

lighteenth century a widely used name for the flute (transverse flute), arising in distinction from 'flute' temporary sense of a recorder.

in "shawm, see SURNA.

reundon pot, struck with the

an fiddle; see KRMANCHA.

names met from the 12th respectively German (whence text); and French (with no with the name of the dance, given to fiddles generally or ular, is not known.

Giorgi flute. Now of curiosity interest, this is a plain cylindrical end-blown flute designed to be held vertically (like a recorder), invented by C. T. Giorgi, Rome, c.1888. About 52 cm. long (20"), the extreme top has the form of an oval lip-plate with mouth-hole in the centre, like that of a modern lute but leading straight downwards into the flute. Many were made in London by J. Wallis & Sons, usually in ebonite and some with keys. Giorgi and others also devised more complicated flutes with his unusual mouthpiece. Gai 1969. See also ALTO AND BASS FLUTE 2 (ablisiphone) mouthpiece. Gai 1969.

Glittern, gulterne. For *glittern* as a medieval name, see CITOLE AND GITTERN. By the 16th century, *gulterne* and *gulterre* were French names for the early *guitar, and 'glittern' came to be used through 17th-century England synonymously with 'guitar'.

Glass harmonica (originally 'armonica'). This was invented in 1761 by Benjamin Franklin while on a visit from America to England. A chromatic set of glass bowls, about half as deep as wide, 37 for a compass of three full octaves, are mounted with the rims closely overlapping on a horizontal square metal axle turned by a treadle aided by a heavy wooden or lead flywheel; the direction is towards the player (like a lathe). The bowls for the sharps have different coloured rims from the naturals and the whole instrument is about 120 cm. (4') long. The bowls are kept moist by a shallow trough of water underneath, partitioned off from the flywheel. All 10 fingers are employed to touch the rims, and since these lie close together the instrument can be played fast and in harmonies. Two celebrated soloists on the instrument were young women, one of them Marianne Kirchgässner, for whom Mozart wrote the Adagio and Rondo, K. 617, for harmonica with flute, oboe, viola, and cello (1791): the harmonica part (compass *g-f'''*) looks on paper almost like a piano part. It is said that Mesmer found the instrument helpful in his hypnosis exper-

finger tips proved bad for the nerves, and that Kirchgässner retired from playing on that account. Donizetti, in the famous 'Mad scene' from *Lucia di Lammermoor*, wrote an obbligato for glass harmonica, now played on the flute. 'Harmonica' can, of course, name instruments of other kinds, and where it occurs in subsequent scores it is generally likely that some form of *glockenspiel is intended if not the mouth-blown *harmonica.

See also MUSICAL GLASSES. For sounds from friction on glass rods, see SOUND SCULPTURES.

Hyatt-King 1946.

Glass harp. See MUSICAL GLASSES.

Glockenspiel (Ger., lit. 'bell chime', and adopted into Eng., in the USA also 'orchestra bells'; Fr.: *jeu de timbres*; It.: *campanelli*). Tuned metal bars, supported at two points with both ends free, and struck in the centre with beaters. The instrument is not recorded in Europe before the 17th century and was rarely in the orchestra until, with its cheerful sound, so appropriate in various contexts, its use grew after the mid-19th. Modern types include versions made expressly for school music and sometimes termed 'metallophones' (see below, 3), while the *vibraphone is a specialized development.

1. *Orchestral glockenspiel* (Pl. 1). The steel bars, 8 mm. thick or more, are laid in two rows, naturals and sharps, supported on felted rails or on cords passed through holes in the bars at the two principal nodal points, in theory distant from each end by 22.4 per cent of the total length of the bar, roughly one-quarter (see PARTIALS, 6). There are no resonators. The instrument is often played in its opened case; after use the naturals may be slid under the sharps to close the case. Some recent models can if wished be held on a vertical metal stand. The beaters, held between finger and thumb, have spherical ends of horn, wood, or brass to produce the characteristic bright penetrating sound. Rubber ends give the more *celesta-like sound sometimes required. Compass is written *g* to *c'''*, sounding two octaves higher, thus reaching to the top note of the piano.

