



ḤĀFEẒ EŞFAHĀNI

ḤĀFEẒ EŞFAHĀNI, Mawlānā Moḥammad, known as Moktare' (inventor), was a 9th-10th/15th-16th century engineer who left a treaty, *Se resāla dar ekòterā'āt-e şan'ati*. According to this treaty, he was the author of 14 inventions but unfortunately only three of his works are described in detail, while the others are mentioned only in passing. Among them is a house security lock designed in 888/1483, a paper-smoother device made in 912/1506, a hydraulic machine to card cotton, a mechanical device to produce an ink of a higher quality, a device that catches a thief and holds him until the arrival of the proprietor, two different time-keepers, a special water elevator wheel, and other non-mechanical inventions. The three described inventions are: a special water mill, a hydraulic oil-mill, and a weight-driven mechanical clock constructed following a European model.

Considering the dates of two recorded inventions, i.e., his house lock in 888/1483 and his paper smoother in 912/1506, Ḥāfeẓ Eşfahāni's productive life must have covered at least a time span of about 23 years (from 1483 to 1506), meaning that he was active even after the rise of the Safavids to power in 907/1501. He was certainly a Shi'ite Moslem as he invented his 14 devices in remembrance of the 14 infallibles (*ma'şums*) of Twelver Shi'ism, i.e., the Prophet Moḥammad, his daughter Fāṭema and the twelve Imams.

The famous historian K̄vānd Mir is the only one of his contemporaries who mentions him. In his, *Ma'āter al-moluk* (p. 242), he states that Mawlānā Moḥammad Eşfahāni considers himself an engineer (*mohandes*) and that he has constructed a timekeeper (*şandūq-e sâ'at*). However, it is evident that



Ḳvānd Mir had not realized the real value of Ḥāfeẓ Eşfahāni's work. The timekeeper that this historian refers to was the first weight-driven mechanical alarm clock ever made, not only in the Islamic world, but in the whole Orient. Ḥāfeẓ Eşfahāni was not attached to any particular royal court, but he must have been a well-known engineer to be summoned by the Timurid court of Sultan Ḥosayn-e Bāyqarā (q.v.; the clock-making operation was undertaken under the patronage of the famous man of culture and politics, the vizier 'Ali-Şir Navā'i) to construct a clock along the lines of a European model. Ḥāfeẓ Eşfahāni relates that in order to save the high esteem of Islam, the Ottoman Sultan, Bāyazid II (886/1481-918/1512), whose engineers and artisans had failed to reproduce an essentially European type of mechanical clock, sent one of these clocks to Iran to be constructed there. The European clock reached Tabriz and then Herat, but nobody seems to have managed to work out how it operated. The Timurid court then asked Ḥāfeẓ Eşfahāni to fulfill this task, and not only did he solve the puzzle and describe it in his treaty, but he also made both a portable and a fixed kind of the originally European clock (Ḥāfeẓ Eşfahāni, pp. 12-16, Mohebbi, 1996, pp. 191-92). According to *Zinat al-majāles* (p. 772), written in 1004/1595, one of his reproductions, then out of usage, was fixed in the tower of a hospital in Kāšān.

A schematic representation of his clock which does not include the alarm part is shown in

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