

## Appendix B

## Glossary

- abrasives.** Various materials used for the removal of material, shaping, smoothing, cleaning, buffing, or lubricating.
- absolute humidity.** Amount of moisture in the air.
- abstract.** Also known as “sticker,” an abstract (or *Abstrakt*) is a link, usually made of hardwood, between the key and the wippen in antique and early modern push actions (*Stossmechanik*). Abstracts were replaced by key capstans in modern pianos. From a servicing perspective, abstracts are a nuisance because each must be detached individually before the action can be removed from the keyboard. Abstracts are often attached to “rockers” on keys, which require adjusting two screws on opposing ends with an offset screwdriver, another time-consuming procedure. Also referred to as “prolonge.” See also “push action,” “rocker,” “sticker.”
- Accelerated Action**®. Steinway & Sons replaced traditional flat balance punchings made of cloth or felt with balance rail bearings (half-round wooden dowels covered with cloth, U.S. patent no. 1,826,848, issued in 1931) in all production grands made in New York since mid-1933. That design change, as well as the new placement of key leads (U.S. patent no. 2,031,748, 1936) was aimed at improving repetition.
- Accu-Tuner**®. Albert Sanderson’s advanced electronic tuning device. Made by Inventronics.
- Acu-Just**® hitch pins. Baldwin’s hitch pins that permit adjusting the rear downbearing of strings by altering the distance between the string and the plate at the hitch pin (U.S. patent no. 3,478,635, 1969).
- action.** An assembly of brackets, rails, wippens, let off buttons, shanks, and hammers (and hammer butts in verticals); the mechanism above the keyboard. In a wider sense, the mechanism described above *and* the keyboard. In verticals, the damper mechanism is part of the action assembly. See also “top stack.”
- action bracket.** Vertical piece of metal or wood that supports action rails and is fastened to the key frame; comprises the “action rack” or “top stack.” Also referred to as “action standard.”
- action frame.** See “action rack.”
- action rack.** The assembly of grand action brackets and rails. Also referred to as “action frame.” See also “top stack.”
- action rail.** One of the three rails to which the shanks, wippens and let off buttons are fastened. Action rails are made of wood or aluminum; Steinway’s rails are wooden dowels encased in brass tubes.
- action stack.** See “top stack.”
- action standard.** See “action bracket.”
- adhesive.** Glue.
- adjacent intervals.** Same interval advanced chromatically, either ascending or descending. For example, adjacent M3s are C-E, C#-F, D-F#, etc. See also “contiguous intervals.”
- aftertouch.** Measurement of the vertical key travel after hammer let off. See also “blow distance,” “drop,” “let off.”
- agraffe.** Brass device screwed into the piano plate that acts as a front termination for strings’ speaking lengths. Some manufacturers use bridge agraffes instead of bridge pins. Also referred to as “stringing stud.”
- aliquot.** Overtone. See also “harmonic.”
- amplification.** Boosting the sound volume or loudness.
- amplitude.** The amount of deflection of a vibrating body. The greater the amplitude, the greater the volume of sound.
- angle vise.** Vise that permits precisely adjusting the drilling angle. Used for drilling piano hammers.
- apron.** See “bass bridge,” “bass bridge shelf.”
- attack.** Initial stage of piano sound. See also “bloom,” “decay,” “sound envelope,” “sustain.”
- aural tuning.** Tuning “by ear,” without the help of electronic devices.
- baby grand.** Small grand piano, up to ca. 5’8” [173 cm] long.
- back.** Structural beams in the back of a vertical piano.
- back rail.** Rail in the back of the key frame that supports the ends of keys at rest. Also referred to as “back touch.” Back rail cloth is also referred to as “key rest felt,” “back touch,” “back rail baize.”

- back stop.** See “catcher.”
- back touch.** Back rail; back rail cloth. See also “back rail,” “baize.”
- backaction.** An assembly consisting of damper underlevers and underlever tray. Some technicians consider the dampers, damper guide rail, underlever stop rail, and the sostenuto mechanism to be part of the backaction. Also referred to as “damper action.”
- backcheck.** Device that catches the hammer after it rebounds from the strings. In grands, it is attached to the back of the key; in verticals, to the wippen.
- backscale.** Segments of strings behind the bridge. The lowest bass strings typically have a very short backscale in small pianos, constraining the tone by reducing the mobility of the bass bridge and the soundboard in that area. See also “stringing braid.”
- baize.** Cloth, e.g. “back touch baize” (back rail cloth), “hammer rest baize” (shank rest felt), “front rail baize” (front rail cloth punching).
- balance head.** See “catcher.”
- balance hole.** Hole in the center of the key for the balance pin.
- balance rail.** Middle rail of the key frame that acts as a bearing for the keys. Also referred to as “centre rail.”
- balance rail bearing.** Cloth-covered, wooden, half-round dowels in Steinway pianos with the Accelerated Action®. Patented in 1931 (U.S. patent no. 1,826,848) and installed in all grands made in New York since mid-1933. Claimed to reduce resistance to the rocking motion of keys. Also referred to as “half-round dowel.”
- balance rail glide.** See “glide.”
- balance weight (BW).** Average, in grams, of downweight (DW) and upweight (UW), or  $(DW + UW) \div 2$ . Typically between 30 g and 45 g. See also “downweight (DW),” “upweight (UW),” “standard measurement position (SMP),” “touchweight (TW).”
- balancier.** See “repetition lever.”
- band saw.** Stationary power cutting tool that allows producing straight and curved cuts at different angles. Large band saws are capable of resawing pinblock planks.
- baseboard.** Board on the bottom of the vertical piano that supports the pedals and pedal linkages. Also referred to as “bottom board.”
- bass bridge.** Also referred to as the “offset bridge,” when it is equipped with the bass bridge shelf, the bass bridge links the strings in the bass (lowest) section to the soundboard.
- bass bridge shelf.** Horizontal extension of the bass bridge that permits the transmission of string vibrations closer to the middle of the soundboard without sacrificing the string length. Also referred to as “bridge apron.”
- bass section.** Lowest section in a piano, strung with the wound bass strings. In modern pianos, bass strings cross over the strings in the tenor section. See also “over-stringing.”
- bass string.** String wrapped with a winding of copper or other metal, used in the bass section and in the lowest notes of the tenor section. The winding slows down the string’s rate of vibration without reducing its tension. See also “whipped bass string.”
- bat pin.** Front key pin. See “key pin.”
- beam.** One of several structural supports comprising the piano’s frame (in grands) or back (in verticals). The purpose of the beams is to strengthen and stiffen the rim and to aid the metal plate in resisting the tension of strings. Also referred to as “bracing.” Alternate meaning: “rail,” e.g., “hammer rest beam.”
- bearing points (of strings).** See “string bearings.”
- beats.** Audible, pulsating changes in sound volume caused by two or more strings tuned so that their coincident partials have slightly different frequencies. Beats are discernible and countable only in consonant intervals. See also “consonant intervals.”
- becket.** The bend in the string at the hole in the tuning pin. The term is also used for the portion of the string inside the tuning pin hole.
- bell.** Cast-iron piece attached to the inside of the rim on the bent side in longer Steinway & Sons grands. Attached to the plate in the treble section with a bolt, the Steinway bell increases the rigidity of the plate in that section, thus improving sustain and sound volume.
- belly.** See “soundboard.”
- belly bar.** See “soundboard rib.”
- belly rail.** Assembly of beams/boards behind the action and dampers in grands to which the front of the soundboard is attached. Also referred to as “cross block.”
- bellymen felt.** Felt used to fill the gap between the plate and the stretcher.
- belt sander.** Power tool used to sand wooden surfaces and bridge pins. Belt sanders are available as fixed or handheld tools.
- bench regulating.** Regulating the keyboard and action on a workbench.
- bentside.** The curved part of the case in the grand piano. See also “cheek,” “spine,” “tail.”
- bichord.** Two strings tuned to the same pitch. See also “trichord.”
- Billings flange.** A brass flange found in some vertical pianos.
- bird cage action.** Action in vertical pianos with damper linkages (stickers) in front of the action. The dampers “cage in” the action and make servicing more difficult. Also referred to as “overdamper action.”
- bird’s eye.** Circular protrusion around the center pin hole in action parts; for example, in the grand shank flange. The bird’s eye prevents the “fork” part with bushings (the shank) from sliding left-right, along the center pin. Being doughnut shaped, it introduces minimal rotational friction between the parts.
- black key.** Key with a black-colored covering usually made of ebony or molded plastic. Black keys are C#, D#, F#, G#, and A#. The whole key or its covering is also referred to as “sharp.”
- bleaching wood.** Procedure that lightens the color and removes color variations of wood by applying to it a hydrogen peroxide or chlorine solution. Not recommended for piano soundboards or veneer because of the caustic effects of the bleach and the surface damage caused by water in bleach solutions.
- blistering of veneer.** Veneer pulling away in patches from the surface to which it is glued. Caused by poor manufacture of veneered parts, poor quality of glue, water damage, or high humidity.
- bloom.** The swelling of sound after the attack and decay stages of the piano’s sound envelope; beginning of the sustain stage. See also “attack,” “decay,” “sound envelope,” “sustain.”
- blow distance.** Distance between the hammers at rest and the strings. See also “aftertouch,” “drop,” “let off.”
- blushing of lacquer.** Whitish spots that develop immediately upon spraying lacquer in high humidity.
- bobbling.** Uncontrolled fast repeating due to the hammer bouncing between the jack and the strings.
- bolt.** A screw with a hexagonal head.

