

Grand Piano Construction

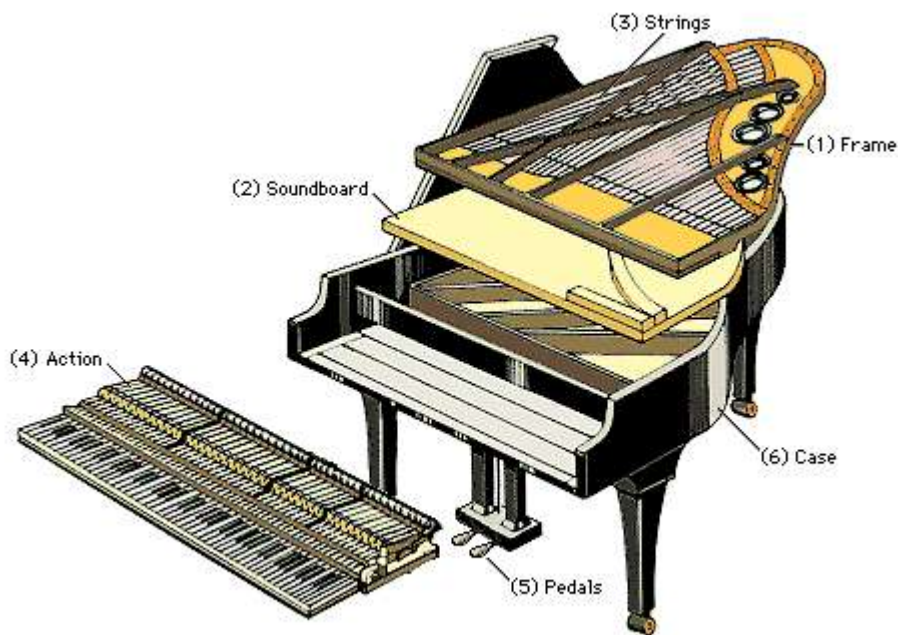


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(1) Frame - also called the plate or harp, this cast iron frame supports an enormous amount of stress exerted by the strings. The average upright or medium-sized grand piano's strings have a combined pull of about 18 tons (16,300 kg). The tension in a 9 foot concert grand is close to 30 tons!

(2) Soundboard - the sound of a string vibrating is pretty feeble on its own. In a piano, it is amplified by this large, thin wooden diaphragm glued around its perimeter. The soundboard is usually made from Sitka spruce, planed to about 3/8" thick. This wood has just the right balance of stiffness and flexibility to effectively transmit sound. The soundboard is also crowned, or bowed slightly upward towards the strings which helps it to maintain compression. This makes it more vibrant, and keeps it from caving in under the pressure from the strings.

(3) Strings - there are over 200 strings in a piano. Each treble note usually has 3 strings, the upper bass notes have 2, and the lower bass notes have only 1. This is because the higher notes are made of thinner strings. If they only had 1 string per note, they would be overpowered by the thicker and louder bass notes. Treble strings are made of steel. Bass notes have a steel core, with a copper winding. This allows the string to vibrate freely while having enough thickness to produce the low note. To conserve space and fit the longest possible bass strings into a cabinet, modern pianos have the bass strings crossing diagonally over the treble strings.

(4) Action - the sensitive inner mechanism of the piano translates all the nuances of your playing to

the hammers that hit the strings. There are many thousands of parts consisting of materials like wood, paper, cloth, felt buckskin, brass, plastic and steel that must work together in a precise chain reaction, with accuracy as high as a thousandth of an inch. For this reason, regulation of these moving parts is essential for evenness, speed, power and control. Periodic adjustments must be made to compensate for wear, compacting of cloth and felt, and changes in wooden parts due to atmospheric conditions that come most noticeably with the change in seasons.

(5) Pedals - pianos usually have 2 or 3 pedals that perform special operations like sustaining or softening the sound of the piano. They are connected to the action by a series of levers, dowels and springs called the trapwork. Considered to be part of the piano action, they too need to be regulated in order to function properly.

(6) Case - the rim of a grand piano is the wooden framework to which the plate is bolted and the soundboard is glued. The rim is in 2 parts: the inner rim and the outer rim. The plate and soundboard are attached to the inner rim. On some of the best pianos, the inner and outer rim are made as one piece to provide a stronger foundation for both structure and sound. Other pianos add the outer rim later. Different manufacturers use different woods such as laminated maple, spruce and beech.

(7) Pinblock - this is a laminated plank made of a hardwood such as maple or beech that runs the width of the piano and is attached to the plate and inner rim. Embedded in holes in the pinblock are steel tuning pins, around each of which is coiled one end of a piano string. The pinblock has to hold the tuning pins tightly enough by friction alone, so that the strings maintain their proper tension without slipping.

(8) Bridge - strings pass over wooden bridges- a long curved one for the treble and a shorter one for the bass strings- which transmit vibrations of the strings to the soundboard. Steel bridge pins are driven into the bridges to keep the strings in place, to aid in sound transmission and to cleanly terminate the vibrating portion of the string (much like a guitar player's finger would press down on the fretboard). The other end of the string terminates at the plate near the tuning pins. Bridges must be well constructed, both to transmit sound properly and to avoid splitting under the hundreds of pounds of downward pressure exerted by the strings. Most bridges are made of maple or beech, either solid or laminated, sometimes with a top layer, or cap.