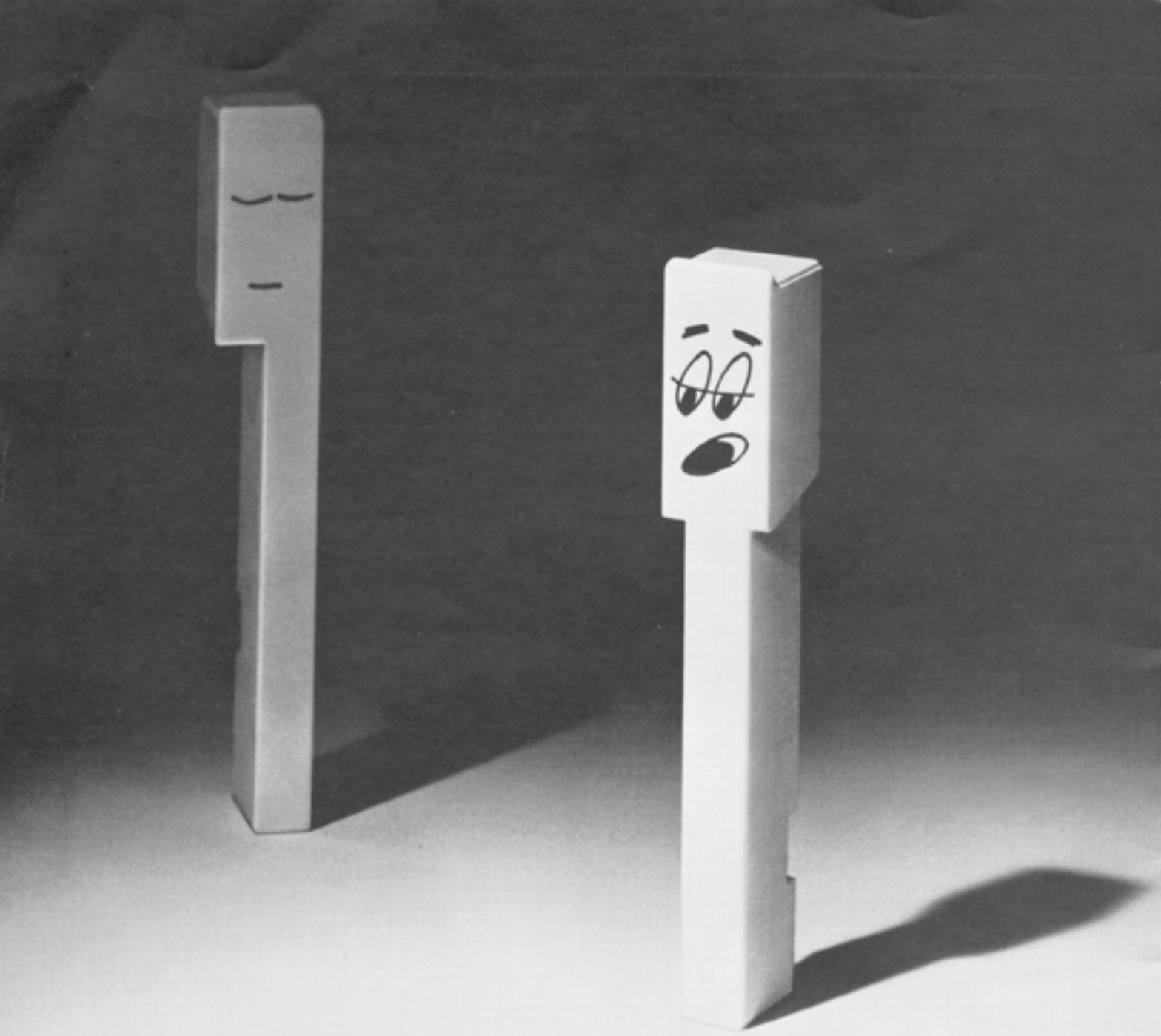
Piano Technicians Journal
January, 1979



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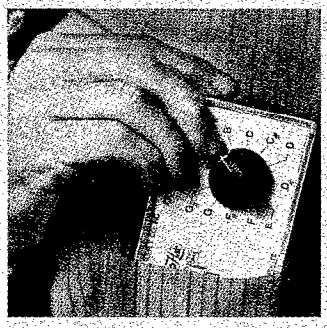

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Articles

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Editorial

HERE WE GO INTO 1979 WITH ANOTHER GREAT YEAR AHEAD FOR PTG.