- boring specifications.** Set of measurements used to determine the position and angle of shank holes in piano hammers.
- bottom board.** Board on the bottom of the grand lyre; board on the bottom of the vertical piano. *See also* “lyre,” “baseboard.”
- bottom door.** *See* “bottom panel.”
- bottom lever.** *See* “wippen.”
- bottom panel.** In vertical pianos, vertical panel under the key bed. Also referred to as “bottom door.”
- braces.** *See* “lyre braces.”
- bracing.** *See* “beam.”
- bridge.** Wooden structure that transmits string vibrations to the soundboard. In modern, over-strung pianos, the long bridge spans the tenor and treble sections. The bass bridge is used for copper-wound bass strings, and in smaller grands and verticals may have a bass bridge shelf or apron. In the context of a grand-piano action, means “repetition lever.”
- bridge apron.** *See* “bass bridge shelf.”
- bridge cap.** Strip of hardwood glued on top of the bridge root.
- bridge notch.** Indentation in the top of the bridge or bridge cap that creates a precise termination for one or more strings of a unison.
- bridge pins.** Pins that hold the strings in firm contact with the bridges. Usually made of brass-plated steel.
- bridge root.** The bottom part of the bridge, which is glued to the soundboard. The bridge root often has a bridge cap glued onto it.
- bridle strap.** Cloth strap in a vertical piano action that connects the hammer butt with the metal hook on the wippen. The strap speeds up repetition by pulling the hammer butt toward its rest position after *staccato* strikes. It also prevents the wippen from dropping too far, allowing the jack to jam under the butt felt when the action is removed from the piano.
- bridle wire.** In verticals, a wire mounted on the wippen to which a bridle strap is attached. Also referred to as “tie wire.”
- brushing finishes.** A family of finishing materials that are applied with brushes.
- buffing compound.** Product containing abrasives and lubricants, usually in brick form, used for buffing metal objects, key tops, and finished surfaces.
- bumping action.** Type of piano action in which the front-facing hammer and its shank are attached directly to the key by pivoting in a *Kapsel*, a fork-like piece attached to the back of the key. The beak of the shank butt “bumps” on the escapement “hook,” causing the hammer to rise. Shortly before the hammer reaches the strings the escapement hook escapes backward, releasing the butt, thus allowing the hammer to drop freely. Also known as *Prellmechanik*, this type of action was perfected by Johann Andreas Stein, who improved the escapement bar (*Prell-Leiste* or *Prelleiste*) by adding individual escapement hooks (*Prellzunge*) to each key. Raved about by Mozart, this type of action became popular in southern Germany and Austria, and is known today as the “Viennese action.” *See also* “push action.”
- burlap.** Coarse natural material used for applying conventional lacquer filler to porous wooden surfaces.
- burning the shank.** Heating and twisting the hammer shank to square the hammer. Also referred to as “burning the hammer,” “casting the hammer.” *See also* “squaring the hammer.”
- burnishing.** A method of “polishing” a porous surface with a smooth metal shank or spatula, or making a powdered lubricant adhere to wood, leather, or felt.
- bushings.** Linings in center pin holes, damper guide rails, pedal blocks, key mortises, key buttons, and other parts that rotate or slide; traditionally made of woolen cloth.
- butt.** *See* “hammer butt.”
- butterfly spring.** A type of repetition spring used by Steinway & Sons and most other piano manufacturers.
- button.** *See* “key button,” “let off button.”
- BW.** *See* “balance weight (BW).”
- CA glue.** *See* “cyanoacrylate glue.”
- cam.** Wooden cams are the traditional means of locking grand-piano legs equipped with pressure plates. Also used to secure the bottom panel in some vertical pianos.
- cap.** *See* “bridge cap.”
- capo tasto.** Also referred to as “Capo d’astro” or “V bar.” Cast-iron bar, usually cast with the plate in one piece, that serves as front termination for the strings’ speaking lengths. In most pianos, a capo tasto is used only in the treble sections; *agraffes* are used in the tenor and bass sections.
- capstan.** Screw that provides an adjustable linkage between piano parts (such as key and wippen) or acts as a stop (e.g., above trapwork levers). Also referred to as “pilot,” “dollie.”
- capstan boat.** Device for testing the effect on action leverage and weight ratio of repositioning a key capstan. *See also* “capstan.”
- Carpenter’s Wood Glue.** Yellow PVA glue made by Elmers®. *See also* “yellow wood glue.”
- carriage.** *See* “repetition lever.”
- case.** Also referred to as “outer rim”; in grands, consists of panels or laminated strips of wood that enclose the piano.
- cast iron.** Material of which a conventional piano plate is made.
- casting the hammer.** *See* “burning the shank.”
- catalyzed finishes.** Two-component finishes that cure through a chemical reaction between the components.
- catcher.** A part in the vertical action: wooden dowel with a leather-covered wooden block at its end, attached to the hammer butt. The catcher gets “caught” by the backcheck after the hammer rebounds from the string(s). Also called “back stop.”
- caul.** A block used to clamp the key bushings during their replacement; one of two side pieces in a hammer press that push the felt against the hammer molding.
- celeste pedal/rail.** *See* “moderator pedal/rail.”
- center pin.** Axle in action parts, usually made of copper or silver, plated in some newer pianos.
- centre.** *See* “center pin.”
- centre rail.** *See* “balance rail.” *See also* “punching.”
- check.** Flat outer side of the case to the right of the treble section. *See also* “bentside,” “spine,” “tail.”
- check block.** *See* “end block.”
- chemical stripper.** Chemical used to strip the finish from wooden or metal surfaces. Usually contains acids and solvents. The thicker the stripper, the easier it is to work with it, especially on vertical surfaces.
- chipping the strings.** A tuning method after installing new strings.
- chisel.** Cutting tool for shaping wood.
- chromatic scale.** Scale of 12 adjacent semitones within an octave, the basis of the modern Western musical tradition. *See also* “octave.”
- chrome buffing compound.** Fine, white buffing compound, especially suitable for buffing ivory and plastic key tops.
- circle of fifth/fourths.** Method for tuning the temperament.

- clamp.** Device used for keeping two or more pieces firmly pressed against each other, typically when gluing them together.
- cleats.** *See* “leg plates,” “lyre plates.”
- cold drawing.** Method of producing piano strings: a metal rod is forced through multiple dies that cut it into a wire of a certain diameter.
- column.** *See* “leg.”
- compound for buffing.** *See* “buffing compound.”
- compressed action.** Action in short vertical pianos with smaller parts.
- compression set.** Permanent shrinking across the grain in a constrained piece of wood subjected to high humidity. Compression-crowned soundboards exposed to excessive humidity develop cracks due to compression set.
- compressor.** Stationary power tool used to provide compressed air for tools and finishing equipment.
- concert-grand piano.** The longest grand, usually longer than 8' [244 cm]. Most modern concert grands are around 9' [273 cm] long.
- condensation.** Moisture turning from vapor into liquid due to the cooling of air saturated with water vapor (relative humidity at 100%).
- condenser.** Radiator on the “warm” side of an air conditioner or dehumidifier in which the coolant condenses from vapor into liquid due to the increase in coolant’s pressure.
- console vertical.** Medium-sized vertical piano, ca. 42–46" [107–117 cm] high. *See also* “vertical piano,” “upright piano,” “spinnet.”
- consonance.** “Pleasant-sounding” combinations of pitches; consonant intervals; opposite of “dissonance.”
- consonant intervals.** Intervals between the lowest six adjacent partials (including the fundamental, which is counted as the first partial) and their inversions within an octave. *See* “Consonant and Dissonant Intervals” on page 97; *see also* “dissonant intervals.”
- contact adhesives.** Usually solvent-based adhesives that provide almost full adhesive strength immediately on joining the glued parts. Also called “contact cement.”
- contact cement.** *See* “contact adhesives.”
- contiguous intervals.** An interval in which the lower note is the upper note of the previous interval (ascending) or the upper note is the lower note of the previous interval (descending). For example, ascending contiguous M3s are F3-A3, A3-C#4, and C#4-F4. *See also* “adjacent intervals.”
- core wire.** Steel string in bass strings that provides a core around which the copper coil is wrapped.
- cornice.** *See* “stretcher.”
- corrosion.** Oxidation of metal.
- counterbearing.** In grands, the raised flange in, or a bar on, the plate between the front speaking-length termination, such as an agraffe or the V bar, and the tuning pin; acts as a string bearing.
- countersinking.** Shaping the top of the hole to get the screw head to be flush with, or below the surface of the rail, board, flange, etc. Performed with a special drill bit.
- cow bone.** Material used for key tops as a substitute for ivory.
- cradle.** *See* “repetition lever.” Can mean the whole “wippen.”
- crank.** *See* “tuning hammer.”
- creepage of glue.** Property of adhesives that allows the glued parts to move slowly along the glue joint when exposed to continuous opposing forces.
- cross block.** *See* “belly rail.”
- cross pattern.** Pattern for sanding a finished surface (e.g., the piano case or lid) straight and free of ripples. The surface is sanded with increasingly finer grades of sandpaper, each grade used to sand across the previous grade at a right angle. The sandpaper must be supported by a hard or semihard support block, or a semihard sanding block can be used.
- crossbar.** *See* “strut.”
- cross-stringing.** *See* “over-stringing.”
- crown.** The curvature of the piano soundboard; the top of the piano hammer. *See also* “soundboard,” “soundboard rib,” “hammer molding,” “shoulders.”
- cutoff bar.** Stiff bar that immobilizes the soundboard in the corner between the spine and belly rail, thus reducing the soundboard’s vibrating area in order to boost its wave impedance. *See also* “fish,” “wave impedance.”
- cyanoacrylate glue.** Fast-drying “superglue,” available in viscosities from water-thin to thick gel. Preferred for quick bonding, but also used for tightening tuning pins, let off screws, and other metal-in-wood applications.
- cycle per second.** Unit of measurement used to express the frequency of sound. Equivalent to “Hertz” (Hz).
- dag.** L-shaped piece of wood that keeps the back rail of the grand key frame in contact with the key bed while allowing it to slide sideways when the soft pedal is depressed. There are four or five dags in most grands.
- damper.** Device that prevents the strings from vibrating.
- damper action.** *See* “backaction.”
- damper body.** In grands, “damper underlever”; in verticals, “damper lever.”
- damper drop.** *See* “damper underlever top flange.”
- damper guide rail.** A rail with bushed holes mounted on the front edge of the soundboard in grands, under the strings, that determines the position of each damper. Damper wires pass through bushed holes in the guide rail.
- damper lever.** In verticals, spring-loaded wooden lever that carries the damper in the back of the action, and is actuated by a damper spoon. May be used interchangeably with “damper body” and “damper underlever.”
- damper lift rod.** Metal rod that lifts all damper levers in vertical pianos; actuated by the damper pedal via a pedal rod.
- damper lift spoon.** *See* “damper spoon.”
- damper lift.** Measurement of hammer motion relative to the moment the damper starts lifting. Typically adjusted to coincide with the hammer’s half-blow distance. *See also* “damper,” “half-blow distance.”
- damper pedal.** Right pedal; lifts dampers away from strings. *See also* “pedal.”
- damper spoon.** Metal stud with a spoon-shaped end, mounted at the back end of a vertical wippen. Damper spoons actuate damper levers.
- damper stop rail.** Limits the vertical motion of the damper underlevers in grands. Mounted on the belly rail behind the underlevers’ top flanges.
- damper tail.** Bottom of a “damper lever” in verticals.
- damper tray.** Rail, hinged to the damper underlever rail, that lifts damper underlevers; rail to which underlevers are attached, and which lifts underlevers. Also referred to as “damper lever rail.”
- damper underlever.** In grands, lever that links the end of the key to the damper. Mounted on the damper tray. Also referred

