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ČARḴ-E ČĀH

ČARḴ-E **ČĀH** (lit. “well wheel”), also called *čarḵ-āb, dūl-āb* (especially the domestic kind), and *čarḵ-e dalw*, a device for drawing water from a well or river or for removing soil during the excavation of a well. It is a type of windlass, consisting of a hollow horizontal cylinder around which a rope is coiled or uncoiled to raise or lower a bucket attached to the end. Rods connecting two sets of projecting radial spokes at the ends of the cylinder provide paddles for turning it (Plate CIII, Plate CIV). These rods reach a length of about 1.7 m in larger models but rarely exceed 1 meter in small domestic models. The cylinder turns on an axle (*tīr-e čarḵ*), formerly made of wood but now of metal, the ends of which are inserted into holes in two wooden posts or, in the fields, in two pillars of stone or brick; the height of the posts or pillars is determined by whether the cylinder is to be turned by hand or foot.

The bucket, which is narrow at the top to prevent water from splashing out, was traditionally made of tanned cowhide, but nowadays automobile tires and inner tubes are generally used. Until recently buckets made of palm leaves were used for removing dirt from wells under construction. A small horizontal cross, called *čanbara* or *argī*, is fastened to the mouth of the bucket by means of a rope, keeping it balanced. The *čanbara* is usually made of sorb (*senjed*) wood, which is light and water resistant. When the wheel has to be turned for a long time a back support is provided, so that one or two people can sit and pedal easily; this kind of *čarḵ* usually also has wider paddles to facilitate the turning. A slightly more developed version of the *čarḵ-e čāh*, which may consist of one or two rotating cylinders, is today commonly used in irrigation

but was formerly also used to provide water for public baths. Each bucket is attached to the harness of a work animal (a bull or a horse) by two ropes, one slightly shorter than the other; to raise the bucket the animal moves away down a slope, called *gowrow* (from *gāv-row*), thus pulling the longer rope to turn the wheel and raise the bucket. When it has reached the limit of this rope the shorter rope tips the bucket so that the water flows out into a basin (*ḥawż*).

Before the introduction of modern machinery for irrigation and water supply small *čarḵ*s, or *dūl-āb*s, of this kind were common features of Iranian gardens and courtyards in regions where the absence of *qanāt*s and running water made wells indispensable. (Other kinds of water wheels were also used to draw water from rivers or streams for irrigation.) The wide geographical distribution of this device is clear from the use of the term *dūlāb* as a name for numerous villages in Iran. Yāqūt (*Boldān* II, pp. 622-24) mentions villages called Dūlāb near Baghdad, Marv, Ray, and Ahvāz, and Dehḵodā (s.v.) mentions modern villages around Tehran, Zanjān, Sanandaj, Bandar-e ʿAbbās, Ahvāz, and Yazd. The earliest occurrence of the name is probably in Ṭabarī (II, p. 581), where Dūlāb in Ḵūzestān is mentioned as a place where a major battle took place; according to Ebn Ḵordāḏbeh (p. 194) it lay at 2 *farsaḵ*s from Sūq al-Ahwāz (Yāqūt, II, p. 622, has 4 *farsaḵ*s). Moqaddasī (pp. 51, 360, 373, 420) refers to Dūlāb in Gīlān as the center of Jīl (see also *Ḥodūd al-ʿālam*, tr. Minorsky, p. 137). *Dūlāb* is also used in similes in the poetry of Nāṣer-e Ḵosrow; Ḵāqānī, Masʿūd-e Saʿd, Saʿdī and others (see Dehḵodā, s.v.)

See also KĀRIZ.

BIBLIOGRAPHY

Given in the text. See also Wulff, *Crafts*, pp. 109-10 with fig. 161, 258 with fig. 343.