The Guild's economy has stabilized. Our leadership and membership has settled comfortably onto a cooperative and progressive level of operation, and aside from a few small mechanical problems (which will be solved with time and experience) it seems we are ready for a Giant Step Forward in '79 -- the theme of our Convention in Minneapolis this summer.

After dealing with organizations for well over a quarter of a century, I have come to the inescapable conclusion that the most successful people in virtually every field of endeavor can usually by found actively participating in their trade or professional association.

At the risk of repeating myself, I will remind you of a statement written some time ago in a **Journal** Bulletin. Teddy Roosevelt was attributed to have said:

> "Every man (and woman) owes part of his time and money to the industry or business in which he is engaged. No man has the moral right to withhold support from an organization that is striving to improve the conditions within his sphere."

Another observation along these lines was made by Supreme Court Justice Brandies:

> "A trade association is an organization which exists for the mutual benefit. It substitutes **KNOWLEDGE** for ignorance, rumor, guesswork, and suspicion. . . . It substitutes **RESEARCH AND REASONING** for these things without closing the door or lessening the value of prothetic reasoning."

The road to success in traveling along the organizational landscape is seldom smooth and unobstructed. People being as imperfect as they are tend to work their imperfections into their organizational pursuits. Unfortunely, these problems tend to interfer with clear and concise reasoning and objectivity and can sometimes make progress in organizations awkward and uncertain. Ben Franklin best illustrates this point with this acute observation:

> "When you assemble a number of men and women together to obtain the advantages of their joint wisdom, you inevitably also assemble with those people all of their prejudices, their passions, their efforts of their local and parochial interests and their selfish views. From such an assembly can perfection be expected? It therefore astonishes me to find this system approaching so near to perfection as it actually does."

Our Guild can protect the interests of members, upgrade and improve our craft, increase individual profits, and make life more meaningful (and more pleasant) in the marketplace. To lend your Guild your support, therefore, is an investment not a sacrifice! It is a contribution to your own business and professional health and welfare. Your Guild provides a wonderful opportunity to learn, to absorb some of the vast experience and knowledge of those who have preceded you in your craft, to rub shoulders in friendship and comradery with those who share your profession, and to sit in conference with other tuner technicians in mutually beneficial discussions. The Guild is an investment in your future and in the future of your industry. Your meetings are vehicles through which the progress of our industry can be brought into focus. Let us hope that the hundreds of meetings involving thousands of technicians in the year ahead will prove both meaningful and productive to all concerned.

Finally, try to avoid the kind of meeting the town council held in the village of Podunk some time last year. The council meeting started with the Chairman leading a discussion on the over-crowded conditions of the jail. After a great deal of time, it was finally decided that they would build a new jail to take the place of the old one. This was duly moved, seconded, and passed. Another discussion followed on the cost of the project and the question of where they would locate the materials. It was finally decided that they would use the materials from the old jail to build the new one. This was properly moved, seconded, and passed. Then the timing of the project was discussed. After a while, it was decided that they would not tear down the old jail until the new one had been completed. This was duly moved, seconded, and passed. With this action out of the way, they adjourned the meeting and started their checker game -- satisfied that they had had a most progressive and productive evening.