- to as “damper body,” “damper lever.” *See also* “damper underlever top flange,” “damper tray.”
- damper underlever top flange.** Flange to which the damper wire is attached; part of the damper underlever. Also referred to as “damper drop,” “damper lift,” “standard damper lift.”
- decals.** Manufacturer’s or rebrander’s name plate consisting of letters and symbols, usually affixed to the fallboard and soundboard. Small decals on the plate next to tuning pins indicate string gauges.
- decay.** Used to describe the last phase in the tone envelope of the piano. *See also* “attack,” “bloom,” “sound envelope,” “sustain.”
- dehumidifier.** Device that removes moisture from air.
- deicing.** Automatically shuts down an air dehumidifier when the evaporator coils freeze.
- Delignit.** German brand of pinblock material made of thin laminations of beech, glued with maleic resin.
- Diaphragmatic® soundboard.** A soundboard thinned toward the edges, patented in 1936 by Steinway & Sons in New York (U.S. patent 2,051,633).
- dissonance.** Combination of pitches perceived as jarring and unpleasant. Opposite of “consonance.”
- dissonant intervals.** Major and minor second, major and minor seventh, and augmented fourth/diminished fifth; those intervals over one or more octaves. *See also* “consonant intervals.”
- Distance multiplier (DM).** Second value in the lead factor (LF) expression (e.g., “0.65” in “14x0.65”), which indicates the distance of the lead weight from the balance hole as a proportion of the front or back key segment. Positive for the front segment, negative if the lead is in the rear segment. Typically 0.1 to 0.8 and -0.1 to -0.4.
- DM.** *See* “Distance multiplier (DM).”
- dollie.** *See* “capstan.”
- dome.** *See* “glide.”
- double escapement.** Feature of the modern piano action, invented by Sébastien Érard in 1821, that accelerates repetition by allowing a note to be repeated with minimal movement of the key. The first escapement occurs when the repetition lever is stopped by the drop button, the second when the jack is tripped under the knuckle by the let off button. Also referred to as “double repetition.”
- double string.** One string that provides two speaking lengths. The string is coiled on two tuning pins, and bends around a single hitch pin. *See also* “double string.”
- downbearing.** Amount of downward force that strings exert on the soundboard by being deflected upward by the bridges.
- downweight (DW).** Amount of weight, in grams, placed on the key at the standard measurement position, which is needed to make the key sink slowly from a dip of about 4 mm. Typically between 40 g and 65 g. *See also* “balance weight (BW),” “upweight (UW),” “standard measurement position (SMP),” “touchweight (TW).”
- Dremel®.** Maker of electric high-speed rotary tools that can be used for engraving, shaping, sanding, cutting, milling, and drilling.
- drill press.** Fixed power tool for precise drilling.
- drop.** Measurement of the downward motion of the hammer in a modern grand action after let off. *See also* “let off,” “blow distance,” “aftertouch.”
- dropped action.** Action in short, “spinet” vertical pianos; mounted below the level of the keyboard and the key bed.
- duct tape.** Adhesive tape used for temporarily binding parts together.
- duplex scale.** Unmuted segments of strings that resonate with the strings’ speaking segments. The *front duplex* is between the capo tasto or agraffe and the counterbearing, and the *rear duplex* is the segment between the rear bridge pin and a termination (duplex bar or strip) in front of the hitch pin. The duplex scale was patented by Steinway & Sons in 1872 (U.S. patent 126,848).
- DW.** *See* “downweight (DW).”
- dynamic ceiling.** The upper limit of a piano’s dynamic range. Usually indicates how loud a piano can sound without harshness and distortion.
- easing key bushings.** Increasing the space between the bushings by compressing the bushings and the wood. *See also* “key bushing.”
- elastic limit.** Maximum tension a string can withstand without permanently altering its elasticity.
- electronic tuning.** Tuning with help of an electronic tuning device.
- EMC.** *See* “Equilibrium Moisture Content.”
- emery cloth.** Abrasive cloth used for shaping and sanding metal surfaces.
- end block.** One of two wooden blocks at each end of the keyboard. Also referred to as “cheek block,” “key block.”
- epoxy.** Two-component glue of high strength and minimal creepage. Excellent for both filling and gluing.
- enharmonic notes.** Notes that sound the same and are played by pressing the same key, but have different names; e.g., C-sharp (written as C<sup>♯</sup>) and D-flat (D<sup>♭</sup>). Enharmonic notes are typically associated with black keys, but white keys also have enharmonic equivalents; for example E<sup>♯</sup>=F, and F<sup>♭</sup>=E. To simplify the naming of black keys, most technicians refer to them by only their “sharp” version, even when the intervals they form are technically incorrect. For example, a major 3rd (M3) up from “C<sup>♯</sup>” is C<sup>♯</sup>-E<sup>♯</sup> (=D<sup>♭</sup>-F), but this interval is always notated as C<sup>♯</sup>-F, which is technically a diminished 4th (d4).
- Equilibrium Moisture Content (EMC).** A measure of the amount of water in a species of wood at a given relative humidity and temperature. EMC represents the balance at which wood no longer gains or loses moisture from/to the air. At 70°F [21°C] white spruce has ca. 5% EMC at 25% RH, 9% EMC at 50% RH, and 14% EMC at 75% RH.
- escapement.** Feature of all but the most primitive piano actions that allows hammers to rebound from strings regardless of the force or type of touch with which the keys are struck. The term refers to the escapement of the jack under the hammer shank knuckle in grands, or the hammer butt in verticals. *See also* “double escapement.”
- evaporator.** Radiator on the “cold” side of an air conditioner or dehumidifier in which the coolant evaporates due to a drop in pressure.
- F.** *See* “friction (F).”
- facing off agraffes.** Adjusting the agraffes to be perpendicular to the strings.
- Falconwood.** Pinblock material made of multiple, thin laminations of maple developed by C.A. Geers Piano Company in Ohio.
- fallboard.** Keyboard lid.
- false beats.** Beats produced by a single string that make it sound like two or more unison strings that are out of tune.

