Tsar Bell

Located

Moscow, Russia

The **Tsar Bell** , also known as the **Tsarsky Kolokol**, **Tsar Kolokol III**, or **Royal Bell**, is a 6.14-metre (20.1 ft) tall, 6.6-metre (22 ft) diameter bell on display on the grounds of the Moscow Kremlin. The bell was commissioned by Empress Anna Ivanovna, niece of Peter the Great.

It has never been in working order, suspended, or rung.

The present bell is sometimes referred to as *Kolokol III* (Bell III), because it is the third generation.

General description

The Tsar Bell is located between the Ivan the Great Bell Tower and the Kremlin Wall. Made of bronze, the bell cracked during a fire after being completed and has never been rung. The bell is the largest bell in the world, weighing 201,924 kilograms (445,166 lb), with a height of 6.14 metres (20.1 ft) and diameter of 6.6 metres (22 ft), and thickness of up to 61 centimetres (24 in). The broken piece weighs 11,500 kilograms (25,400 lb).

The bell is decorated with relief images of baroque angels, plants, oval medallions with saints, and nearly life-size images of Empress Anna and Tsar Alexey, who was reigning at the time the previous Tsar Bell was cast.

History

The history of Russian bell founding goes back to the 10th century, but in the medieval Russian Orthodox Church, bells were not typically rung to indicate church services, but to announce important ceremonies and celebrations, and as an alarm in case of fire or enemy attack. One of the largest of the early bells was the original Tsar Bell, cast in the 16th century. Completed in 1600, it weighed 18,000 kilograms (40,000 lb) and required 24 men to ring its clapper. Housed in the original wooden Ivan the Great Bell Tower in the Moscow Kremlin, it crashed to the ground in a fire in the mid-17th century and was broken to pieces.

The second Tsar Bell was cast in 1655, using the remnants of the former bell, but on a much larger scale. This bell weighed 100,000 kilograms (220,000 lb), but was again destroyed by fire in 1701.

After becoming Empress, Anna ordered that the pieces be cast into a new bell with its weight increased by another hundred tons, and dispatched the son of Field Marshal Münnich to Paris to solicit technical help from the master craftsmen there. However, a bell of such size was unprecedented, and Münnich was not taken seriously. In 1733, the job was assigned to local foundry masters, Ivan Motorin and his son Mikhail, based on their experience in casting a bronze cannon.

A pit 10 metres (33 ft) deep was dug (near the location of the present bell), with a clay form, and walls reinforced with rammed earth to withstand the pressure of the molten metal. Obtaining the necessary metals proved a challenge, for in addition to the parts of the old bell, an additional 525 kilograms (1,157 lb) of silver and 72 kilograms (159 lb) of gold were added to the mixture. After months of preparation, casting work commenced at the end of November 1734. The first attempt was not successful, and the project was incomplete when Ivan Motorin died in August, 1735. His son Mikhail carried on the work, and the second attempt at casting succeeded on November 25, 1735. Ornaments were added as the bell was cooling while raised above the casting pit through 1737.

However, before the last ornamentation was completed, a major fire broke out at the Kremlin in May 1737. The fire spread to the temporary wooden support structure for the bell, and fearing damage, guards threw cold water on it, causing eleven cracks, and a huge 10,432.6 kilograms (23,000 lb) slab to break off. The fire burned through the wooden supports, and the damaged bell fell back into its casting pit. The Tsar Bell remained in its pit for almost a century. Unsuccessful attempts to raise it were made in 1792 and 1819. Napoleon Bonaparte, during his occupation of Moscow in 1812, considered removing it as a trophy to France, but was unable to do so, due to its size and weight.

It was finally successfully raised in the summer of 1836 by the French architect Auguste de Montferrand and placed on a stone pedestal. The broken slab alone is nearly three times larger than the world's largest bell hung for full circle ringing, the tenor bell at Liverpool Cathedral.

For a time, the bell served as a chapel, with the broken area forming the door.