You would be amazed at how often this happens when systems and methods are abandoned for pleasure and expediency. Let's hope all chapter meetings this year will be held in true spirit of mutual trust and friendship -- spread good will, understanding -- make the year ahead one we can speak of proudly for decades. DLS ■

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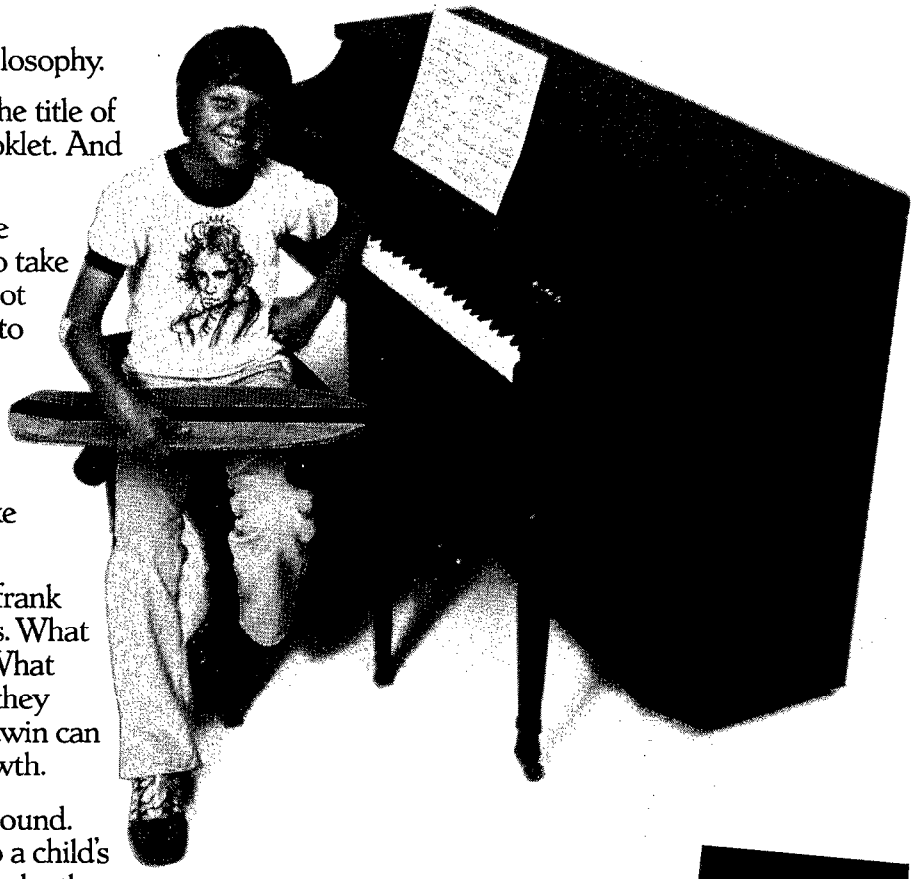

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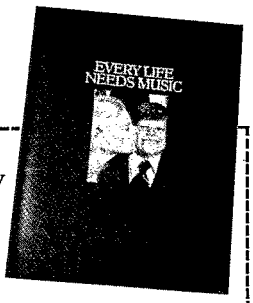

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President's Report

by Don Morton
P.O. Box 9412, N. Hollywood CA 91605

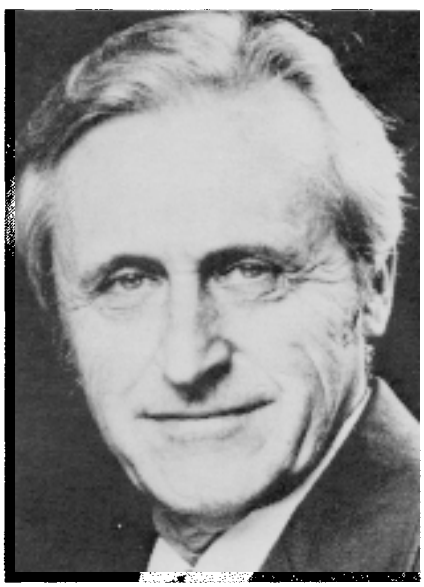
Now that the holiday season is past, and a brand New Year is reality, it seems a good idea — no, in fact it's imperative for the health of our organization — that we examine our purpose, principles, and goals as structured for the year ahead.

Just to keep up with the whirlwind changes and stresses confronting all of us today requires more and better planning, plus discipline and flexibility. But just keeping up is not enough if we expect to progress. What worked well 10 years ago, or even yesterday, may be outdated tomorrow — causing problems and even failure in well-grounded healthy organizations.