- Fandrich, Darrell, RPT.** Founder of Fandrich & Sons Pianos in Seattle, WA, and inventor of the patented Fandrich Vertical Action™.
- Fandrich, Delwin, RPT.** Piano designer and rebuilder. Founder of Fandrich Piano Co., Inc.
- feeler gauge.** Strip of steel used to determine the depth and length of cracks or gaps. Used extensively in soundboard rebuilding.
- felt.** Material of varying density and hardness; derived from wool.
- fibers.** See “wood fibers.”
- file.** Hand tool used for removal or shaping of metal, wood, or other materials.
- filler.** Material used for repairing gouges, cracks, and surface imperfections.
- finish.** Material applied to various surfaces to protect and beautify them.
- fish.** Extension of the rim, usually made of hardwood, and affixed inside the rim where the bentside joins the cheek; used to improve sustain in the treble by increasing the stiffness and therefore the wave impedance of the soundboard. See also “cutoff bar,” “wave impedance.”
- flagpoling.** Bending of tuning pins, which adversely affects tuning stability. For a complete explanation, see “Bending and Twisting of Tuning Pins” on page 108. See also “tuning pin.”
- flange.** In action parts, the stationary part to which the movable part is attached. The only exception is the damper underlever top flange, which moves with the underlever. On piano plate, the protruding part in front of the pinblock. See also “plate horn.”
- Flügel.** “grand piano” in German; from *Flügel* (wing), to describe the piano’s shape.
- fly.** See “jack.”
- foam wrap.** Thin, synthetic material used for wrapping high-gloss piano parts.
- Forstner bit.** Drill bit for drilling flat-bottomed holes. This type of bit causes less splintering when it exits the hole of an unsupported work piece.
- frame.** See “plate.”
- French polish.** Hand-rubbed, low-build shellac finish.
- frequency of sound.** Describes the pitch, measured in Hertz (Hz) or cycles per second.
- friction (F).** Half of the difference between downweight (DW) and upweight (UW):  $(DW - UW) \div 2$ . Typically 9–17 g.
- front rail.** Part of the key frame. See also “balance rail,” “key pin,” “punching.”
- front touch.** Front rail punching; key dip. See also “baize,” “punching.”
- front weight (FW).** Total radius weight, in grams, of the front segment of the key, measured at standard measurement position. Front weight is useful for determining the inertia of the key, and for comparing keys that have lead weights in different positions. Typically 30–50 g for key #1. See also “touchweight.”
- full-fit.** Style of attaching the pinblock to the rim and stretcher. Used in Steinway & Sons and other quality grands.
- fundamental.** Primary harmonic or partial; base pitch of a note in a series of harmonics or partials.
- FW.** See “front weight (FW).”
- gap.** Vertical distance between the tip of the jack and the hammer butt in vertical actions. The gap is needed to enable the jack to reposition under the hammer butt.
- gel superglue.** Thicker type of superglue suitable for gluing more types of surfaces than ordinary superglue.
- German silver.** Material of which traditional action center pins are made: an alloy of copper, nickel, and zinc. Also known as “nickel brass.”
- gilding.** Gold-colored, usually metallic finish on piano plate.
- glide.** Brass stud with a wide, rounded bottom end, mounted in the key frame’s balance rail; allows adjusting the contact between balance rail and key bed. Also referred to as “balance rail glide,” “dome.”
- grand piano.** Piano whose soundboard, plate, and strings are laid horizontally, the strings running in line with the hammers and hammer shanks.
- graphite.** Carbon in powder form, used as a lubricant for felt, leather, wood, and metal.
- grinder.** Machine used for sharpening, cleaning, and shaping metal objects; also useful for buffing.
- guide notes.** Usually, end notes and middle notes in each section of the keyboard and action; used to set the regulation for the rest of the action.
- guide rail.** See “damper guide rail.”
- half-blow distance.** The position of the hammer halfway between its idle position and the strings. This is approximately when the damper should start lifting. See also “damper lift.”
- half-blow pedal.** See “soft pedal.”
- half-blow rail.** In verticals, a rail between the hammer shanks and the shank rest rail that brings the hammers closer to the strings when the half-blow pedal is depressed. In some verticals, the hammer rest rail itself swings forward. See also “shank rest rail.”
- half-round dowel.** See “balance rail bearing.”
- half top.** In grands, the front lid. See also “lid.”
- hammer.** Felt-covered wooden molding mounted on the shank to produce sound by striking the strings.
- hammer-blow distance.** See “blow distance.”
- hammer butt.** The base of the hammer shank in vertical actions.
- hammer cushion.** See “shank rest felt (or cloth).”
- hammer height.** Vertical distance between the top of each hammer (in idle position) and the strings.
- hammer molding.** Wooden strip that forms the core of the piano hammer. Felt is compressed and glued to the wooden hammer molding. See also “crown,” “shoulders.”
- hammer nose.** Tip of the hammer. See “crown.”
- hammer rail.** In grands, a rail, usually of wood or aluminum, to which all hammer shanks are affixed. In verticals, same as “hammer rest rail” or “shank rest rail.”
- hammer rest felt (or cloth).** See “shank rest felt (or cloth).”
- hammer rest rail.** See “shank rest rail.”
- hammer shank.** Wooden shank that carries the hammer at its end. Grand shanks are pivoted in the shank flanges; vertical shanks are installed in the hammer butts.
- hammer strike weight (SW).** Effective weight, in grams, of the hammer and shank. Typically 9.5–14 g for hammer #1. Also referred to as “strike weight.”
- hammer weight (HW).** Weight, in grams, of the hammer head. Typically 8.0–12.5 g for hammer #1.
- hardener.** Chemical that increases the hardness of the hammer felt; usually, a lacquer, lacquer sanding sealer, collodion, or acrylic solution.

- hardening capo tasto V bar.** Procedure used in piano-plate manufacturing and rebuilding to increase the rigidity and hardness of the V bar.
- harmonic.** Theoretically ideal overtone.
- harpsichord.** String instrument, a precursor of the grand piano, that utilizes plectra instead of hammers to generate sound; i.e., strings are plucked, not struck.
- head.** Same as “hammer” or “hammer head.”
- heating lamp.** Infrared light bulb used to warm up and dry the soundboard before shimming it; can be used to keep wooden parts warm to extend working time and penetration of hot hide glue.
- heat-treating capo tasto.** See “hardening capo tasto V bar.”
- heel.** See “tail,” “wippen heel,” “jack tender.”
- Herrburger-Schwander.** Style of grand action (wippens and shanks) found in many grand pianos, especially those made in Europe and Asia during the 20th century.
- Hertz.** Unit of measurement for frequency of sound. Expresses the number of vibrations or cycles per second.
- Herz-Érard action.** Simplified and improved form of the Érard’s double-escapement action that is the basis of the modern grand action. First used in pianos by Henry Herz in Paris, and soon adopted by Broadwood, Collard, Steinway, Bechstein, and others. Very similar to the modern Herrburger Schwander action design.
- hex screw.** Has a hexagonal recess in the head; developed for the automobile industry.
- hexagonal string.** Steel string of hexagonal profile. Used for manufacturing universal replacement bass strings whose copper winding can be adjusted in length.
- Hexagrip pinblock.** Method of building the pinblock with laminations that cross each other at a 60° angle instead of the usual 90° angle; patented by Steinway & Sons in New York.
- hide glue.** Traditional adhesive used for gluing wood, cloth, felt, and leather. Hot hide glue is supplied in granules or flakes, diluted in water, and kept warm (at ca. 150°F) in a glue pot throughout the application. Also available in liquid form, ready to use at room temperature.
- hitch pin.** Steel pin in the piano plate to which a string is attached.
- hopper.** See “jack.”
- horn.** See “plate horn.”
- hot glue.** Gummy, thermoplastic glue applied with a special glue gun. Used for low-strength applications, such as gluing the felts to the plate.
- hot hide glue.** See “hide glue.”
- humidifier.** Device that increases the amount of moisture in the air.
- humidity.** Moisture in the air. See also “absolute humidity,” “relative humidity.”
- HW.** See “hammer weight (HW).”
- hydrogen peroxide.** Chemical used for bleaching. Not recommended for soundboards.
- hygrometer.** Device that measures relative humidity. See also “psychrometer.”
- impedance.** See “wave impedance.”
- individual eye.** See “string loop.”
- individually tied strings.** Stringing the piano with one string per speaking length. Each string has a loop in its end that ties it to the hitch pin. Used in pianos by Bösendorfer, Grotrian, and others. See also “double string,” “string loop.”
- inertial touch force (ITF).** Index established by John Rhodes, RPT and Darrell Fandrich, RPT that represents the force (kinetic energy) needed to overcome inertia of the action and key. Typically between 200 and 300.
- inharmonic.** A property of a stiff string, which raises the frequency of its partials.
- interval.** The “difference in pitch” between two notes played one after another (melodic interval) or simultaneously (harmonic interval). See also “adjacent intervals,” “contiguous intervals.”
- ironing hammer felt.** One of the final voicing procedures; makes the sound focused and clean.
- ITF.** See “inertial touch force (ITF).”
- Ivory.** Man-made ivory substitute for white key tops. Superseded by acrylic tops.
- Ivorite®.** Yamaha’s white key top material; mimics ivory’s porosity.
- ivory.** Traditional white key top material derived from elephant tusk. Ivory trade is banned worldwide.
- jack.** Part of the wippen that pushes the hammer shank and its hammer toward the strings, and trips with its front part, also known as “jack tender,” on the let off button. In grands, the jack pushes the shank knuckle; in verticals, the hammer butt. Also referred to as the “fly.” In German, *Stosszunge* (push tongue). See also “jack tender,” “wippen,” “let off button,” “knuckle,” “hammer butt.”
- jack heel.** See “jack tender.”
- jack tender.** The front part of the jack, which “escapes” as it trips on the let off button. Also referred to as “jack heel.” See also “jack.”
- jack spring.** Spiral spring between the wippen base and jack tender in verticals.
- jigsaw.** Also called saber (or sabre) saw, the jigsaw is a handheld cutting power tool. The maximum cutting width is limited, but the cutting can be performed at an angle or follow an irregularly shaped line.
- Kapsel.** In Viennese and other bumping-style actions, a metal fork fastened to the back of the key, in which the hammer shank pivots. See also “bumping action.”
- key.** Wooden lever that transmits the strikes of the player’s finger to the action and the damper mechanism.
- key bed.** Part of the piano case that supports the keyboard and action. In grands, the pedal lyre is suspended from the key bed. Can also mean “front key punching” or “front baize.”
- keyboard.** A unit consisting of the key frame with key pins, various felts and punchings, and the keys mounted onto it.
- key bushing caul.** See “caul.”
- key bushing.** Felt or leather lining glued to the wall of a mortise in the front of a key, or a mortise in a key button in the middle of a key. Key bushings limit and cushion the key’s sideways motion. See also “easing key bushings.”
- key button.** A strip of wood glued to the middle of the top surface of the key; a hole through it admits the balance pin and is lined with cloth or leather bushings on either side. Also referred to as “key chase.”
- key carriage.** See “rocker.”
- key chase (key chasing).** See “key button.”
- key dip.** Key’s total vertical travel, measured at the front of the key when the key is depressed with moderate force.
- key end felt.** Felt at the end of the grand key that lifts the damper underlever.
- key frame.** Wooden frame that holds the keys.

