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TUNING FORK, a small bar of cast tool steel with tolerably defined edges, bent into a fork with two prongs. A handle of the same metal extending from the bend of the fork serves as a sound-post to transmit the vibrations of the fork to any resonance board or body convenient for reinforcing the sound. The fork is set in vibration by striking one of the prongs against any hard substance, by pressing the prongs together if the fork is a light one, or, if it is large, by drawing a double bass bow across one of the prongs. The larger forks are sometimes made with a worm upon the handle in order that they may be screwed into a resonance box, the dimensions of which should agree with the pitch of the fork. The ordinary use of a tuning fork is to serve as a pitch carrier or standard, for which it is particularly suited owing to the permanence with which it maintains the pitch to which it may be tuned. It is flattened by heat and sharpened by cold about 1 vibration in 20,000 for every degree Fahr., so that the exact pitch always depends upon the temperature. A tuning fork is tuned by filing the ends of the prongs or between them near the ends to make it sharper, or by filing between them near or at the bend to make it flatter. Less filing is required to flatten than to sharpen. It should be allowed to rest after tuning, on account of the disturbance of the molecular structure by the filing, and after a few days should be compared again with the pitch required, and corrected. The tuning fork is also of value in certain physical investigations, from the constancy of its rate of vibration. In England it is generally tuned to C in the treble clef, because organ-builders start their tuning from that note; in France it is tuned to A in the treble clef, which is the note of the third open string of the violin. The French diapason normal is tuned to A at 15° C. ( = 59° Fahr.) and is fixed at 435 double vibrations in a second. The inventor of the tuning fork was John Shore, royal trumpeter in 1711, sergeant trumpeter at the entry of George I. in 1714, and lutanist to the chapel royal in 1715.

According to Chladni, whose analysis of the tuning fork has been generally accepted, it has two nodes or points of least vibration at the bend, with a ventral or vibrating loop between, by which its vibrations are transmitted to the handle. That this is not the case has been shown by Mr W. F. Stanley.@@1 The fundamental note appears to be an octave below the note which the ear recognizes as the pitch of the fork. Helmholtz, Tyndall, and others accept the latter as the fundamental, and Helmholtz expressly says that each prong may be regarded as an elastic rod fixed at one end.@@2 The fork is really a bent elastic rod vibrating at both ends, with a node at the bend, through which, and in the same way as with the bridge of any stringed instrument, the vibrations are conducted. As well as the second partial, the third and fourth are in large forks fre­quently distinguishable, but such partials above the octave are very weak. In addition to the lower harmonic partials it is generally easy to produce with a blow a very high inharmonic tinkle or ringing metallic note, that will continue to sound for some time without blending with the true note of the fork. The precise interval varies, but is usually two octaves and between a flat fifth and a major sixth above the recognized pitch of the fork. With ordinary tuning forks this tinkling note is to be found amongst the highest treble notes of the pianoforte. Theorists give other inharmonic proper tones in due ascending order ; they are derived from calculation on the assumption that they proceed as the squares of the odd numbers, but are beyond practical verification owing to

their extreme position in the scale of musical sounds and the varia­tion of power in different ears to distinguish them.

The tuning fork was used by Scheibler (1777-1837) as the easiest means for correctly determining the pitch numbers of vibrations. To make a Scheibler tonometer, take a fork in which the octave can be easily heard and intercalate as many forks as, giving count­able beats with each other, will fill up the octave. The addition of the whole number of beats and their fractions in the octave will be the vibrating number, in double vibrations per second, of the lower fork. In order to measure the fractions of vibrations accu­rately forks should be chosen that are audible for 40, or at least 20 seconds. For instance, 60 beats counted in 20 seconds would be 3 a second, and 65 in the same time 3∙25. The forks should remain for three months after filing before their differences are finally determined, and the whole examination should be conducted in a known, uniform temperature. Scheibler considered four beats a second between two forks a good number for counting ; but Mr A. J. Ellis, who has used Scheibler’s invention as a basis for an exhaust­ive historical statement of musical pitch@@3 and as the novel and exact means for determining the non-harmonic musical scales of various nations, especially Eastern nations,@@4 considers three beats a second the best counting number. This would increase the number of intermediate forks.

Attempts have been made to use tuning forks instead of strings for key-board instruments, the object being to obtain permanence of tuning with the soft, unexciting quality of tone furnished by the fork. The inventions of Clagget, London, 1788, of Riffelsen (the melodikon), Copenhagen, 1803, and of Schuster (the adiaphonon), Vienna, 1819, were of this nature. The latest adaptation of a key­board to tuning forks has been effected by Mr Machell of Glasgow ; it was shown at the Inventions Exhibition, South Kensington, London, 1885.

TUNIS, Regency of, formerly one of the Barbary states of north Africa, but since 1881 a dependency of France, whose resident-general exercises all real authority in the nominal dominions of the bey. Is bounded on the west by Algeria, on the north by the western basin of the Mediter­ranean, on the east from Cape Bon to the Gulf of Gabes (KAbis) by the eastern basin of the same sea, and on the south-east by the province of Tripoli. On the south the boundary is the Sahara and the frontier line is indefinite. The greatest breadth from east to west is about 150 miles, the length from north to south about 300 miles. The population does not exceed a million and a half.

*Physical Features.—*Tunis is formed by the prolongation towards the east of the two great mountain chains of Algeria *(q.v.)* and closely resembles that country in its physical features, products, and climate ; see Africa, vol. i. p. 265. The northern Algerian chain (the Little Atlas) is prolonged through Tunis to Rás Sídi 'Alí al-Makkí, the highest summits never attaining an altitude of 4000 feet. It forms a picturesque, fertile, and well-watered region, with extensive cork woods in its western parts, and sepa­rated from the southern mountains by the valley (the ancient Zeugitana) of the Mejerda (the ancient Bagradas), the most important river of north Africa, which after a tortuous course of nearly 300 miles falls into the Gulf of Tunis at Porto Farina. The basin of the Mejerda, which is now tra­versed by the railway from Algiers to Tunis, is very fertile, and many important ruins testify to its prosperity in Roman times. The rich lacustrine deposits in the Dákhila, or plain of Bulla Regia, show that it was only in relatively recent times that its upper waters found a passage to the sea by

*@@@1 Nature,* vol. xxvi. pp. 166, 243,

*@@@2 Sensations of Tone* ; Eng. transl. by A. J. Ellis, 2d ed., 1885, p. 70.

@@@3 “ On the History of Musical Pitch,” in *Journ. Soc. of Arts,* 5th March and 2d April 1880 ; see also 7th January 1881.

@@@4 “On Musical Scales,” *ibid.,* 27th March and 30th October 1885.