One such example is in government restrictions, such as Section 1 of the Sherman Act and Section 5 of the Federal Trade Commission, which prohibits discussing prices for our services in open meetings or even in groups. Already we have had to change our Code of Ethics because of this. Originally our association was formed with the main purpose being to improve and protect the interests of our members. Today the law requires that we also emphasize the values to the public through fair competition practice with no hint of discrimination involving membership.

Today our association is a complex organization made up of several thousand individuals who meet together in small groups called chapters. There they exchange ideas of both technical and philosophical nature, publish newsletters, and occasionally hold regional meetings combining several chapters. Once a year an international meeting is held in which all members are invited to participate in planning and maintaining the ground rules by which we operate.

Under this system every member is offered a challenging opportunity to exercise his or her leadership, not only for the benefit of our organization but also for the benefit of the community, industry, and the entire nation. Leadership must come from within the individual; it must be based on a desire to improve and change things in the direction you believe they should go. Leadership influences, motivates, and directs others. It can be for good or for bad, depending on the motive of the leader. Good leadership pursues constructive, cooperative ideas that promote the well-being of the individual and the community.

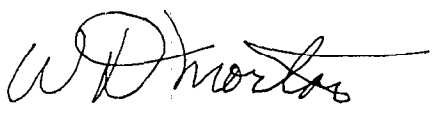


An organization such as PTG functions as a business or a government, at the head of which are two main groups — the executive board and the "paid staff." The top executives of both of these groups share the responsibility as spokesmen for our organization. Here there must be unity of purpose, open and honest communication, and a mutual respect for each other's motives and abilities. Likewise, at this level must be a clear delineation of job responsibilities. These are the conditions under which your president and Board work with your executive director and staff.

But, it is a changing world requiring constant updating of everything from bylaws to paychecks. Nothing is permanent, especially your leaders. There is a constant change in membership (renewal for some, upgrading for others), along with new members coming into our ranks. We have no permanent elite in our active leadership; that category is left for the Hall of Famer's and similar awards. Voluntary effort is the backbone of our organization. Who will know the extent of your influence or the scope of your creative abilities unless you try putting your ideas to work?

If you are going to lead out, however, be prepared to meet and appreciate opposing viewpoints to your ideas. Cooperation and understanding by the voting membership are necessary for the success of any project.

Now is 1979, according to the time capsule in which we function. Got any ideas? Are you on a committee? Would you like to change a few things? What's wrong with throwing effort towards some of your insights in 1979? The challenge is here and you have an eager attentive group of over 3000 people who are willing to listen. Happy new year! ■



Book Review

by Jack Krefting

Those who have read *The Piano Key and Whippen* will be happy to know that another Walter Pfeiffer classic is now available in English — *The Piano Hammer*, translated into English by Jakob Engelhardt. The original German title, *Vom Hammer* (literally "On the Hammer" or "Of the Hammer"), is a bit misleading as the book has nothing to do with the construction or voicing of piano hammers. Rather, the book addresses itself to action design and geometry. It contains 91 mechanical drawings of piano actions, principally obsolete or experimental actions of German and Austrian design.

The 120-page book is divided into two parts. The first part covers nomenclature and descriptions of various designs, some of which are described nowhere else. Pfeiffer has classified the various designs into four categories: The bumping action, the pulling action, the pushing action, and the linked action. Downward-striking actions, where models or drawings are available, are included also.

The second half of the book addresses itself to design factors, transmission ratios, measurement of forces, efficiency and dimensional relationships of piano actions. In a sense, *The Piano Hammer* is a sequel to *The Piano Key and Whippen*. Both books are scholarly in nature, well researched, and carefully written. *The Piano Hammer* continues upward through the action beginning with the jack, which is about where *The Piano Key and Whippen* left off.

The translation of any text presents certain inevitable problems, not the least of which is the problem of the untranslatable word. Jakob (Jim) Engelhardt had some unusual problems with this translation because, not only were there some words in the text which have no English equivalent, but he was faced with the additional dilemma of Dr. Pfeiffer's penchant for the use of unorthodox technical terms. German technicians, according to Engelhardt, have trouble understanding the original German text, so it is small wonder that translating difficulties have arisen. It is to Engelhardt's credit that the English version is clear and easy to read. He has used American nomenclature for the most part, with British nomenclature in parentheses where the two differ.