2. *Keyboard glockenspiel*. This is more scarce, and varies in build from small and portable to the size of a small celesta. The keyboard, actuating small metal up-striking hammers, allows little variation in dynamics, and the volume of sound is anyway not great. Percussionists far prefer the plain glockenspiel (1, above), but there are many works written with the keyboard version in view, e.g. Dukas, *L'apprenti sorcier*; Debussy, *La mer* (the composer writes 'or celesta'); Mahler, Seventh Symphony; Messiaen, *Oiseaux exotiques*. The keyboard glockenspiel is generally understood to sound one octave higher than written, like the celesta. It is also the best instrument for Papageno's music



Pl. 1. An orchestral glockenspiel (Boosey & Hawkes).

in Mozart's *Die Zauberflöte* (labelled for 'instrumento di acciaio', i.e. 'of steel') written with chords of many notes as if it were piano music. It can also be used for the 'carillon' part in Handel's *Saul*; it is very uncertain what instrument Handel actually had, but keyboard metal-bar instruments were used long before in the *carillon countries for bell-tuning and instruction.

Toy pianos are another form. John Cage wrote a suite for toy piano in 1948.

3. *School glockenspiels*. First, simple instruments manufactured for small children, with one row or (chromatic) two, and bars only 1.5–2 mm. thick and therefore quite short for the notes they give (see below, 5). An old name for these was 'harmonica', though some German exporters early in this century already termed them 'metallophones'. (The small household dinner gongs with hollow bun-shaped brass resonators under the bars were also manufactured as 'harmonicas'.)

As developed during the 1950s for the *Schulwerk* of Carl Orff (1895–1982) the instruments have bars up to 18 in number, 2–6 mm. thick and often placed over a wooden trough which serves as resonator, an idea borrowed from South-East Asia, where instruments of tuned bars have been in use from the early Middle Ages (see RANAT, RONEAT; XYLOPHONE, 3). The bars can be lifted off, so that with a one-row diatonic instrument an F bar can be quickly replaced by an F# bar for playing in G major, and so on. The compass is usually

one-and-a-half octaves and alto and bass instruments are also supplied.

For individually mounted bars, each with a horizontal tubular resonator, see CHIME BAR.

4. *Lyra glockenspiel* (or bell lyra or lyra). A glockenspiel for marching bands, the bars mounted one above another in a lyre-shaped metal frame on top of a staff; the base of the staff is supported in a leather harness like that of a standard-bearer. The bars are nowadays of aluminium, usually in two rows giving two chromatic octaves played with one beater. The sound carries well above the drums, and there are Corps of Drums that use these glockenspiels as their main or only melodic instrument; or else they may use the more recent horizontal models carried on a strap ('marching bells', etc.). The lyra came in in Germany around the 1870s as a musical replacement for the old 'jingling johnny' (see BELL TREE), often retaining its pendant horsetails.

5. *The pitch of a bar*. The bar vibrates in a 'bending' manner under the restoring force of its stiffness. The thicker the bar, the greater the stiffness and the higher the frequency. As to length, the underlying law holds true: frequency varies as wave-velocity divided by the length. But owing to the presence of shear stresses in addition to bending stresses, the wave-velocity itself varies inversely with the length, so that in the result the frequency varies inversely as the length squared. Therefore, for a bar to sound an octave lower than another (of the same material and even thickness), it need

be only 1.4 times as long ($\sqrt{2}$); the width, if small compared with the length, should in theory hardly affect the pitch, so the basic equation for a freely supported bar is:

$$\text{frequency} \propto \frac{\text{thickness}}{\text{length squared}}$$

or for rough calculation of the note of a steel glockenspiel bar (all dimensions in cm.):

$$\text{frequency (Hz)} \propto \frac{520,000}{l^2}$$

(For 'overtone-tuning', see XYLOPHONE, 2; for the pitch of metal tubes of similar sizes, see TUBAPHONE.)

To lower the pitch of a bar it is thinned in the central region (e.g. by filing a notch across, or countersinking pits), thus reducing stiffness at the main fundamental antinode (see PARTIALS, 6). To raise the pitch, the bar is filed under the ends, where the sharpening effect of reduced mass outweighs any flattening effect from reduced thickness.

See PERCUSSION.

Gong (Indonesia). See GAMELAN, 1a, e.

