

The flight of an arrow is symbolic of life itself. It springs from the bow with high aim, flies toward the blue heaven above, and seems to have immortal power. The song of its life is sweet to the ear. The rush of its upward arc is a promise of perpetual progress. With perfect grace it sweeps onward, though less aspiring. Then fluttering imperceptibly, it points downward and with ever-increasing speed, approaches the earth, where, with a deep sigh, it sinks in the soil, quivers with spent energy, and capitulates to the inevitable.