

often certainly the term Mangonel seems to be used generically for all machines of this class. Marino Sanudo uses no word but *Machina*, which he appears to employ as the Latin equivalent of *Mangonel*, whilst the machine which he describes is a Trebuchet with moveable counterpoise. The history of the word appears to be the following. The Greek word μάγγανον, "a piece of witchcraft," came to signify a juggler's trick, an unexpected contrivance (in modern slang "a jim"), and so specially a military engine. It seems to have reached this specific meaning by the time of Hero the Younger, who is believed to have written in the first half of the 7th century. From the form μαγγανικόν the Orientals got *Manganik* and *Manjanik*,* whilst the Franks adopted *Mangona* and *Mangonella*. Hence the verbs *manganare* and *amanganare*, to batter and crush with such engines, and eventually our verb "to mangle." Again, when the use of gunpowder rendered these warlike engines obsolete, perhaps their ponderous counterweights were utilised in the peaceful arts of the laundry, and hence gave us our substantive "the Mangle" (It. *Mangano*)!

The Emperor Napoleon, when Prince President, caused some interesting experiments in the matter of mediæval artillery to be carried out at Vincennes, and a full-sized trebuchet was constructed there. With a shaft of 33 feet 9 inches in length, having a permanent counterweight of 3300 lbs. and a pivoted counterweight of 6600 lbs. more, the utmost effect attained was the discharge of an iron 24-kilo. shot to a range of 191 yards, whilst a 12½-inch shell, filled with earth, ranged to 131 yards. The machine suffered greatly at each discharge, and it was impracticable to increase the counterpoise to 8000 kilos., or 17,600 lbs. as the Prince desired. It was evident that the machine was not of sufficiently massive structure. But the officers in charge satisfied themselves that, with practice in such constructions and the use of very massive timber, even the exceptional feats recorded of mediæval engineers might be realised.

Such a case is that cited by Quatremère, from an Oriental author, of the discharge of stones weighing 400 *mans*, certainly not less than 800 lbs., and possibly much more; or that of the Men of Bern, who are reported, when besieging Nidau in 1388, to have employed trebuchets which shot daily into the town upwards of 200 blocks weighing 12 cwt. apiece.† Stella relates that the Genoese armament sent against Cyprus, in 1373, among other great machines had one called *Troja* (*Truia?*), which cast stones of 12 to 18 hundredweights; and when the Venetians were besieging the revolted city of Zara in 1346, their Engineer, Master Francesco delle Barche, shot into the city stones of 3000 lbs. weight.‡ In this case the unlucky engineer was "hoist with his own petard," for while he stood adjusting one of his engines, it went off, and shot him into the town.

With reference to such cases the Emperor calculates that a stone of 3000 lbs. weight might be shot 77 yards with a counterpoise of 36,000 lbs. weight, and a shaft 65 feet long. The counterpoise, composed of stone shot of 55 lbs. each, might be contained in a cubical case of about 5½ feet to the side. The machine would be preposterous, but there is nothing impossible about it. Indeed in the Album of Villard de Honnecourt, an architect of the 13th century, which was published at Paris in 1858, in the notes accompanying a plan of a trebuchet (from which

* Professor Sprenger informs me that the first mention of the *Manjanik* in Mahomedan history is at the siege of Táyif by Mahomed himself, A.D. 630 (and see *Sprenger's Mohammed* [German], III. 330). The *Annales Marbacenses* in *Pertz*, xvii. 172, say under 1212, speaking of wars of the Emperor Otho in Germany: "Ibi tunc cepit haberi usus instrumenti bellici quod vulgo *tribok* appellari solet."

There is a ludicrous Oriental derivation of *Manjanik*, from the Persian: "*Man chi nek*"! "How good am I!" Ibn Khallikan remarks that the word must be foreign, because the letters j and k (ج and ك) never occur together in genuine Arabic words (*Notes* by Mr. E. Thomas, F.R.S.). It may be noticed that the letters in question occur together in another Arabic word of foreign origin used by Polo, viz. *Játhalth*.

† Dufour mentions that stone shot of the mediæval engines exist at Zurich, of 20 and 22 inches diameter. The largest of these would, however, scarcely exceed 500 lbs. in weight.

‡ *Georg. Stellae Ann.* in *Muratori*, XVII. 1105; and *Daru*, Bk. viii. § 12.