Gong and tam-tam. Bronze instruments suspended by the rim and struck at or near the centre with a heavy wool- or felt-covered mallet; some oriental gongs, however, are not suspended but rest face upwards (see, e.g., BONANG).

1. Western orchestral percussion has during the 20th century come to distinguish between: 'tam-tam' (normal orchestral gong) with rim turned back little or not at all, no central boss, and not tuned to a particular note; and 'gong', thicker, with the rim well turned back, usually a central boss, and in some cases tuned to a particular note. Their different sound qualities are up to a point reflected in the sounds of the words themselves ('tam-tam' more metallic; 'gong' more booming). Both words are of East Asian onomatopoeic origin, but it so happened that when gongs were first imported from the East in the 18th century, England adopted 'gong' but the Continent usually 'tam-tam', in neither case then with any distinction of form in mind. An early use is by Gossec in his funeral music for the statesman Mirabeau, 1791, a large tam-tam being carried in the procession.

Diameters vary between about 30 cm. and 95 cm. (12" and 37"), for the orchestra the larger the better—unless, as in some modern compositions, two or more contrasted pitches are asked for. Thus Boulez has required two or more tam-tams of different (unspecific) pitches—'medium', 'low', etc.—and similarly two or more gongs. A leading gong-maker in the West through modern times has been Paiste in Switzerland, with a reputation on a par with that of Zildjian for 'cymbals'.

2. Most of the vibration takes place away from the rim with higher 'partials persisting longest; but the behaviour of the different kinds of gong does

not prove easy to account for. For example, the higher partials of a tam-tam may surge in a crescendo after the stroke before they decay; and with some gongs the initial pitch may be heard to rise, or fall by up to a whole tone or more, following a stroke. Gong-makers in the Far East may pay great attention to this, knowing by experience how to make a gong that rises in pitch or falls—it is said that a customer will specifically order the one or the other. Only latterly has the phenomenon begun to be researched in the West in scientific terms.

3. For different gongs of the East, see CHINA AND KOREA, 1a, 2a; JAPAN, 1a (*shoko*); GAMELAN, 1a, e; SOUTH-EAST ASIA; also GONG CHIME. Gongs are known to go back to the sixth century AD from China southwards (thus considerably younger, it seems, than the 'bronze drum'). Individual instruments especially prized for their beauty may be given proper names, have magical powers attributed to them, and receive ritual offerings.

Gong bumbung. See BLOWN GONG.

Gong chime. 1. The set of tuned gongs with one player has its highest importance in music from Burma to Indonesia (see GAMELAN, KULINTANG, SOUTH-EAST ASIA). The gongs, usually bronze, are most typically of the kind also called 'kettle gongs': fairly small, with the rims deeply turned over and a prominent boss on which they are struck. In most cases they are arranged, boss upwards, round a low circular frame of wood or bamboo, held by thongs passed through holes in the gongs. One player sits in the middle of the circle (as see SOUTH-EAST ASIA, Pl. 2, back row, right); or else the kettles are placed in one or two straight rows (see BONANG) also GAMELAN, Pl. 1 (foreground).

The Thai *gong* (*khong*) *wong yai* (SOUTH-EAST ASIA, Pl. 2) has 16 gongs covering just over two octaves in approximately equal intervals (given as from *d'* to *e''*); the smaller *gong wong lek* is an octave higher, with gongs from 9 cm. (3½") upwards in diameter; the beaters are hide-covered. (For their participation in the *pi-phat* ensemble, see SOUTH-EAST ASIA, Ex. 1.) Also in Thailand is the gong chime in a large upright crescent frame, *gong mon*, played especially for funeral music. In Burma there are gongs set in rows, *maung zaing*, said to be relatively recent.

2. China, *yunluo* ('cloud gong'): 10 almost flat small gongs hung in a wooden frame held in one hand and hit with a horn hammer on the end of a bamboo stick. All have the same width, being graded in metal thickness from about 0.8 mm. for the deepest note to 2 mm. for the highest. Once used in formal court ensembles, the *yunluo* has been revived for the modern Chinese orchestra with up to 36 gongs; in one type they are graded in diameter.

3. In Western music, it appeared in Italian opera notably by Puccini in *Madama Butterfly* of 'tam-tam giapponese' a chromatic octave of 'a compass in both opera'.

Gong drum. See BANN DRUM.

Goofus. *Free-reed instrument.