Having said that, it is incumbent on us to question the translator's usage of American slang in his translation of what must be considered an otherwise scholarly text. At one point, Engelhardt asserts that we must "do our own thing," and at another point he describes the hammer motion of a certain action as "pell-mell"; he describes various positions of the jack as "in firing position" and "tailgating." In describing a particularly strange action design, Engelhardt's translation avers that this particular design "takes the cake." One could infer from this slangy translation that Engelhardt was being charmingly idiomatic or inappropriately flippant, depending upon one's point of view.

One clue to Engelhardt's approach to this translation is the apparent injection of his own personality into the work of Dr. Pfeiffer. Eleven years ago, when he translated *The Piano Key and Whippen*, his translator's preface covered a scant two pages; this time, he uses more than three pages in a rambling defense of American piano manufacturers in response to an obscure footnote in the text. Necessary or not, it would seem that he doth protest too much. The footnote in question was in reference to a letter written by a friend of Dr. Pfeiffer's — that's all. But Engelhardt's response seemed to cover market factors, the popularity of certain features, the dislike of technicians for small verticals, reasons why those technicians were wrong, and hints that wives have ways to get their husbands to buy pianos for them. Again, his usage of slang terms and phrases like "crapping out" and "everything's groovy" seems out of place in a preface to a serious text.

Why would an average American tuner-technician want to spend $35 for a thin book (90 pages of actual text and illustrations) which deals primarily with obsolete, foreign, and often unproven designs that he will probably never encounter in his day-to-day business? Because, whatever the problems of translation, the book itself is a classic. The illustrations are fascinating, the text illuminating, and the theory sound. Anyone who has more than a passing interest in the development of the piano action would find the book interesting. Those who intend to seriously study piano draftsmanship or action design should consider this book a "must" for their reference library.

With the permission of Jakob Engelhardt, we are reprinting one chapter of the book. We think you will find it interesting. ■

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The Bumping Action

by Walter Pfeiffer
Translated to English by J. Engelhardt

The basic distinguishing feature of all bumping actions is the hammer installation: the hammer assembly [i.e. hammer head + shank + butt] is fastened to the key and pivots on it. Thus in the bumping action the hammer is part of the key and the two move together; the hammer assembly is usually in the form of a two-armed lever. As a general rule, the hammer is actuated by the hammer tail[4] bumping against an obstacle. In some forms a secondary lever, called the "escapement lever[5]," is interposed. In the early forms the back bar (or cross block), or a continuous fixed rail, the "bumper rail[6]," serves as a stop; in the later forms the continuous rail is replaced by individual levers, known as "escapements" or "hoppers[7]." The escapement provides the letoff in a bumping action.

Early Forms of the Bumping Action

A very early — to our point of view the simplest — form of the bumping action is shown in Fig. 1. Here, as usual, the key is a two-armed lever; on its back end the very delicate hammer assembly, likewise a two-armed lever, rests flat. The end of the key is beveled, and where the bevel begins is the pivot point of the hammer assembly. This is simply fastened to the key by means of a leather strip glued to both pieces; the leather at the same time serves, as it were, as a center pin. The hammer shank is rectangular in cross section, measuring 1 by 6 millimeters in the treble; attached to it, pointing toward the player, is the tiny hammer, weighing only one-fifth of a gram in the extreme treble. When the key is struck, its back end is brought upward, the hammer tail bumps against the cushioned back bar, and the tiny hammer is catapulted toward the string with a kinetic energy corresponding to that delivered to the key. The touch weight of this action is 4 to 6 grams, the average key dip is 6 millimeters. There are no dampers, nor are they necessary for the delicate sound produced by this action.

Another early form of the bumping action is reproduced in Fig. 2. Here the hammer assembly is fastened at the sides and pivots on a screw in a correspondingly hollowed-out portion of the back half of the key. Sachs calls this arrangement a "bumping action of [the] most original form"; in fact, he says of it that here seems to have been preserved the archetype of the bumping action. In the small square piano on which our figure is based, the touch weight is 22 grams, the key dip 3 millimeters[8].

