



GEMCUTTING

GEMCUTTING (*ḥakkākī*). The first-known reference in Persian to gem cutting is found in an anonymous treatise on jewelry, *Jowhar-nāma-ye nezāmī*, written in 592/1195-96 under the last K̄vārazmšāh. According to Īraj Afšār (pp. 40-41), both Naṣīr-al-Dīn Ṭūsī and Abu'l-Qāsem Kāšānī used this treatise in their works (see bibliography) without mentioning it. Similarly, the information on gem cutting found in Moḥammad b. Maṣṣūr's *Gowhar-nāma*, written in the 15th century, is just a duplication of the earlier works.

According to these texts, gem cutting and polishing were both done by the same machine, namely the grinding wheel or *čarḡ-e ḥakkākī* (*Jowhar-nāma*, fol. 30a; Ṭūsī, p. 43; [Figure 1](#)). This wheel may have resembled the bow-operated grinding wheel used by the turquoise cutters of Mašhad. Hans. E. Wulff described the wheel as being “about 18 inches in diameter□ cast from a mixture of resin (*lāk*), tallow (*pī*), wax (*mūm*), whiting (*sang-e safīdāb*), and emery (*sombādeh*.” Through it is fixed “an iron spindle (*šōqeh*) that has a pushed-over, wide wooden pulley section (*taneh-sōqeh*) about 2 inches in diameter. The spindle runs in a wooden frame (*čahār-čūb*) between two upright posts (*pāyeh*)... A gut string (*zehrūd*) is slung around the pulley and attached to a bow (*kamāneh*). As the bow is moved backward and forward the wheel is kept in motion although only the forward stroke is a grinding stroke” (Wulff, p. 39). The spasmodic movement of the bow-powered wheels left scars resulting from unavoidable breaks in the cutting action (Arrhenius, p. 57). The wheel, which, contrary to modern horizontal wheels, rotated vertically, was a cutting wheel. Smoothing, polishing, and glossing was done by another wheel



made of metal (lead or copper often covered by different powders) or of wood (willow or plane tree).

Moḥammad-Ḥasan Khan E'temād-al-Salṭana was referring to such cutting machines in Mašhad in the last quarter of the 19th century when he indicated that “the turquoise cutting devices (*ālāt*) are very simple” (III, p. 33). These devices were used in Safavid Persia in the 17th century. According to the French jeweler Jean Chardin, the Persian lapidaries made their wheels of two parts of emery to one of gum lac. This composition had to be well kneaded and fired in such a way that it did not lose its viscosity (*šīra*) during firing. They rotated these wheels hafted on to a circular mandrel, with a bow which was held in one hand, while with the other they held the stone against the wheel. In this manner cutting was easy and inexpensive. When they wanted to polish the stone, they replaced this wheel by one made of red willow, on which they threw putty or tripoli. The seal engravers used the bow and a very small copper wheel with emery. Persian and Indian emery were both used, but the latter cut better (Chardin, ed. L. Langlès, IV, pp. 142-43; Charleston, p. 86; Raphaël du Mans also gives the same composition of the wheel, apud Richard, II, p. 147). The wheels' composition was somewhat different from those described by Wulff, but the abrasive was always emery.

Unfortunately the Safavid texts fail to elucidate the gem cutting and polishing techniques. Tonokābonī, the physician of Shah Solaymān (p. 875), confirms that rubies were polished by burned onyx (*jaz'-e sūkta*), water, and emery. But the technique that he described in a simple phrase, according to the earlier texts, was divided into several steps. The rough ruby was first glued with gum lac onto a wooden stick before cutting began on a cutter's grinding wheel made of emery and gum lac. This wheel was then replaced by a lead one (*čark-e osrob*) covered by powdered emery to smooth the gem. Lastly, the ruby was polished on a copper wheel (*čark-e mes*) covered with the burned onyx, and then it was washed with water (*Jowhar-nāma*, fol. 30a; Ṭūsī, pp. 43-44; Kāšānī, p. 42). Abū Rayḥān Bīrūnī, quoting Abū Yūsuf Kendī, also mentions lead and copper wheels used in the smoothing and polishing of rubies (Bīrūnī, p. 122).

Emerald (*zomorrod*) is processed exactly in the same manner, although the mat ones were glossed by touchstone. The means of distinguishing between emerald and other stones resembling it, namely green glass (*mīnā*), jasper (*yašb-e sabz*), and spinel (*la'l-e sabz*) lay in the polishing techniques: Contrary to emerald, which was polished on a copper wheel, the latter two stones were glossed on a marquise and the green glass on a wheel made of willow wood



(*čarḳ-e bīd*) or plane tree (*čarḳ-e čenār*; *Jowhar-nāma*, fol. 36b; Ṭūsī, p. 58; *Kāšānī*, pp. 50-52; Moḥammad b Maṣṣūr, p. 213).

The resulting stone was either cut flat that could be round, square, hexagonal, or octagonal, or it was cut cabochon (*moqabbab*), which had a higher price (*Jowhar-nāma*, fol. 31a; *Kāšānī*, p. 43). A mat gem could be glossed if it were first made concave by a scorpion wheel (*čarḳ-e ‘aqrab*) and then polished. The cutters called this technique “*pošt kāsa karda*,” like a reversed bowl (*Jowhar-nāma*, fol. 41a, *Kāšānī*, p. 54). How this scorpion wheel worked is not clear, but it was used to make the inner part of a mat gem thinner and therefore more transparent. This technical know-how indicate that Chardin’s description of gem cutting is either incomplete or that this Persian craft had deteriorated in the meantime.

Both the flat and cabochon cut were known to Persians although the faceted cut was not mentioned in the Persian sources. Diamond cleavage was done with a hammer (Ṭūsī, p. 68; *Kāšānī*, p. 86), but there is no reference to the diamond powder necessary for faceting. According to Victor Meen and A. Douglas Tushingham, “until the end of the eighteenth century, eastern lapidaries rarely faceted the precious stones” (p. 66). In contrast, Manuel Kleene, on the basis of the materials from the Nišapūr excavations, concludes that “polygonal and polyhedral faceting are to be met in the form of stone beads” in 10th and 11th centuries (p. 30). Evidently Persian texts do not give a complete picture of the art of gem cutting in Persia.

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