Gopi-yantra. Indian one unusual kind with which themselves in the north metal pot, open-topped, over the bottom. Bound of a bamboo cut to a fork top to hold a tuning peg. This passes down into the skin by a toggle. As the its vibration is resonated clear note. The bamboo together near the top, lowers the note. A single bamboo stick on the fork.

The note of the *gopi-yantra* be expected from the involved, apparently by attachment of the string (skin) results in two large cycles of skin motion) oscillation in the fundamental becomes largely an octave harmonic (Adkins).

Gora. South African instrument resembling a 'musical cm.) slightly curved, with of ox-sinew). But the blowing (a rare instance). The lower end of the instrument of flattened quill (vulva) of which is bound to the with both hands, and narrowly parted lips, it in and out, making the setting the string in the mouth-cavity select (mostly, it is said, for brisk melodies, while heard between the Hottentot instrument, Bushmen, and then (1) and other Bantu (also *lesiba*, 'feather'), played herding.

See AFRICA; Kirby 1934.

Grille (Old Fr., also 'slender'). A name for some type of small

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century English
church, though
it recorded. Later
occasionally made
Among the very
a small bamboo
two are German:
an octave and a
and a solo sonata
a march of 1807
tenoroon (Mikson
a tenoroon are
atlin. The rather
bamboons can be
ending at appro-

a part with this
in *Quilote* and *Rin*
of *Spring*, and
ly played on the
though it seems
d, at least at first,
(Hevan 1978).

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instrument is still
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p.

up to c.1850,
It is shown in
al difference that
nt the diapasons
of the stopped
not exceed one-

and-a-half times. For reasons outlined under CHI-
TARRONK the top or top two courses of a theorbo
are tuned an octave lower than they would be on
a lute or archlute and this can give accompanying
harmonies a very rich sound. The tuning generally
followed the 'A tuning' of the lute (see LUTE, 2b)
with diapasons, e.g. from G down to low A'.

Some puzzle arises over the identity of numerous
instruments met in collections, mainly from the
first half of the 18th century and many of them
German, in which the upper pegbox is carried
above the lower by a jinked piece (see LUTE, Pl. 3).
Such specimens, though with bodies about lute-size,
have long been exhibited as theorboes, but are now
considered more likely to be examples of baroque
13-course lute (with no octave lowering of the top
courses): see LUTE, 4.

2. *Muslc.* Many instructions for accompanying on
the theorbo are French, c.1660-1730. In England
it was the most regular plucked instrument for
accompanying the voice: Playford's song pub-
lications from 1639 onwards name it 'Theorbo-
lute', e.g. 'with a thorough-bass (figured continuo)
for the Theorbo-lute, Bass viol, Harpsichord or
Organ' (*Banquet of Music*, 1688, an early mention
of the 'harpsichord in this connection in England).
Mace (1676) shows how the bass line might be
realized on the theorbo—great leaps back and forth
between the deep diapasons, and chords and fast
running decorations above—in an idiomatic style
quite different from keyboard styles (Huws Jones
1972), and as different again from the older,
pre-baroque, ways of accompanying the voice on
the lute itself.

Thumb plano. See SANSÁ.

Thunder sheet. See EFFECTS.

Ti. Chinese flute; see DIZI.

Tibet. See CHINA AND KOREA, 3.

Tibia. 1. (Lat.). Ancient Roman name for a *reed-
pipe, corresponding to Greek *aulos.

a. **Organ reed stop** (esp. see CINEMA ORGAN).

Tilincea (Romania). See FLUTE, 8b.

Timbales (In full, *timbales creoles* or *cubaines*—not
to be confused with the French name for *timpani).
One of the drums of Latin American dance music,
forming a pair, differing from *bongos and *conga
drums in being intended for playing with drum-
sticks: the counterhoops project above the heads
whereas with hand drums they are drawn lower
down to give freedom to the hands. Cylindrical,
with diameters up to 35 cm. (14"), the two drums
are held on a common stand. The main quaver
rhythms are played on the larger drum, the smaller

'filling in'. Frequently a pair of *cowbells (modern
form) are mounted above the timbales, for the right
hand to play with the stick while the left hand
continues on the larger drum.

Timbrel. See TAMBOURINE, 2.

