lashed to a handle of wood, almost identical with the one employed by the Eskimo of Port Barrow, etc. (92 and 96).

NOTE.—A very curious metamorphosis of the Eskimo type is the following: Formerly the Alaskan Eskimo chipped their arrow-head and skin-scrapers with a compound flint chipper of bone and rubbed the brash edge down to prevent tearing the skin. When he substituted the steel for the stone blade, he still employed the arrow-chipper to take the wire-edge off the blade. Finally he has invented a somewhat similar tool, with a beaver tooth in place of a bone, and this tool is now labelled knife-sharpener in most collections.

The Hupa tool for chipping arrow-heads is thus used: The work is held in the palm of the hand, which is protected by a buckskin pad, and the chips are flaked off by pressing on the edge of the flint with the tool held in the right hand, the ball of the handle resting in the palm. The Point Barrow Eskimo also press downward in chipping with a similar tool.

"The Viard arrow-maker," says Powers, "takes a piece of jasper, chert obsidian, or common flint, which breaks sharp-cornered and with a conchoidal fracture; this he heats in the fire and then cools slowly, which splits it in flakes. Then taking one of these flakes he gives it an approximately right shape by striking it with a rough hammer, then slips over his left hand a piece of buckskin with a hole to fit over the thumb (this buckskin is to prevent the hand from being wounded), and in his right hand he takes a pair of buck-horn pincers tied together at the point with a thong. Holding the piece of flint in his left hand he breaks off from the edge of it a tiny fragment with the pincers, by a twisting or wrenching motion. The piece is often reversed in the hand so that it may be worked away symmetrically. Arrow-head manufacture is a specialty, just as arrow-making, medicine, and other arts." These pincers are probably only our compound chipper. With the Klamath River Indians a piece of bone is fastened to a wooden shaft 1½ feet in length, the working point of which is crooked and raised to an edge, the force employed being all the time solely pushing. To guide the instrument with a steady hand the handle is held between the arm and the breast, while the point, with but little play room, assisted by the thumb, works on the edge of the flake, which again is held for greater safety in a piece of deer-skin. After the two sides have been worked down to a point then another instrument is required, with which the barbs and projections are broken out. This is a needle or awl of about 3 inches in length, and by a pushing motion the desired pieces are broken out, as with the first-mentioned tool.

These Indians have also what (Plate XXI, Fig. 90) is called an "arrow straightener," which they use to straighten arrow-shafts, and likewise their arrows that have become warped by use. This tool is employed thus: The arrow-shaft (Plate XX, Fig. 84) is passed through a slot, and the workman looks along the shaft and nips it with the tool where it is crooked. They go over the arrows with the straightener several times while working them down with a knife. For lashing the head and feather

(Fig. 88) the finest shredded sinew from the leg of the deer is used (Fig. 86). Glue is made from the sturgeon and paint from the ochers of the hills (Fig. 89). For filling up the interstices of sinew, wood, and stone, pitch (Fig. 87) is administered by means of a pitch-stick (Fig. 91.)

The war arrows of the Hupas are the perfection of grace. They consist of the following parts, which will be described in the following order: *head*, *foreshaft*, *shaft*, *shaftment*, and *nock*, each with its seizing or lashing. (Figs. 99, 102.)

The arrow-heads are of jasper, chalcedony, obsidian, and bottle-glass from ¾ of an inch to 2¼ inches in length, quite uniformly ⅝ of an inch in width and $\frac{3}{16}$ of an inch in thickness, forming an isosceles triangle with incurved base. Side notches are made for the sinew thread which forms the lashing of the head. Bird-arrows, designed to stun rather than to wound, lack the stone head.

The foreshaft (Fig. 102*b*) is about 3½ inches outside measure, painted or not, according to fancy, and inserted into a socket in the end of the shaft by a point 3 inches long. The shaft is always a sucker of white wood, and with the shaftment measures about 2 feet in length. There is little similarity between the uniform, straight, and delicate rod and the twig or sucker out of which it has been formed. Much time and pains are expended in removing the bark by means of wooden wrenches or nippers, in steaming and straightening with a wooden wrench (Fig. 90), scraping, standstoning with two pieces of coarse-grained sandstone having semi-cylindrical groves (Fig. 94), and finally in polishing down, not with emory paper, but with the leaf of a coarse marsh-grass full of siliceous particles.

The shaftment or feathered part is in the neighborhood of 6 inches in length. Three feathers (Fig. 88) are seized on at the ends by sinew (Fig. 86), but they are not always glued down along the shaftment. Almost universally around the shaftment, inside the feather, occur streaks of paint in endless variety of color (Fig. 102*c*), width of stripe, and order of succession. In the same quiver will occur variation of width and succession, but not in colors. These decorations have been called clan and owner marks.

Nock is the part of the arrow concerned with the bow-string (Fig. 102*d*). Itself may be flat, like a fish-tail, cylindrical like the shaftment, only wrapped with the feather seizing, bulbous as in the Chinook arrow, or flaring as in the swallow-tailed nock of the Indian tribes of the plains and the great interior basin.

On the Hupa arrows, the nock is cylindrical, slightly bulbous by reason of thick paint on the feather-seizing. The notch in the nock may either be angular or rectangular. All the sinew lashings in this series are painted.

The fishing arrows of the Hupa (Fig. 100) have a foreshaft of bone which have bilateral barbs, one, two, or three pairs, and to the front of this foreshaft are lashed the stone heads.