- key-imbalance weight (KIW).** Front weight (FW), in grams, without any leads in the key. Positive if the key tilts forward, otherwise negative. Typically 3–10 g.
- key keeper.** See “key stop rail.”
- key pin.** Metal pin installed in key frame; determines the position of the key and the plane in which it swings. Front key pins typically are oval and balance pins round. Front key pins are also referred to as “bat pins.”
- key rest felt.** Cloth of felt on the back rail. Also referred to as “Back rail cloth.”
- key shoe.** Hardwood strip glued to the middle of the bottom of the key to strengthen the key’s balance hole.
- key slip.** Wooden board in front of the keyboard. Also referred to as “lock rail.”
- key stop rail.** In grands, rail mounted over the front segments of keys to prevent the keys from getting dislocated during a move, and to prevent them from bouncing up too far during loud, *staccato* playing. Also referred to as “key keeper.”
- key top.** Key covering.
- key-weight ratio (KR).** Ratio between the weight on the front of the key, measured at the standard measurement position, and the weight at the capstan needed to balance the key. Typically 0.45–0.60.
- kick board.** See “bottom panel.”
- killer octave.** See “melody octave.”
- KIW.** See “key-imbalance weight (KIW).”
- Kluge.** German keyboard manufacturer. See also “Tharan®.”
- knuckle.** A cylindrical piece of felt covered with leather, with a wooden core that is glued into a slot on the underside of the grand hammer shank. Being an interface between the jack and the grand hammer shank, the knuckle allows escapement. Also referred to as “roller.” See also “escapement,” “double escapement.”
- KR.** See “key-weight ratio (KR).”
- lacquer.** Quick-drying, spray-on finishing material.
- laminated.** Composed of layers, or laminations. Laminated wooden structures, such as pinblocks and bridges, resist warping and cracking, and are structurally stronger than solid boards. Adjacent wooden laminations are usually arranged so their wood grains run perpendicular to each other. See also “pinblock,” “bridge.”
- lamp, heating.** See “heating lamp.”
- lead factor (LF).** Expression (e.g., “14x0.65”) that shows how much lead (e.g., 14 g) is placed where along the front or rear key segment (e.g., 0.65 of the distance between the balance hole and the key front).
- leads.** Weights used to balance the keys while regulating the keyboard, or permanently installed in keys to balance the weight of the action parts and hammers.
- lead weight (LW).** Weight, in grams, of the lead or group of leads installed in the key. First value in the lead factor (LF) expression, e.g., “14” in “14x0.65.” Typically 12–16 g for large (½”) leads.
- leg.** Supports a grand piano. Some verticals are equipped with legs that support the ends of the key bed.
- leg plates.** A pair of metal plates used to attach legs to a grand piano. The plate on the leg usually has a protruding, wedge-shaped flange that wedges into an inversely shaped opening in the plate mounted on the piano. Also referred to as “lock plates,” “cleats.”
- let off.** The highest point (closest to the strings) of the hammer travel supported by the jack. Also referred to as “set off.” See also “drop,” “blow distance,” “aftertouch.”
- let off button.** Device for regulating the let off. Also referred to as “set off button.”
- letter-coded drill bits.** System of coding the size of drill bits “between” the ordinary inch-fractional and wire-gauge sizes.
- level.** Property of a finish to spread evenly and create a smooth surface. Slow-drying finishes, such as varnishes and urethanes, level well; fast-drying finishes, such as lacquer, don’t. Finishes that level well on horizontal surfaces tend to run and sag when applied too heavily to vertical surfaces. See also “orange peel.”
- leveling strings.** Adjusting the strings of a unison to be on the horizontal plane at the hammer strike point.
- lever.** See “damper underlever.” Also can mean “wippen.”
- lever block.** See “wippen heel.”
- LF.** See “lead factor (LF).”
- lid.** Panel that covers the top of the piano. In grands, the lid consists of two panels, the front lid and the main lid. The keyboard lid is called the “fallboard.” Also referred to as “top.”
- lid latch.** In grands, the hook and knob in the bentside that latch the lid to the case. Also referred to as “turnbuckle.”
- lid prop.** Lid-supporting rod attached to the inside of the case in grand pianos. Most grands have two props: a regular one, and a shorter one to be used in chamber music and piano accompaniment. Vertical lid props are usually very short. Also referred to as “prop stick.”
- lid prop cup.** In grands, a wooden or metal piece on the underside of the large lid that receives the end of the lid prop. Also referred to as “prop stick boss.”
- lifter rod.** Wooden linkage between the key capstan or rocker and the wippen in tall uprights. See also “sticker.”
- lifting.** See “damper lift.”
- limit, elastic.** See “elastic limit.”
- linesman pliers.** “Universal” pliers that can be used for grasping objects as well as cutting them.
- linkage of pedals.** See “trapwork.”
- listing.** See “stringing braid.”
- lock bar.** In grands, rail on the front lid; in verticals sometimes used for “key slip.” Also referred to as “lock rail.”
- lock board.** In grands, “stretcher” or “lock bar”; in verticals, “key slip.”
- lock plates.** See “leg plates,” “lyre plates.”
- lock rail.** See “lock bar.”
- lock washer.** A metal washer that prevents the screw or bolt from loosening by introducing a spring action between the screw’s head and the surface. Lock washers can be split or bent.
- long bridge.** Piano bridge that connects the strings to the soundboard and spans the treble and middle sections.
- loop.** See “string loop.”
- lubricant.** Material that decreases friction between parts that make contact. Lubricants not only free the mechanism, but reduce its wear.
- LW.** See “lead weight (LW).”
- lyre.** In grand pianos, houses the pedals, and is hung from the key bed.
- lyre braces.** Wooden or metal struts between the back of the lyre and key bed, used for countering foot pressure on the pedals. Also referred to as “lyre stays.”



- lyre plates.** A pair of cast-iron plates used for attaching the lyre to the grand piano. The plate on the lyre usually has a protruding, wedge-shaped flange that wedges into an inversely shaped opening in the plate mounted to the underside of the key bed. Also referred to as “lock plates,” “cleats.”
- lyre stays.** *See* “lyre braces.”
- marker.** *See* “paint marker.”
- masking tape.** Opaque, whitish adhesive tape used for covering and protecting a piano’s parts and case during painting. Useful for temporarily marking parts, string gauge numbers, sound-board separations and cracks, etc.
- Material Safety Data Sheet (MSDS).** Document describing a substance’s composition, physical properties, toxicity, health effects, first aid, and other information. Available directly from manufacturers of chemical products or through various on-line resources. A comprehensive list can be found at <http://www.ilpi.com/msds/>.
- matting hammers to strings.** Adjusting the shape of the hammer crown to simultaneously strike all strings in a unison.
- MEE.** *See* “Moisture Excluding Effectiveness (MEE).”
- melody octave.** A range within the lower treble section, approximately from C5 to E6, where melodies are often presented in romantic music, but that often has weak volume and sustain.
- metal shoe.** *See* “shoe.”
- Mirror Glaze®.** Line of finish-buffing products made by Meguiar’s.
- missing note.** A condition in which the hammer jams and doesn’t strike the strings when a note is played; usually happens when the note is quickly repeated, or played loudly after the key has been slowly released.
- moderator pedal/rail.** Mechanism in some vertical and, less commonly, grand pianos that mutes the sound by inserting a felt or cloth between the hammers and strings. The moderator is operated either by a hand-operated lever or the middle pedal. Also referred to as “practice,” “celeste,” or “muffler” pedal/rail. *See also* “pedal.”
- Moisture Excluding Effectiveness (MEE).** A measure of a finish’s ability to slow the exchange of water vapor between the coated piece and the surrounding air, expressed as a percentage of total effectiveness for a particular species of wood. A finish with an MEE of 100% would completely seal the coated piece and prevent any exchange of water vapor. MEE increases with the number of coats applied.
- molding.** *See* “hammer molding.”
- monkey.** *See* “sostenuto monkey.”
- Moto-Tool.** *See* “Dremel®.”
- muffler rail.** *See* “moderator pedal/rail.”
- music rack (music desk).** Stand for sheet music.
- muslin.** Material for soft buffing wheels.
- mute.** A device for muting strings during tuning. Felt or rubber wedges are used in grands; Papps mute, rubber mutes with a handle, and leather-covered wooden mutes in verticals. *See also* “temperament strip.”
- mutton tallow.** Sheep grease; used as a lubricant.
- nap.** Orientation of “grain” that makes leather smooth in one direction and rough in the other.
- needling hammers.** Voicing procedure to soften and/or increase the resilience of the hammer felt.
- nippers.** Wire-cutting pliers.
- noise.** Sound of no detectable pitch; comprising a continuously varying spectrum of frequencies.
- nose.** *See* “plate horn.”
- nose.** Tip of the hammer. *See* “crown.”
- nose bolt.** Device that supports the plate or its struts. Also referred to as “pillar bolt.”
- nose bolt nut.** Nut, often decorative, that attaches the plate or plate strut to a nose bolt. Also referred to as “rose.”
- notching.** *See* “bridge notching.”
- oblong tuning pins.** Tuning pins in old pianos and harpsichords with a flattened top end instead of the modern square tip.
- Octagrip pinblock.** Multi-laminated pinblock material made by Northwest Piano Builders. The wood grains of the laminations run at 45° to each other.
- octave.** An interval in which the first partial of the upper note is at the same frequency as the second partial of the lower note. This frequency is approximately twice that of the first partial of the lower note. *See also* “chromatic scale.”
- octave register.** Any 12 adjacent chromatic notes bound by an octave. Octave registers are usually expressed as 12-note ranges that ascend from any note C. In an electronic tuning device, the octave register must be defined to increase the accuracy of the device’s measurements.
- octave tuning.** Tuning of octaves after setting the temperament in the middle section of the piano.
- octaves, stretched.** *See* “stretched octaves.”
- offset bridge.** Bass bridge with a shelf or apron. *See also* “bass bridge.”
- open-face pinblock.** Pinblock in older pianos and several brands of modern pianos that is not covered by the plate.
- orange peel.** Effect evident on finished surfaces, especially those sprayed with a fast-drying finish such as lacquer. Orange peel afflicts finishes that don’t level well. *See also* “level.”
- orbital sander.** Power sander that moves the sanding element in a circular pattern. Not recommended for sanding wood, for which only straight-line or belt sanders should be used.
- outer rim.** *See* “case.”
- oval pin.** *See* “key pin.”
- over-centering of hammers.** Condition caused by the hammer’s length, from shank to tip, being shorter than the vertical distance between the strings at strike point and the hammer shank’s center pin. Over-centering is a consequence of the hammers wearing out or being incorrectly drilled.
- overdamping action.** Vertical action in which the damper mechanism is above the action, not behind it, as in Wornum’s tape-check action. Also called “bird cage action.”
- over-stringing.** The bass strings cross *over* the strings in the tenor (middle) section. All modern pianos are over-strung. Also referred to as “cross-stringing.” *See also* “straight-stringing,” “bass section.”
- overtones.** Sounds generated by a vibrating string. Also referred to as “aliquotes” and “partials.”
- paint thinner.** Mineral spirits used for dissolving varnishes.
- pan-head screw.** Screw with a flat head with rounded edges that protrudes above the surface. Pan heads are usually found on sheet-metal screws.
- Papps mute.** Spring-loaded, tweezer-like mute made of plastic for muting the strings in vertical pianos during tuning.
- parlor grand.** Medium-size grand piano, usually between 5’8” [173 cm] and 7’ [213 cm] long.
- partials.** *See* “overtones.”
- particleboard.** Panel made of wooden particles glued together. Used in cheap pianos.