In order to be able to give the hammer assembly more freedom of movement, thus imparting more kinetic energy to the hammer, in the arrangement shown in Fig. 3, which became very popular in this and similar forms, the hammer assembly is no longer compactly and inadequately mounted on the key, but rather "pivoted in a wooden fork attached rigidly to the key pointing upward, called the flange, in such a manner that the hammer tail, which protrudes on the other side of the fork, must strike against the bumper rail." According to Marx, the touch weight of the small instrument which he examined was 12 grams, the key dip 4 millimeters.

The mechanisms described up to this point have been horizontal and upward striking; however, the bumping action is also found in a downward-striking form. This is shown in Fig. 4. The back half of the key is slotted; in this is seated the small hammer assembly, held in place and pivoted on a piece of parchment. The bumping and the blow on the string both take place on the same arm of the lever, but there is also a back lever arm to accommodate a piece of lead. The function of the lead weight is to return the hammer to its rest position, from which it can again be catapulted toward the string. We carefully constructed an action model of this, and on our model the key dip is 5 millimeters, the touch weight 22 grams. All additional information can be obtained from the drawing.

Figs. 5 and 6 show special forms of the early bumping action, special in that a two-armed escapement lever is interposed in between the back bar and the hammer. In the first instance the hammer assembly and the back half of the key act in opposition to each other; in the second, they act in the same direction. Sachs refers to the former, as we do, as a bumping action, but — evidently influenced by the direction in which the hammer assembly faces — to the latter as a pushing action. In this we cannot agree with him. It might perhaps be classed as a hybrid form, but the overall construction is definitely that of a bumping action, which deviates from the customary forms only in that a two-armed lever is interposed in between the bumper rail and the hammer assembly and that the latter acts in the same direction as the back half of the key. The deciding factor in classifying this as a bumping action, however, is neither the secondary lever nor the direction in which the hammer assembly faces, which for us is beside the point, but rather purely and simply the basic characteristic of all bumping actions: the hammer attached to the key.

Fig. 1 *Rudimentary bumping action*
Middle of the eighteenth century
Small square piano in the *Württembergisches Landesgewerbemuseum*, Stuttgart

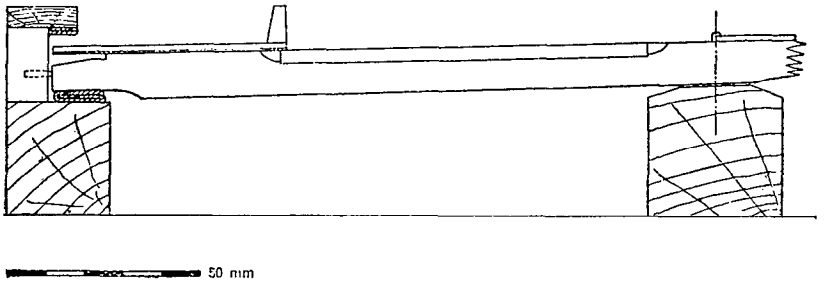


Fig. 2 *Bumping action, hammer mounted at the side of the key*
Latter part of the eighteenth century
Small square piano, originally in the *Musikhistorisches Museum* of Wilhelm Heyer, Cologne, No. 114, now in the *Musikwissenschaftliches Instrumentenmuseum* of the University of Leipzig
Drawn from a pattern by Otto Marx, Leipzig

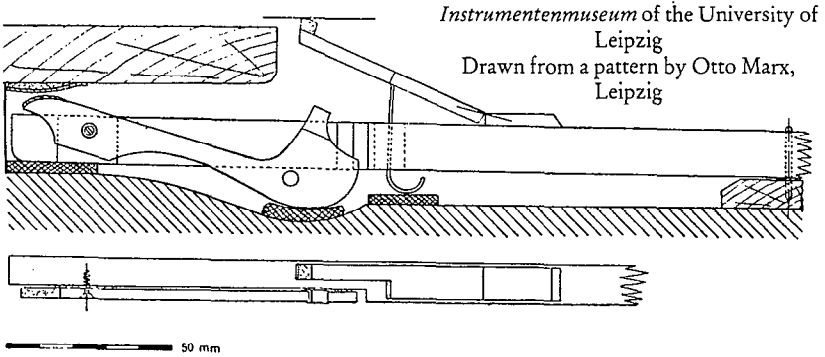


Fig. 3 *Bumping action with hammer flange*
c. 1760 – Originally *Heyersche Sammlung* No. 98, now in Leipzig
According to Marx

