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Wind Musical Instruments

Sharifjon Akhmedov Mamirdjanovich
Head of the Department of Music Education, Faculty of Arts, Andijan State University, associate professor

Abstract

The classification of musical instruments is based on their division according to the nature and conditions of use of sounding bodies. According to the method of sound formation, according to the type of vibrator that sets the column of air into vibration, wind instruments are divided into flute, reed and mouthpiece.

Keywords: Wind instruments, musical instruments, wooden musical instruments that make musical sounds, Register, air, lower frequency.

Introduction.

Wind musical instruments - musical instruments, which are wooden, metal and other tubes of various devices and shapes, emitting musical sounds as a result of vibrations of the air column enclosed in them. The register of wind instruments is determined by their size: the larger the volume of the air column enclosed in the instrument, the lower the frequency it oscillates and, consequently, the lower the sound emitted by the instrument.

The main part.

Changing the fluctuations of the air column in the instrument (and hence the pitch) is achieved in two ways:

- by stronger blowing, the air column is cut into two, three, four, etc. parts, as a result of which not the main tone, but one of its overtones (overblowing) begins to sound;
- the volume of the sounding column of air is increased or decreased by means of special devices - valves, gates, pistons, backstage - which the musician activates with his fingers.

Woodwind musical instruments. Woodwind instruments are called woodwind instruments, the principle of playing on which is based on shortening the sounding column of air by opening holes located on the body of the instrument at a certain distance from each other.

In the early stages of their development, these instruments were made exclusively from wood, from which historically they got their name. Some modern instruments of this type (for example, the flute) are almost never made of wood; for the manufacture of others, wood is used along with other materials.

Wind musical instruments. Playing most wind instruments involves the use of human breath. This is where their name comes from: the old Russian word “spirit” means air. The sounding body of any wind instrument is a column of air enclosed in the barrel channel.

The classification of musical instruments is based on their division according to the nature and conditions of use of sounding bodies. According to the method of sound formation, according to the type of vibrator that sets the column of air into vibration, wind instruments are divided into flute, reed and mouthpiece. Flute (labial or whistling)

The vibrator for these instruments is a jet of air that cuts against the sharp edge of the labial opening or the wall of the trunk. Flutes include:

- ocarina-shaped instruments - various ceramic whistles with playing holes;

longitudinal flutes:

- ✓ open - tools, the barrel of which is open at both ends;
- ✓ multi-barreled - instruments, which are a set of tubes of various sizes, with one end of each tube closed, the other open;
- ✓ whistle - instruments, in the upper end (head) of the barrel of which is inserted a sleeve, lip or tongue of the performer, forming a gap through which the air stream is directed to the sharp edge of the cut of the whistle hole;
- ✓ transverse flutes - instruments with one closed end (head), where there is a sound hole, on the edge of which a stream of air is directed.

Reed.

The vibrator for this group of instruments is an elastic plate - a breaker (cane, squeaker). This group includes:

- tools with a free tongue: in the form of a birch bark plate, grass leaf, etc.;
- instruments with a single or double beating tongue;
- instruments with a slipping tongue: harmonicas, harmoniums, etc.

Mouthpiece.

The vibrator for these instruments is the performer's properly closed and collected lips. The position, degree of elasticity and flexibility of the performer's labial and facial muscles, their training, endurance and strength when playing a wind instrument is commonly called an embouchure. Performers on mouthpiece instruments tightly put their lips to the mouthpiece, and the jet of air sent causes them to vibrate. Thus, unlike all other wind instruments, mouthpiece ear cushions not only participate in the process of sound formation, but are a direct vibration activator - a vibrator. And although performers on flute and reed instruments must also have embouchures (the flutist directs a stream of air to the cut of the instrument with it, the performer on the reed instrument, covering the reed with his lips, controls its vibration with the help of the embouchure), it is the mouthpiece instruments that are called embouchure.

Flute and reed instruments used in professional performance are usually called woodwinds, despite the fact that wood is far from always the material for their manufacture; mouthpiece - brass wind instruments.

The frequency of vibrations of a column of air enclosed in a tube of a wind instrument (the pitch) depends on the length of the tube. With an increase in its length, the oscillation frequency decreases (the pitch decreases), with a decrease in its length, the oscillation frequency increases (the pitch rises). In addition, by increasing the voltage of the embouchure and the speed of the blown air (blowing), the air column can be made to vibrate not only as a whole, but also divided into 2, 3, 4, etc. equal parts. A column of air, sounding as a whole, gives the main tone. A column of air, divided into two equal parts, sounds an octave above the fundamental tone, into three equal parts - a duodecim above the fundamental tone, into four equal parts - two octaves above the fundamental tone, etc. This sequence of sounds extracted on a wind instrument by blowing , is called the natural scale, and the sounds themselves are called natural or overtones. On the oboe,

clarinet, bassoon, blowing occurs with the help of special "octave" valves. For clarity, we present a natural scale built from a sound to a large octave.