**PC-7.** Epoxy paste that can be used as a filler between the pinblock and the plate flange.

**pedal.** Foot lever that lifts all dampers (“damper” or “sustain” pedal; right), shifts the key frame sideways to soften the tone (“soft” pedal in grands; left), reduces the hammer-blow distance (“soft” pedal in verticals; usually left), holds only certain notes (“sostenuto” pedal; middle), or inserts the moderator cloth between the hammers and strings to mute the sound (“moderator” pedal; usually middle).

**pedal rocker.** In vertical pianos, horizontal linkage between a pedal and a pedal rod.

**pedal rod.** Vertical linkage between the pedal and a mechanism it actuates. Modern pedal rods in grands are usually equipped with adjustable nuts at the top that allow simple regulation of the pedals.

**petroleum jelly.** Lubricant used on the threads of screws and bolts.

**Phillips-head screw.** Screw with X-shaped head slot. Requires a Phillips screwdriver.

**piano.** Stringed percussion instrument with a keyboard; also used as a dynamic marking in music, meaning to “play softly.”

**pianoforte.** Term for the instrument derived from Cristofori’s original invention, which he called a *gravicembalo col piano e forte* (harpsichord with soft and loud).

**Piano Technicians Guild (PTG).** Organization of piano technicians and professionals. *See also* “Technicians’ Organizations” on page 523.

**pillar bolt.** *See* “nose bolt.”

**pilot.** *See* “capstan.”

**pilot notes.** *See* “guide notes.”

**pinblock.** Laminated block of hardwood that holds tuning pins and prevents them from unwinding under the strings’ tension. Also referred to as “wrest plank.”

**pitch.** Frequency of sound, expressed in hertz, e.g., “440 Hz,” or as a musical note, e.g., “A4.” In the context of action geometry, an angle, as seen from the side, between the center line running through the hammer and an imaginary line perpendicular to the shank that intersects the shank at the middle of the hammer molding. The angle toward the player is negative pitch; toward the belly rail, positive pitch. Most hammers have a 0° pitch angle, but those with positive rake usually have negative pitch to make the hammer perpendicular to the strings at strike. *See also* “rake.”

**pitch raise.** A process of increasing string tensions to tune a piano to match a higher frequency of a reference note, such as A4. Requires compensating for pitch drop, which occurs at different rates in different sections of the piano.

**plate.** A metal structure inside the piano on which the strings are suspended. Modern pianos have a three-quarter (up to but not over the pinblock) or full-size (over the pinblock) plate made of iron cast in one piece. Also referred to as “frame,” especially in the context of antique pianos.

**plate horn.** Called “iron frame nose” in C.F. Theodor Steinway’s U.S. patent 204,106 (1878), this part of the cast-iron plate transfers the compression force from the plate to the metal shoe in the belly rail, which transfers the force through the beams to the rim and back to the plate. The plate horn is usually located in the bass/tenor break. Some pianos have two plate horns, notably old Mason & Hamlin concert grands model CC.

**plate webbing.** Area of the piano plate around the tuning pins.

**player piano.** Piano capable of reproducing music. Popular in the early 20th century, mechanical player pianos used paper rolls. Holes punched in the roll caused a pneumatic mecha-

nism to actuate hammers. Electronic reproducing pianos such as Yamaha’s Disklavier and Bösendorfer CEUS® both record and reproduce music. They record to a removable electronic medium and provide a MIDI hookup. Newer models can be linked to a personal computer.

**plinth.** In verticals, the rail with holes for pedals that supports the bottom panel.

**power tools.** Tools powered by an electrical motor.

**practice pedal.** *See* “moderator pedal/rail.”

**Premium Blue.** Trade name for hammers made by Louis Renner GmbH exclusively for Renner USA.

**pressure bar.** A vertical protrusion in a horizontal area of the plate, typically over the pinblock; an extension of a strut.

**pressure bars.** Metal bars that clamp down the strings under the tuning pins in vertical pianos.

**pressure ridges.** Ridges that form in the soundboard as a result of high humidity causing excessive compression, which crushes the board’s wood fibers.

**projection of sound.** The “carrying power” or volume of sound, as perceived in a larger hall away from the piano.

**prolonge.** *See* “abstract.”

**prop stick.** *See* “lid prop.”

**prop stick boss.** *See* “lid prop cup.”

**Protek™.** Line of lubricants carried by Pianotek.

**psychrometer.** Device for measuring “relative humidity” in the air by comparing the temperatures taken by conventional and wet-bulb thermometers. *See also* “hygrometer.”

**PTG.** *See* “Piano Technicians Guild (PTG).”

**pulley key.** Key with elongated balance hole, which causes it to move from front to back during playing.

**punching.** Felt, cloth, paper, or cardboard cut in a circular shape with a hole punched through the center. Used on balance and front key pins, under the keys. Cloth or felt punchings should be above the cardboard and paper punchings. Also referred to as “washer.” In the UK, front rail punching is referred to as “front baize.”

**push action.** Also known as *Stossmechanik*, this action style was pioneered by Cristofori, inspired many forms of the English-style action in the last quarter of the 18th century, and eventually led to the development of Érard’s double-escapement action. *See also* “bumping action.”

**PVA glue.** Polyvinyl acetate glue, such as regular white glue, various wood glues, etc.

**PVC-E glue.** Polyvinyl chloride glue used for gluing felts, leathers, and key tops.

**quarter-sawing.** Sawing lumber in quarters first along the length, then radially cutting individual boards out of each quarter, across the grain. Quarter-sawing produces straight, dimensionally stable boards that resist warping.

**R.** *See* “strike-weight ratio (R).”

**R.H.** *See* “relative humidity.”

**rails.** *See* “action rails.”

**rake.** An angle, as seen from the side, that the hammer shank forms with an imaginary line that passes through the shank center pin and is parallel with the string at strike. Most pianos have a 0° rake. Those that have positive rake also have a negative pitch angle. *See also* “pitch.”

**rattling soundboard.** Condition caused by the soundboard separating from its ribs or the rim (frame). Rattles can also be caused by debris on the soundboard, and by separations in the bridges or between the bridges and the soundboard.

- rebuilding.** Reconditioning the piano to its original or better condition.
- recrowning the soundboard.** Rebuilding procedure to restore the soundboard's convex shape.
- regular-fit pinblock.** Style of attaching the grand pinblock to the rim or frame on each end of the block, but not to the stretcher.
- reinforcement of hammer felt.** Chemical treatment that stiffens the low shoulders of piano hammers. In cheap hammers, the "reinforcement" is merely dye.
- relative humidity.** The amount of humidity (water vapor) in the air relative to the maximum amount of vapor air can retain at a given temperature, expressed as a percentage followed by the letters "RH," e.g., "50% RH."
- repetition.** See "wippen."
- repetition lever.** Feature of the modern double-escapement grand action: lever on top of the grand wippen that allows the jack to reposition under the shank knuckle without releasing the key all the way to its idle position. Also referred to as "balancier," "bridge," "carriage," "cradle." In the UK, "repetition lever" typically refers to "wippen."
- reproducing piano.** See "player piano."
- resetting hammer.** Hammering the felt of the hammer around its crown (top) after needling it.
- resonance.** Effect exhibited by objects that spontaneously start to vibrate when another object vibrates at a certain frequency. Vibrations of the two objects are sympathetic, or at the same frequency. "Tuning" one object (for example, adjusting a string's length, thickness, or tension) can bring it in resonance with another or prevent it from resonating. The entire piano can be viewed as a set of resonating or non-resonating objects whose interactions must be carefully controlled to produce the desired sound.
- resonator, tension.** See "Tension Resonator."
- RH.** See "relative humidity."
- ribs.** Wooden "beams" glued to the underside of the soundboard. Ribs stiffen the soundboard across the grain, and help crown the soundboard.
- rider.** See "rocker."
- ridges, pressure.** See "pressure ridges."
- rim.** Wooden structure, usually of laminated hardwood, that defines the shape of the grand piano and serves as the foundation on which to mount the soundboard, plate, key bed, and case. Usually made in two stages: inner rim, and outer rim or case. Steinway & Sons makes the inner and outer rim in one operation. See also "case."
- rocker.** A piece of wood attached to the key that permits the adjustment of *abstracts*, which link keys with wippens. A rocker has a protrusion in the middle of its bottom surface that acts as a fulcrum. The screws with which it is fastened to the key at each end permit adjustment of the height of the wippen and, therefore, the hammer-blow distance. Also referred to as "key carriage," "rider." See also "abstract," "pedal rocker."
- rods.** See "pedal rods."
- roller.** See "knuckle."
- rose.** See "nose bolt nut."
- rotary tool.** High speed, hand held power tool that can be used for engraving, shaping, sanding, cutting, and drilling. A popular model is made by Dremel.
- rouge buffing compound.** A very fine buffing compound that produces the ultimate shine on metal objects.
- rough-regulating.** Action regulation performed after replacing action parts.
- router.** Handheld or stationary power tool for cutting notches of various profiles and for trimming laminates. In piano rebuilding, used for trimming new bridge caps and new, oversize white key tops.
- rubbing.** Procedure after finishing a surface to either satinize the surface or prepare it for buffing.
- sander.** Power sanding tool. See also "belt sander," "orbital sander," "vibrating sander."
- sanding sealer.** Finishing material, used to fill the wooden surface before applying the top coats of the finish; usually sprayed on.
- sandpaper.** Paper coated with abrasives, used for sanding, shaping, and cleaning various surfaces.
- satinize.** Rub a finished surface with an abrasive and/or steel wool to give it a satiny sheen. Especially desirable for lacquered surfaces.
- sawhorse.** Stand for temporarily supporting a piano or its parts.
- scale design.** Term that describes all aspects of piano stringing: the thickness of strings for each note, their lengths, spacing, etc. Usually referred to in the context of string thicknesses and their distribution throughout the scale.
- Schwander.** See "Herrburger-Schwander."
- seating the string.** Bending a string slightly to improve its contact with the bearing points: V bar, outside the bridge pins, and on each side of plate flanges and duplex terminations.
- semi-concert grand.** Grand piano approximately 7'4" [223 cm] long.
- set off.** See "let off."
- shank.** See "hammer shanks."
- shank rest felt (or cloth).** Strip of soft cloth (baize) on shank rest rail, also referred to as "hammer rest felt"; in Steinway grands, soft felt squares glued to shank rest felt bases in wippens, also referred to as "hammer cushion."
- shank rest rail.** Rail under hammer shanks, covered with shank rest cloth. Also referred to as "hammer rest rail." A Steinway & Sons grand has no rest rail; each wippen is equipped with a shank rest felt, also referred to as "hammer rest felt." See also "half-blow rail."
- shank strike weight (SS).** Radius weight, in grams, of the shank itself. Typically 1.5–2.0 g. See also "hammer strike weight (SW)," "strike weight."
- shank weight ratio (SR).** Ratio between the hammer strike weight and the knuckle lift force needed to suspend the hammer. The knuckle lift force is a force applied to the knuckle perpendicular to the knuckle tangent that passes through the shank center pin.
- sharp.** Black key covering or the whole black key. See also "black key."
- sheet-metal screws.** Screws with coarse, uniform threads and a straight shank; commonly used for fastening action parts, and in soundboard repairs.
- shelf.** See "bass bridge shelf."
- shellac.** Finishing material used for French polish.
- shifting key frame.** In most grands, the key frame shifts sideways when the soft (left) pedal is depressed. This softens the sound because the hammers move sideways and miss one string in each unison, or strike the strings between the dense, grooved areas of the hammer felt.
- shift pedal.** See "soft pedal."
- shimming.** Filling cracks in the soundboard; inserting wedges in the long bridge; filling a crack or gap between any two parts.