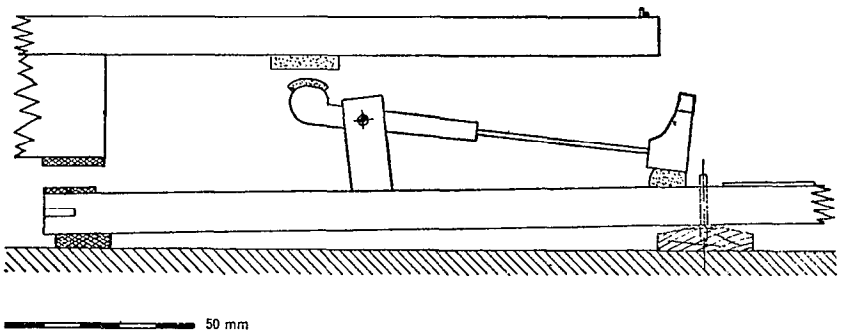
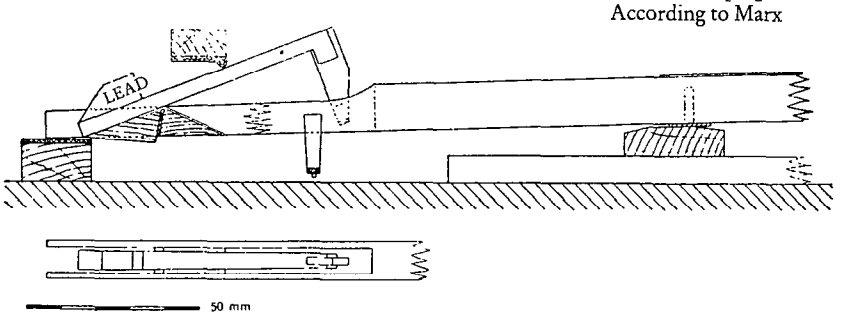


Fig. 4 *Downward-striking bumping action*
George Pether, London, c.1820
Originally *Heyersche Sammlung* No. 142, now in Leipzig
According to Marx



Our fifth figure shows the same action as in the small square piano by H. C. Hayne, 1977, in the *Berliner Sammlung* [Berlin Collection] (No. 337). Curt Sachs speaks here of a "bumping action with an escapement lever." He gives no illustration, but this can be found in Rosamund Harding. Fig. 6 is the action of the small square piano by I. J. Senft in the *Berliner Sammlung* (No. 1280, hammer action illustration 9). Here Sachs writes: "Pushing action with hammers turned backwards, attached to the keys with metal flanges and with escapement levers with jacks[9] seated firmly upon them which activate the hammers." (Cf. Curt Sachs, *Sammlung alter Musikinstrumente bei der Staatlichen Hochschule für Musik zu Berlin, Beschreibender Katalog [Collection of Antique Musical Instruments at the National Music Academy in Berlin, Descriptive Catalogue]*, Berlin, 1922, pp. 78 and 82.) Also, the *Heyersche Verzeichnis [Heyer's Catalogue]*, under No. 113, lists a small square piano with the hammer action shown in our Fig. 6. Georg Kinsky, in agreement with us, refers to this as a "bumping action." Otto Marx, the restorer and caretaker of this collection, wrote to the author that in the course of restoration work he found the name of the builder, lacking in Kinsky, hidden under the soundboard: "Joh. Andreas Mahr, Wiesbaden 1801." He gave the key dip of this instrument as 7 millimeters and the touch weight as 15 grams and described the touch as pleasing. In reference to the action shown in Fig. 5, Marx comments that here, too, the touch is light and flowing; he gives the key dip as 5 millimeters and the touch weight as varying between 18 and 25 grams. In the small square piano on which our Fig. 6 is based, the key dip is 6 millimeters, the touch weight 10 grams. The touch is light, much too light; the repetition is excellent.