Voltaire once joked that the Kremlin's two greatest items were a bell which was never rung and a cannon (the Tsar Pushka) that was never fired.

Computational simulation of sound

In the spring of 2016, a team of UC Berkeley, Stanford, and University of Michigan researchers publicly performed an electronic reproduction of how the Tsar Bell would sound if it had not been damaged during casting. To simulate the sound of the bell, the team researched the bell's material characteristics and constructed a polygon mesh that modeled the shape of the bell. The team then used finite element analysis to compute the component frequencies of the bell when rung. For the first public performance, a stack of twelve speakers installed below the campanile on the UC Berkeley campus played the digital simulation of the Tsar Bell. The fundamental frequency of the sound was approximately 81 Hz.

Membranophones

By the Renaissance, Europe had a variety of drums performing specialized functions: frame drums and small tabors accompanied dance and song; larger tabors served as time beaters in small mixed ensembles; great cylinder drums with fifes were placed at the disposal of foot troops; large kettledrums and trumpets were restricted to cavalry and ceremonial music of the aristocracy. The music was at first improvised; later both outdoor carousel music and indoor polychoral sacred music were written for one or two pairs of instruments, sometimes in two contrasting ensembles or choirs—for example, Johann Heinrich Schmelzer’s *Arie per il balletto a cavallo* (1667).

Kettledrums were introduced into the orchestra about 1675–90 by, among others, Jean-Baptiste Lully in *Thésée* (first performed 1675) and by Henry Purcell in his *Ode for St. Cecilia’s Day* (1692). With the development of new playing techniques, modified drumstick heads, and the possibility of notating their music (hitherto prohibited by the rules of secrecy imposed upon guild members), kettledrums, henceforth called timpani, triumphantly entered orchestra, opera, and church, soon becoming the most important percussion instrument in the orchestra. Johann Sebastian Bach included a timpani solo in his *Cantata No. 214* (*Tönet, ihr Pauken!*; “Sound, You Timpani!”) and again in his *Christmas Oratorio* (1735). Haydn also wrote significant parts for the instrument. It

was Beethoven, however, who liberated the drums from merely rhythmic functions and their conventional tunings; he was also one of the first to write chords for the instrument.

The snare drum remained primarily a military instrument, although Handel used it in his *Musick for the Royal Fireworks* (1749) and Gluck wrote for it in his opera *Iphigénie en Tauride* (1779). The bass, or "Turkish," drum was rare in Europe until the craze for Janissary music in the later 18th century; it was found in Gluck's *Le Cadi dupé* (1761), Mozart's *The Abduction from the Seraglio*, and Haydn's *Military Symphony*.

The northern frame drum, or tambourine, was given the status of a salon instrument by 18th-century French society, and, combined with harp or keyboard instrument, it could be heard at fashionable soirees.

Friction drums maintained an existence in various parts of Europe, where they were played at Christmas, during the carnival season, or to greet the New Year; some of these traditions continued into the 21st century.

Developments after 1800

In general, until the early 19th century, the trend in Western musical culture had been to make diminishing use of nontonal percussion instruments. Those that succeeded in gaining access to the orchestra were used sparingly, often only as special effects or indications of local colour. By the mid-20th century, this trend had been reversed, especially in popular music, in which percussion instruments, both traditional and alien, play a basic part. Castanets, for example, either clicked together rhythmically or in sustained rolls, had been little more than dancers' instruments since the 16th century. Richard Wagner was probably the first major composer to use them, in the Paris version of his opera *Tannhäuser* (1861); 14 years later Georges Bizet employed them with great effect in his opera *Carmen*. Now, modern rhythm bands frequently include one or two single castanets or a pair attached to a long handle for ease in clicking.

On the other hand, tonal percussion instruments have assumed increasing importance. Those inherited from the Middle Ages, such as xylophones and jew's harps, were expanded to the limit of their potential; others were imported and modified to meet local requirements. Influenced by the great popularity of the piano, keyboards were adapted to numerous 19th-century idiophones in an attempt to render hitherto monophonic (single-voiced) instruments polyphonic.