- shoe.** Metal piece in the belly rail that joins the beams and connects them to the plate horn. The part of the shoe that protrudes through the belly rail into the action cavity is called the “toe.”
- shoulders.** Areas of the hammer felt responsible for the rebounding of hammers from strings. *See also* “hammer molding,” “crown.”
- silent piano.** Acoustic piano that allows muting the strings with a rail that blocks the hammers before they reach the strings. The piano is equipped with sensors and electronics that make it work like a digital piano; it can be used with headphones, and connected to a PC via a MIDI interface.
- silicone lubricants.** Lubricants for metal and felt.
- single strings.** *See* “individually tied strings.”
- sizing solution.** A solution that improves the fit of porous materials. A sizing solution can be used to free tight key balance holes, key bushings, and center pin bushings; or to tighten key balance holes and key bushings when slightly loose. A good sizing solution for felt, leather, and wood is a 50% to 90% solution of alcohol and water. Note that all commercially available alcohol already contains some amount of water.
- slap rail.** *See* “stop rail.”
- slapping key frame.** Key frame that generates “slapping” noises when the piano is played loudly. Typically, the noises are caused by gaps between the front rail and the key bed.
- sleeves.** *See* “threaded sleeves.”
- SMP.** *See* “standard measurement position (SMP).”
- soft pedal.** Left pedal, often called the “shift pedal” in grands, which softens the sound either by shifting the keyboard and the action sideways, or by reducing the hammer-blow distance (also referred to as “half-blow pedal”), thus reducing the hammers’ speed at impact. *See also* “pedal,” “una corda pedal.”
- sostenuto.** Mechanism that lets one or more notes ring while other notes are played normally. With one or more keys depressed, the player depresses the sostenuto pedal, and the sostenuto mechanism keeps those dampers lifted. Other notes are damped normally, and can be played with or without the damper pedal. Sostenuto is found in most longer grands and in high-end uprights.
- sostenuto monkey.** Felt-and-leather-covered wooden linkage attached to the sostenuto rod in New York Steinway grands.
- sostenuto staple.** A wire that connects the sostenuto monkey with the sostenuto rod in most Steinway & Sons grands made in New York.
- sostenuto tab.** Protruding part attached to the underlever top flange that is caught by the sostenuto rod when that underlever is lifted and the sostenuto pedal is engaged.
- soundboard.** Wooden board that transduces the energy of string vibrations to the air. Also referred to as “belly.”
- soundboard rib.** One of multiple wooden bars glued to the bottom of the soundboard to stiffen it across the grain and make it bow upward. Also referred to as “belly bar.”
- sound decay.** *See* “decay.”
- sound envelope.** Sound quality through time. *See also* “attack,” “bloom,” “decay,” and “sustain.”
- spine.** Long, flat side of the case in grand pianos. *See also* “bent-side,” “cheek,” “tail.”
- spinnet.** Short vertical piano only a little taller than the keyboard (36–42” [91–107 cm]). *See also* “vertical piano,” “console vertical,” “upright piano.”
- spun string.** *See* “wound string.”
- squaring the hammer.** Heating and twisting the hammer shank to align the hammer’s center line with the plane in which it moves. *See also* “burning the shank.”
- squaring keys.** Aligning sides of keys to vertical plane as part of a keyboard regulation.
- SR.** *See* “shank weight ratio (SR).”
- standard measurement position (SMP).** Position 13 mm in from front edge on white key top, or from the front slope on black key top. *See also* “balance weight (BW),” “downweight (DW),” “touchweight (TW),” “upweight (UW).”
- staple.** *See* “sostenuto staple.”
- stay.** Brace or other device that keeps another part from moving. *See also* “lyre stays.”
- steaming keys.** Technique for removing key bushings.
- stem.** Wire.
- sticker.** A wooden linkage between the key capstan or rocker and the wippen in tall uprights. Stickers were also used as damper lifters in “bird cage” vertical actions. *See also* “bird-cage action,” “rocker,” “wippen.”
- stop rail.** Any rail that stops the motion of another part. Also referred to as “slap rail.” *See also* “damper stop rail.”
- straight-stringing.** Stringing design in antique pianos and all harpsichords in which all strings are laid out more or less parallel to each other. Modern pianos are over-strung.
- straps, bridle.** *See* “bridle straps.”
- stretched octaves.** The effect of string inharmonicity, which requires tuning intervals “wider” (upper note higher or lower note lower) than they theoretically should be tuned.
- stretcher.** Structural board in grands behind the open fallboard and in front of the pinblock. Also referred to as “cornice,” “lock board.”
- string loop.** A loop tied on the end of the string, used to attach the string to the hitch pin. In pianos with individually tied strings, each string has a loop; in pianos with double strings, an occasional plain string has a loop. Wound strings always have a loop and are tied individually. Also referred to as “individual eye.”
- strike point.** The spot on the string where it is struck by the hammer, expressed as a ratio between the length from the front string bearing (the V bar, agraffe, or the raised plate flange) to the strike point, and the length from the strike point to the front bridge pin. Usually, that ratio is between 1:8 and 1:10 in the middle section and the bass, diminishing to as little as 1:25 in the treble. Also can mean “tip of the hammer” or “hammer nose.”
- strike weight.** Term established by David Stanwood to indicate the “effective” weight of action parts. The strike weight of a hammer, for example, is the combined radius weight of the hammer and shank without the weight of the flange. *See also* “front weight (FW),” “hammer strike weight (SW),” “shank strike weight (SS),” “touchweight (TW),” “wippen radius weight (WW).”
- strike-weight ratio (R).** Ratio between balance weight (BW) plus front weight (FW), and leveraged strike weight (SW) plus leveraged wippen radius weight (WW). Typically 5.2–6.2 (5.2:1 to 6.2:1).
- string.** Steel wire with high carbon content. Bass strings are regular steel strings wrapped with a copper coil.
- string bearing.** Any point around which a string bends along its path: tuning pin, counterbearing, V bar, agraffe, pressure bar (in verticals), bridge and bridge pin, duplex termination, hitch pin.