Timpani (or kettledrums; Fr.: *timbales*; Ger.:
Pauken; It.: *timpani*—a sing. '*timpano*' exists; Ru.:
litavry; Sp.: *timbales*). The large cauldron-like
instruments tunable to different notes, and, though
not historically the oldest drums of the West, the
oldest in the orchestra and without question the
classic drums of symphonic music. Normally of
copper, two, three, or more timpani of differing
sizes are played by one performer, each drum
tunable over the range of a fifth by changing the
tension of the head (calfskin, or nowadays of plastic,
which can give very clear notes).

1. *Hand-screw timpani.* The traditional timpani are
tuned by six or eight T-handled screws which draw
down the metal counterhoop (in Fig. 1a, shown in
section, the superior type with projecting lugs with
holes for the screws). Such remained in professional
use in British orchestras up to the 1950s, and
many amateur societies rely on them still. Otherwise
they have been almost entirely replaced by the
more expensive pedal timpani or other 'machine'
drums (see below, 2, 3), which enable the player
to retune instantly to different notes.

Most music up to the mid-19th century and
much since is scored for two timpani, normally
tuned to the tonic and dominant of the movement.
The central notes of their respective tuning-ranges
lie a fourth apart, *d* and *A*. This makes the compass
Bb to *f* for the smaller and low *F* to *c* for the larger,
allowing eight tonalities, from *F* down to *Bb*, to
have the tonic on the small drum, the ancient

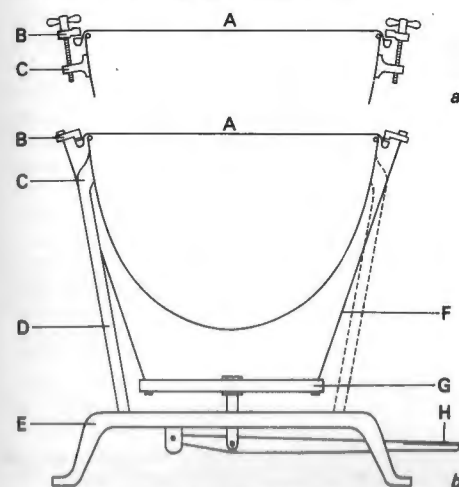


Fig. 1. (a) Section of top part of hand-tuned drum; (b)
section of a pedal drum, showing the basic principle.

choice (in many old scores the two notes are written
C and G whatever their actual sound, matching
the notation of the classical *trumpet with which
the timpani were intimately allied). Changes in
tuning are mostly demanded between movements
or, if during a movement, allowing sufficient bars'
rest for retuning with the handles. Average di-
ameters for a set of two drums are 63.5 cm. and 71
cm. (25" and 28"). A hole in the bottom of each
drum takes up temperature changes in the air.

Works of the Romantic period increasingly call
for three drums, as Brahms in some of his major
works and Tchaikovsky in most. With the third
drum of an intermediate size, the other two became
more separated in size to add a whole tone at each
end of the tonal compass, the lowest useful note of
each drum now usually considered to be, from the
smallest downwards, *c*, *G*, and *Eb*; typical diameters
then are 61, 66, and 75 cm. (24", 26", and 29½").

2. *Pedal timpani* (Pl. 1). The general principle of
these is illustrated diagrammatically in Fig. 1b. The
head (A) is to be tightened from below by the pedal
while the main stress on the shell remains within
the top region (B-C) as on a plain hand-tuned
drum. The shell is supported on four metal struts
(D) rising from the heavy base (E). The tension
rods, one of them shown (F), lead down to a disc-
or star-shaped frame (G) which is moved up or
down by the pedal (H). The classic system is that
designed in Dresden by Pittrich, from 1872. Later
designs include lighter-weight models, as by the
leading American timpani maker, Ludwig, some
with fibreglass shell, and with the tension rods
passing inside the shell, emerging near the top to
engage the counterhoop.

Pedal actions are very sophisticated, with bal-
anced movement that can be held in any position
and an adjustable pitch indicator placed up beside
the rim. On one single pedal drum different notes
can be played quickly one after another, though
never to the point of dispensing with the need for
two or more separate timpani.