As already mentioned, the absolute pitch of the fundamental tone depends on the length of the instrument tube, but the intervals between overtones do not depend on the absolute pitch of the fundamental tone, but always remain constant: between the first and second overtones - a pure octave, between the second and third - a pure fifth, between the third and the fourth - a pure fourth, etc. The intervals between the overtones do not correspond to the intervals of the same temperament of the same name, but this discrepancy is not so great as not to use natural sounds in practice. The exceptions are the seventh, eleventh, thirteenth and fourteenth overtones, which are so different from the corresponding sounds of the equal temperament scale that they are perceived by ear as false. Despite this, before the invention of chromatic instruments, they were widely used when playing natural horns and pipes.

Wind musical instruments have been known since prehistoric times. Presumably in the Paleolithic era (approximately 80-13 thousand years BC), a flute, a pipe, a pipe-shell appeared; in the Neolithic era (approximately 5-2 thousand years BC) a flute with playing holes, a Pan flute, a transverse flute, a transverse pipe, pipes with a single tongue, nasal flute, a metal pipe, pipes with a double tongue.

Flute and reed wind instruments are hollow tubes of cylindrical or conical, and sometimes reverse-conical section. The simplest flute and reed instruments made it possible to produce only a small amount of natural sounds on them. On the Pan flute, the gradualness of the sound scale was achieved by means of tubes of different sizes (the shorter the tube, the higher the sound). However, their change during the game made it difficult to perform the technique. The idea arose to try to vary the length of the air column within one tube by drilling holes in it. The open hole allowed the air sent by the performer to the instrument to leave the tube before it ended, which shortened the air column and thus raised the sound. A hole closed with a finger restored the integrity of the tube.

The flute was widely used in Ancient Egypt (mem - a longitudinal flute with five playing holes and sebi - transverse), Palestine (ugab - a longitudinal open flute), in China (paixiao - a type of Pan flute; xiao - a longitudinal bamboo flute with six playing holes; di - bamboo transverse flute with six playing holes, four holes for tuning and one for coloring the timbre; xuan - longitudinal clay flute with six playing holes), India (vansha - transverse flute and layu - longitudinal). To a much lesser extent, the instrument was common in Ancient Greece and Rome. These are varieties of the syrinx (flute): a flageolet (a high register variety of a longitudinal flute) with playing holes and a Pan flute.

In the countries of the Ancient World, in addition to flutes, reed instruments were widespread. In ancient Greece, one of the most beloved instruments was the aulos. The instrument was a cylindrical or conical tube with 3-4 or 6 playing holes and with a double reed. The performer usually used two aulos at the same time. On one sounded a melody, on the other - an unchanging tone accompanying it. In the last century BC, the avlos was improved. The number of game holes has increased to 15.

Some of them were closed with rotating rings, which facilitated the execution process. Avlos accompanied theatrical performances, gymnastic exercises, he was also used as a military instrument in military campaigns. Pythian (low) and choral (high) aulos were popular. In Rome, aulos was called tibia.

Argul was widely used in ancient Egypt. The instrument consisted of two interconnected pipes of different lengths and beak-shaped mouthpieces with single tongues. The short tube had 6 playing holes, and the longer one had only a hole for sending air. They played two pipes at the same time,

like an aulos. Unlike the Argoul, the Arabic tsummara had playing holes on both pipes. In China, there were instruments of the oboe type guan and sona.

The emergence of the European oboe is associated with two medieval types of the oriental oboe. This is the Indian zurna and the Arabic zamr. European musicians used the oriental way of playing: the reed of the instrument was completely immersed in the mouth and vibrated freely, which made the sound very loud and monotonous. In the era of the Middle Ages, an offshoot of the oboe group arose - a family of Western European pipes with a conical barrel. The treble and soprano pipes were called shawls, the alto and tenor pipes were called pommers, and the bass pipes were called bombards or large bass pommers. These instruments had a diatonic scale of almost two octaves and had different tunings. The total range of the flute family was by the end of the 16th century. five and a half octaves: from the counter octave F to the third B.

The improvement of woodwind instruments is associated primarily with an increase in the number of playing holes. Being located at certain distances from each other, they began to be divided into main ones and holes with valves. The latter, in turn, were divided into holes with valves initially in the closed position and holes with valves initially in the open position.

The main holes made it possible to obtain the main diatonic scale of the instrument. As a rule, they are covered with rings (glasses) connected to special corrective valves. Holes with valves that are in the closed position and open when pressed, make it possible to get altered tones on the instrument. Holes with valves open and closed when pressed are used to produce the lowest sounds of the instrument.

The oboe, clarinet and bassoon also have octave keys. They are located on the opposite side of the main holes and help the performer to blow. For an octave overtone, the same fingering is used as for the main tone (more complicated on the bassoon), only the entire scale of the instrument will sound an octave higher.

Flute, oboe and bassoon belong to the "octave" instruments. They give both even and odd overtones. The clarinet is a "quinting" instrument, since when overblown, it immediately gives a fifth through an octave from the main tone. It is impossible to get even overtones on it.

The forerunners of modern brass instruments were shells and horns dating back to the prehistoric era. Simple horns, made from animal horns and even elephant tusks, were widely used in cases where it was necessary to emit a signal that was superior in strength to the human voice. They produced several natural sounds, timbre inexpressive, with a predominance of low overtones.