- stringing braid.** Cloth threaded between strings to deaden their rear segments (backscale). Stringing braid is also used between hammer shank flanges and the tubular shank rail in Steinway grands. Also referred to as “listing.”
- stringing stud.** See “agraffe.”
- stripper, chemical.** See “chemical stripper.”
- strut.** A cross-member or brace in a piano plate, cast in one piece with the plate in modern pianos. Also referred to as “crossbar.”
- stud.** See “agraffe.”
- superglue.** See “cyanoacrylate glue.”
- surform plane.** Tool similar to a regular plane, but equipped with a grater-like cutting element on its underside.
- sustain.** Length of time a note is audible. Applied to a piano’s tonal envelope, a phase that follows attack and decay. The beginning of the sustain phase is often referred to as “bloom.” See also “attack,” “bloom,” “decay,” “sound envelope.”
- sustain pedal.** See “damper pedal.”
- SW.** See “strike weight,” “hammer strike weight (SW).”
- swaging.** In wound bass strings, flattening a round steel core wire to create a rectangular profile the winding can grab onto; without swaging, the winding would slide off unless the core wire is “whipped,” a technique popular in older pianos (Figure 84 on page 35). Swaging is not necessary if the core wire is of hexagonal profile. See also “bass string.”
- tail.** In grands, hammer molding under the shank hole; part of the case on the side opposite the keyboard. Also referred to as “heel.” See also “bentside,” “cheek,” “spine.”
- talcum powder.** Used as lubricant, or to absorb moisture from one’s hands during restringing.
- tape-check action.** Action in which the repetition and returning of the hammer to rest position is helped by a tape or strip of leather. Patented by Hermann Lichtenthal of Brussels, Belgium, subsequently used by Robert Wornum in his vertical pianos.
- temperament.** A 12-note chromatic scale; tuning corrections (“tempering”) needed to distribute the 12 adjacent notes of a chromatic scale so that the intervals between them have particular beat rates on the level of particular partial pairs (see “Coincident Partials,” page 96).
- temperament strip.** A strip of thin felt used for tuning the temperament in the middle section of the piano. See also “mute.”
- tender.** See “jack tender.”
- tensile strength.** String tension at which a string breaks.
- Tension Resonator.** A device found in Mason & Hamlin pianos, consisting of metal rods with turnbuckles and a metal disc in the center, which pulls the rim and the belly rail inward.
- Tharan®.** Key top material made by Kluge.
- thermoplastic glues.** Glues that soften or melt when heated. All PVA glues are thermoplastic to some extent. Low-creep PVAs are less thermoplastic, which makes them easier to sand.
- thinner.** Liquid used to dilute a finish or contact glue. Common thinners are alcohol for shellac, paint thinner for varnishes, lacquer thinner and acetone for lacquer finishes. Two-component finishes require proprietary thinners.
- threaded sleeves.** Metal inserts, threaded with a coarse thread on the outside and a fine, machine thread on the inside, used for machine screws in wooden parts.
- three-quarter plate.** Plate in pre-modern pianos that extends to, but not over the pinblock.
- tie wire.** See “bridle wire.”
- timbre.** Sound quality or sound “color.”
- toe.** Tip of the metal shoe that protrudes through the front of the belly rail. The plate horn is attached to it with a metal wedge.
- toluol (toluene).** Solvent used in finishing products and adhesives. Faster-drying than xylol.
- toning.** See “voicing.”
- top.** See “lid.”
- top door.** See “upper panel.”
- top stack.** The assembly mounted on the grand key frame: action brackets and rails (action rack), action parts, and the sostenuto brackets and rail in New York Steinways. Also referred to as “action stack.” See also “action.”
- touchweight (TW).** Term used to denote the same amount of change or effect on downweight (DW), upweight (UW), and balance weight (BW).
- trapwork.** Levers mounted on the underside of the key bed in grand pianos that link the pedals with the damper, sostenuto, una corda, or other mechanism.
- traveling.** Adjusting the swing plane of action parts by shimming their flanges.
- trichord.** Three strings tuned to the same pitch. See also “bichord.”
- tripoli.** Very fine abrasive used as lubricant and buffing compound.
- Tubular Metallic Frame.** Steinway’s patented action frame (U.S. patents no. 81,306 for vertical action and no. 93,647 for grand action, issued in 1868 and 1869, respectively, to Theodor Steinway). The frame consists of metal action brackets and action rails that are hardwood dowels encased in brass tubing of special profile. The rails are soldered to the racks and are not adjustable.
- tuning.** Adjusting the pitch of each string of a piano.
- tuning hammer.** Tuning wrench.
- tuning pin.** Metal dowel inserted through the plate into a hole in the pinblock that suspends the string and permits adjustment of its tension. Modern tuning pins are lightly threaded, have a hole for the string becket, and a square top end. Also referred to as “wrest pin.” See also “flagpoling.”
- turnbuckle.** In grands, knob in the bentside that latches the lid to the case. See also “lid latch.”
- TW.** See “touchweight (TW).”
- twisting bass string.** Bass strings must be twisted in the direction in which their copper wrappings point in order to tighten the wrapping and prevent it from rattling against the steel core.
- two-component finish.** A modern finish that hardens through a chemical reaction between two components. A two-component finish commonly used on pianos is polyester.
- ultrasonic humidifier.** Humidifier that disperses water into the air using a membrane that vibrates at ultrasonic frequencies.
- una corda pedal.** Italian for “one string”; a term used for “action-shifting soft pedal.” It originates from a time when two strings per unison were common, and shifting a grand’s keyboard and action sideways caused the hammer to miss one of the strings. In modern pianos with three strings per unison in the tenor and treble sections, the shifting makes hammers strike two of three strings, or strike all three strings with the softer areas of the hammer felt. See also “pedal,” “soft pedal.”
- undercarriage.** See “wippen.”
- underlever.** See “damper underlever.”
- unison.** An interval between a note and itself. In piano construction, refers to “all strings of one note.” The bass section can be strung with one, two, or three strings per unison. Lowest tenor

- unisons have two or three strings, and the rest of the piano three strings per unison.
- upper panel.** In vertical pianos, a vertical panel that encloses the top part of the piano, above the fallboard, from the front. Also referred to as “top door.”
- upright piano.** Vertical piano, taller than ca. 46" [117 cm]. *See also* “vertical piano,” “console vertical,” “spinet.”
- upweight (UW).** Amount of weight, in grams, placed on the key at the standard measurement position, that the key will lift on its own to the key dip of about 4 mm. Typically 20–32 g. *See also* “balance weight (BW),” “downweight (DW),” “standard measurement position (SMP),” “touchweight (TW).”
- V bar.** Bottom portion of the capo tasto bar; acts as a front string termination.
- vertical piano.** Piano whose soundboard, plate, and strings are laid vertically. Considered inferior to the grand piano, mainly because the action in verticals doesn't perform as well as the grand action. *See also* “upright piano,” “console vertical,” “spinet,” “grand piano.”
- vibrating sander.** Power tool for sanding various surfaces. Avoid using an orbital sander on wooden surfaces because it vibrates in a circular pattern and tears wood fibers. Instead, use a straight-line sander parallel to wood grain.
- voice-down hammers.** Dense hammers that require reducing their tonal brightness, or “voicing them down,” by needling their felts.
- voice-up hammers.** Less dense hammers that require increasing their tonal brightness, or “voicing them up,” typically by applying a chemical hardening agent to their felts.
- voicing.** Adjusting the tonal qualities of a piano by manipulating the shape, density, and resilience of the hammers, and adjusting their interface with the strings. Other techniques may be used to even out the voicing, such as adjusting the string downbearing, mass-loading the soundboard, changing the impedance of the soundboard assembly, reshaping and hardening the V bar, rescaling the piano, tuning the rear duplex, etc. Also referred to as “toning.”
- vortex chiller.** Device that chills compressed air. Used to cool down cutting tools in applications that generate a lot of heat, e.g., pinblock drilling.
- washer.** *See* “punching.”
- water separator.** Device that removes the moisture condensed in the air compressor.
- wave impedance.** Property of the soundboard and bridges that causes energy to be reflected back to the vibrating string, thus softening the attack and prolonging the sustain of sound. *See also* “cutoff bar,” “fish.”
- WD-40®.** Water-displacing agent and mild lubricant. Does not contain silicones.
- webbing.** *See* “plate webbing.”
- wedge for key bushings.** *See* “caul.”
- weighting of keys.** Procedure for determining the weight that needs to be installed in, or removed from, each key to produce optimal response of keyboard and action.
- Weldbond®.** Trade name for a strong PVA glue.
- Wetordry™.** Sandpaper made by 3M Company that can be used for wet or dry sanding.
- whipped bass string.** Bass string in which the winding is first loosely wound toward the end of the core wire, then tightly wound in the opposite direction, over the first winding (Figure 84, page 35). Whipping prevents the winding from sliding on the core wire without the core being swaged, as is customarily done today. Whipping also may lower inharmonicity in bass strings. *See also* “bass string,” “wound string.”
- wippen.** Device that links the key with the hammer shank and hammer. Consists of the wippen base, wippen heel, wippen flange, and the jack with its spring and, in grands, repetition lever and the repetition spring. In verticals, the wippen carries the jack, backcheck, and bridle strap hook in the front, and the damper spoon in the back. Also referred to as “lever.”
- wippen heel.** Part of the wippen base that rests on the key capstan. Also referred to as “lever block.”
- wippen radius weight (WW).** Effective weight, in grams, of the wippen, measured at the center of the heel. Typically 17–21 g. *See also* “hammer strike weight (SW),” “shank strike weight (SS),” “strike weight.”
- wippen rail.** Rail, usually of wood or aluminum, to which the wippens are affixed.
- wippen stack weight (WSW).** The weight with which the wippen, with the hammer and shank on it, presses the key capstan:  $(SW \times SR \times WR) + WW$ .
- wippen weight ratio (WR).** The ratio between the force applied to the jack by the knuckle (assuming the force is perpendicular to the line between the shank center pin and the top of the jack) and the lift force at the wippen heel felt to keep the wippen in balance. Typically around 1.5.
- winding.** A winding of copper, steel, or aluminum, used on bass strings to slow their rate of vibration without reducing the tension at which they are stretched. *See also* “bass strings,” “whipped bass string,” “wound string.”
- wire gauge.** Numbers used to indicate string thickness. Piano strings normally range from #13 for the highest notes to between #19 and #23 for the lowest notes in the tenor section. String gauges in quality pianos are distributed in half numbers, e.g., #13, #13.5, #14, #14.5, etc., up to #17 or #18, and in whole numbers thereafter.
- wire tie.** A piece of pliable metal or plastic wire lined with paper or plastic, used to tie plastic bags and food items by wrapping the tie around the piece(s) and twisting its ends together.
- wood fibers.** Cellular strands, also referred to as “wood grain,” that give wood its strength along their length. Excessive dryness causes wood fibers to separate from each other, resulting in cracks.
- wound string.** Also referred to as “spun string.” *See* “bass string,” “winding.”
- WR.** *See* “wippen weight ratio (WR).”
- wrest pin.** *See* “tuning pin.”
- wrest plank.** *See* “pinblock.”
- WSW.** *See* “wippen stack weight (WSW).”
- xylol (xylene).** Solvent used in finishing materials and adhesives. Slower-drying than toluol.
- yellow wood glue.** A thermoplastic PVA glue suitable for wood joints that are not exposed to continuous stress.