There are also 'single handle' machine drums,
with one large handle instead of the pedal, allowing
a drum to be quickly retuned with one hand,
leaving the other hand free to strike. These appeared
in Germany c.1850 and are the kind that Wagner
wrote for in the *Ring*. In Act 1, Scene 3, of
Götterdämmerung, the second of two timpanists
plays seven different notes on two drums within
the space of 28 bars, including Hunding's sinister
rhythm, dead solo.

The first attempt at a 'machine drum' tunable
by a single movement is, needless to say, credited
to Leonardo da Vinci. Little more was done before
a spate of inventions in every country, from a
rotary drum (below, 3) by Stumpff, a German living
in Amsterdam, in 1821, to the 'Dresden' pedal
drum noticed already. Some pedal drums built to
earlier specifications back to the 1840s are said
still to have been in use in the Munich opera house
in the 1960s (Tobischek 1977).



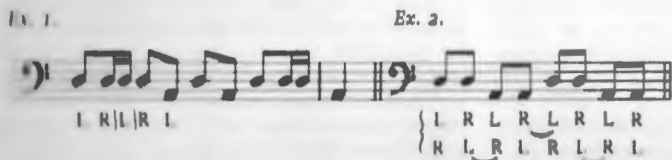
Pl. 1. Pair of pedal timpani
(model by Premier, Leicester).

3. *Rotary timpani*. These are mounted on a central column which rises from a base and for one part of its length has a screw-thread. The tension-rods lead down to a frame which engages the thread, while another frame, supporting the shell, turns freely on the column. Hence, when the player rotates the drum one way or the other by one hand, both frames rotate together but the tensioning frame moves up or down the screw-thread. The mechanism is usually concealed inside the shell, but in older models may lie outside it. Also, the action is in some cases reversed, the shell engaging the screw and the tensioning turning free, so that in this instance the shell is moved up against the head to increase the tension. These drums do not, of course, leave both hands free from tuning as the pedal does, and the rotation can move the player's favourite striking spot out of reach. But a timpanist has only two feet, and if he must quickly change the note of a third drum, then a rotary drum or one of the old hand-tuned drums can be the solution. A similar rotary principle is used in *rototoms.

4. *Timpani playing*. The two sticks are of cane or wood with ends of felt over a harder felt or cork core, and of various degrees of softness to suit the music or follow a composer's instruction. Each stick is held between thumb and index finger, the wrist held low. The drums are struck fairly near the rim, the sound being if necessary damped with the fingers while holding the stick. The two hands are used as far as possible alternately ('hand to hand'), reserving 'double beats' with the same hand for where necessary in fast passages. This frequently

leads to crossing one hand over the other from drum to drum. Ex. 1 is a timpani flourish in Purcell's *The Fairy Queen* (Symphony to Act 4), one of the earliest written solo passages for timpani and lying naturally for alternate hands starting with the left—as one can test for oneself in dumb-show, the small drum tuned to D being placed on the right (though on the Continent it may be on the left). Ex. 2 on the other hand shows a simple group of notes calling for cross-beating in either of the two ways indicated (cross-beats shown bracketed) and executed with a rhythmic swing and a fine visual effect recalling the timpanist's historical parent, the cavalry kettledrummer with the drums slung on either side of the drum horse and the reins attached to the drummer's stirrups. In complete contrast, Ex. 3 is from one of the first major composers to write for pedal drums, Richard Strauss, in *Till Eulenspiegel*: the part is simply headed 'Pauken', without stating initial tunings in the old manner. After a few pages in the score the drums give out five notes of the principal theme (which is indicated in Ex. 3 by small notes): the first two notes on the middle drum of three and the last two on the large drum, ending with a roll.

Ex. 3.



The timpani roll is also made with hand-to-hand strokes. Among special effects, the glissando with the pedal, upwards or downwards, first became familiar to audiences in works by Bartók, most wonderfully in the Adagio of the *Music for Strings, Percussion, and Celesta* (1935). Rarer is *con sordini* or *coperti* (covered with a cloth), originally done with cavalry kettledrums at funerals (with trumpets likewise muted) and later, e.g., demanded by Mozart in some operas.