In ancient Egypt, Palestine, Greece, Rome, a straight metal natural pipe was widely used as a military and signal instrument. In ancient China, bronze pipes da-chun-ku (with a large bell) and xiao-chun-ku (with a small bell) were used. In ancient India, the most ancient wind instrument shankha (pipe from a sea shell) and rana-sringa (horn) were common.

In a primitive communal society, Slavic squads had the simplest musical instruments. To collect the squad and give military signals, tury horns were used. In the annals of the X-XI centuries. trumpets and tambourines are mentioned, and on the frescoes of the Kyiv Sophia Cathedral (XI century) there are images of flutes and straight pipes.

The Ipatiev Chronicle of 1151 says that the movement of troops in the Kyiv squads began to the sound of trumpets. During the reign of Yuri Dolgoruky (90s of the 11th century - 1157), the number of troops was determined by the number of banners and the corresponding number of pipes and tambourines.

In the XII century. there was a separation between trumpets and horns. Pipes began to be used in military practice, horns passed into watch, hunting and shepherd use. In the era of the Crusades,

pipes became the property of the privileged classes (1096-1270), in their significance they were equated with weapons.

Simple horns were used by many peoples of Europe until the Middle Ages. There were three types of horns: small (zinc), medium and full or half. They were made from buffalo horn. In the XIV century. the trunk of the horn began to bend. Thus, ring-shaped curved hunting or forest horns were created, and at the end of the 15th - beginning of the 16th centuries, slightly smaller signal (postal) ones. At the beginning of the XVI century. in Germany, hunting horns appeared in three turns.

Further improvement of the brass Instruments is connected primarily with the replenishment of their natural scale. As a result, on long narrow-scale 12 instruments, it became possible to extract the natural scale from the second to the sixteenth overtone, and on short wide-scale instruments, from the second to the sixth-eighth overtones. Along with the improvement of brass wind instruments, the performing technique was also improved. So, at the end of the XVII - beginning of the XVIII century. a new playing technique arose - clarino (from lat. clarus - clear). It consisted in the maximum use of the upper section of the natural scale, where the sequence of extracted sounds becomes progressive. The constant use of the upper register of the instrument (trumpet or horn) required the highest skill from the performer. The highest achievements of this technique were reflected in the works of composers A. Vivaldi (1678-1741), G. Handel (1685-1759) and J.S. Bach (1685-1750).

The quest associated with the creation of chromatic brass instruments is most clearly seen in the improvement of the horn (see French horn). Sometimes these searches led to completely unexpected results. Thus, the experience of creating a horn with valves, undertaken in 1760 by F. Kelbel, led to the creation of byugelhorns - wide-scale instruments with valves, which were widely used in brass bands.

The valve mechanism, invented at the beginning of the 19th century, greatly expanded the possibilities of brass instruments, although in terms of timbre natural instruments were superior to chromatic ones. The valve mechanism is of two types: pump-action (piston) and rotating. The pomp was first used by the Berlin masters F. Blumel and G. Stölzel in 1814 for the French horn. The design of the rotating valve was created in 1832 by P. Riedl from Vienna. The valve mechanism consists of several additional tubes or crowns of various lengths. Each of the crowns corresponds to a double valve, which includes the crowns in the main tube and, accordingly, lowers the entire system of the instrument.

All chromatic brass instruments except the trombone have three main valves. The first valve lowers the entire instrument's pitch by 1 tone, the second - by 1/2 tone, the third - by 2.5 tones. All three valves pressed together lower the instrument's pitch by 3 tones. Thus, all intervals between natural sounds are chromatically filled (except for the octave between I and II). It must be taken into account that when the crowns are turned on separately, the scale of the main tube decreases exactly by the required amount: to decrease by 1/2 tone, the length of the main tube must be increased by 1/15 of its part, to decrease by a tone - by 1/8, to decrease one and a half tones - 1/5. When you turn on two or three crowns at the same time, the ratio will change dramatically. So, if you press the third valve simultaneously with the first one, its crown length will no longer be 1/5 of the length of the main tube, but a slightly smaller value, since the length of the first crown has already been added to the length of the main tube. When all three crowns are turned on at the same time, this difference will become even more noticeable (instead of lowering by 3 tones, the overall scale will decrease by 2.3/4 tones). Therefore, each crown is made somewhat longer than the calculated one, which only slightly reduces the sounds when any one valve is pressed. But with a combination of gates, intonationally purer sounds are obtained. However, in combinations

involving a third valve, the design ratios between the main and additional tubes change significantly.

Summary.

The use of the fourth gate (quart valve) on some instruments makes it possible to chromatically fill the intervals between I and II overtones, but almost all sounds taken using combinations of valves sound much higher, and when all four valves are pressed simultaneously, instead of lowering by 5.1 / 2 tones, the main scale will decrease by only 5 tones. However, the use of a quarter valve simplifies valve combinations. In addition, the use of a quarter valve increases the range of the instrument by a major third down.

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