5. *Pitch and size*. The sound of a drum is composed of non-harmonic partials with, from timpani, a predominance of those arising from vibration modes having diametrical nodes only (see PARTIALS, 7). The relative frequencies of these partials, although non-harmonic, come in theory not far away from harmonic, and it has been further shown by trials in the USA with actual timpani that these frequencies are considerably lowered by the mass of air inside the drum and then make a series very close to 2, 3, 4, 5, . . . If then taking, for example, G as the pitch of the first of these partials (the one generally regarded as the heard pitch of the drum), the series runs practically G d g b d', etc., thus including the intervals of the fifth, which timpanists often listen for while tuning. One might ask why the diameters for a pair of drums quoted above (1) lie closer than would match tuning ranges a fourth apart: it may be bound up with the lowering of partial frequencies by the enclosed air, of which the larger drum holds the greater mass. There are in fact, made in Germany for school music, some timpani with cylindrical shells wide open at the bottom, with listed diameters and tuning ranges which agree quite closely with the direct theoretical relation between diameter and pitch.

6. *Early kettledrums*. See NAQQARA for medieval small kettledrums or 'nakers', often carried on a belt round the waist—or by a boy walking in front (see MEDIEVAL INSTRUMENTS, Pl. 1). The large drums which had reached the West during the 15th century were brought to England from the Netherlands by Henry VII and were primarily horse-drums. As these began to appear in the orchestra during the 17th century, they were played with heavy sticks, or often in later periods with sticks with disc-shaped wooden ends about 5 cm. (2") across and giving a very crisp sound. Such are still illustrated in 1845 (Kastner, *Méthode des timbales*), though by then Berlioz had been insisting on the choice of soft-ended sticks ('sponge sticks' he terms them) for orchestral use. The 18th-century kettledrums, sometimes placed together on an iron stand, were usually smaller in diameter than later (often around 50 cm. or 20"), with the two of a pair different by only about 2 or 3 cm., which may point to a very considerable difference in tension, giving a markedly crisper sound from the smaller drum whose duty it was to sound the tonic. Cavalry kettledrums in Europe today will often be seen to preserve such small dimensions.

Unusual tunings are demanded in a number of lesser-known works by 18th-century composers, also use of more than two drums, as where Christoph Graupner in a *Sinfonia* of 1747 gives six timpani a melody on the notes from low F up to d—very much like Holst in *The Planets*. But the major orchestral breakaways from the old tonic-and-dominant tradition are in the works of Beethoven: timpani entrusted on their own to principal themes, as in the first bars of the Violin Concerto, and in the Scherzo of the Ninth Symphony, in the latter exploiting the full tuning-range of octave Fs—this only one of his several very unusual tunings for the two drums.

7. *Solo repertory*. From the Baroque, pieces of 1685 by Philidor have sometimes been revived including a march for two pairs of drums tuned respectively to g and e, and c and G (Titcomb 1956). Later, Kastner (1845) tells how a Berlin timpanist had recently performed a concerto on six drums, running from one to another on a sort of gallery, throwing the sticks in the air and going through the most extraordinary motions without his execution suffering in the least, all accompanied by eight trumpets and full orchestra. There are timpani concertos by P. Pieranzorina, a timpanist born in 1814, and Julius Tausch, c.1878. A sonatina for two timpanists is by Tcherepnin (1940); six pieces, *Recitative and improvisation*, by Elliott Carter (1966); and a few other works, not that most timpanists feel any great need for concertos.

Timp-tom. See TOM-TOM, 3.

Tin whistle. See FLAGEOLET, 1.

Tiple (Sp., 'treble'). 1. Small *guitar with four or five *courses of strings (now metal), made in numerous forms in Spain, and in Latin America especially Colombia (where it has been rated as the 'national instrument'), Venezuela, and up to Mexico. It may be about half the size of a guitar or somewhat more, and be tuned like the upper strings of the guitar, to a higher pitch or with the lowest course raised an octave as on a *ukulele; but there are many different local tunings also. Besides accompanying songs, the tiple in ensembles may strum harmonies above the guitar playing the bass (and a *bandola playing the melody). There are also both folk commercial makes of the tiple, with the outer courses double and the inner two courses triple with an octave (lower) string in the middle (also GUITAR, Ex. 3b, Colombia): in the USA, Martin was making this from c.1920.

2. Tiple, as a wind instrument of Catalonia (Spain): see SHAWM, 3b.

Tof (drum). See MILICAL INSTRUMENTS, 1d.