Escapement[10] Actions

Johann Andreas Stein (1728-1792) added the most decisive and important improvement to the bumping action: he replaced the fixed bumper rail running the width of the instrument with individual escapements (or hoppers), thus in an excellent manner giving the player control over the blow. True, to begin with, Stein's action lacked back checks and the action later underwent further modifications, for the most part of a technical nature, but the basic arrangement for what is referred to as the "German action" may rightly be termed the work of Stein. He gave the bumping action its final form, the form it was to keep down to our day, more than a century and a half later. The world-famous "Viennese action" is

none other than Stein's escapement (or hopper) action taken over and improved upon in a few technical details by Stein's daughter Nanette and her husand, the piano artist Johann Andreas Streicher.

We refer the reader to Figs. 7 through 10. The touch of the Stein grand in the *Landesgewerbemuseum* [Provincial Museum of Trades and Crafts] in Stuttgart is very light, the letoff resistance can scarcely be felt and the repetition is excellent. The key dip is about 6 millimeters; the touch weight is 30 grams beginning in the bass and an additional 20 grams in the treble.

In his *Geschichte des Claviers* [Two possible translations: *History of the Piano* or *History of Stringed Keyboard Instruments*, depending on whether the modern or older usage of the word *Klavier* is intended. — J. E.] (Leipzig, 1868, p. 206), Oskar Paul mentions an action manufactured by Bösendorfer in Vienna which "could be termed a most happy combination of the German action and the English jack action." In the accompanying illustration it can be seen that the action in question is a bumping action, differing from conventional ones only in that the escapement does not stand upright but hangs.

At the present time the Viennese action is so well known that we deem it unnecessary to comment on its design and mode of operation. Anything anyone could wish to know about this action can be found in other books. A much more important question in our mind is why this originally outstandingly good mechanism could, little by little, have been displaced by the jack action.

Johann Nepomuk Hummel — we have mentioned him already; Oskar Paul and Georg Kinsky likewise quote him as a source — spoke well of the Viennese action, that it could be easily manipulated by the most delicate hands and permitted the player to lend inspiration[11] to his performance, because it had a distinct, reliable response and did not impede fluency by requiring too much exertion. It was also durable and only half as expensive as the English action. The latter did not permit the same degree of dexterity in playing as the Viennese action because, owing to the much greater key dip, the touch cramped the player's style to a certain

Fig. 5 *Bumping action with escapement lever in between hammer and back bar*
Hammer facing player
Originally *Heyersche Sammlung* No. 121, now in Leipzig
According to Marx

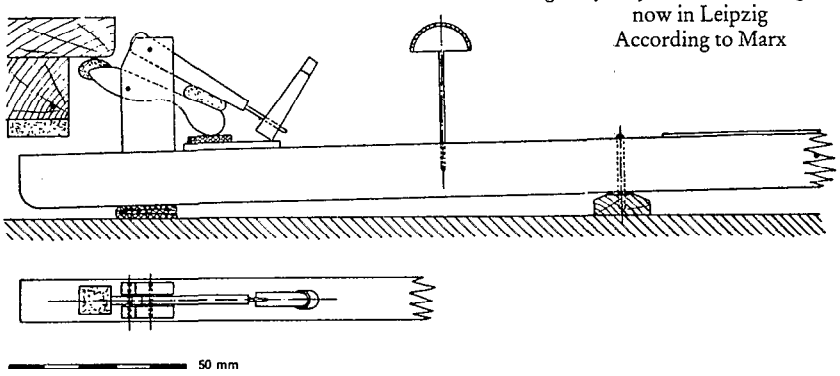


Fig. 6 *Bumping action with escapement lever, hammer facing away from player*
Gottfried Mahr, Wiesbaden, 1807
Small square piano in the possession of piano maker Ernst Dutt, Stuttgart

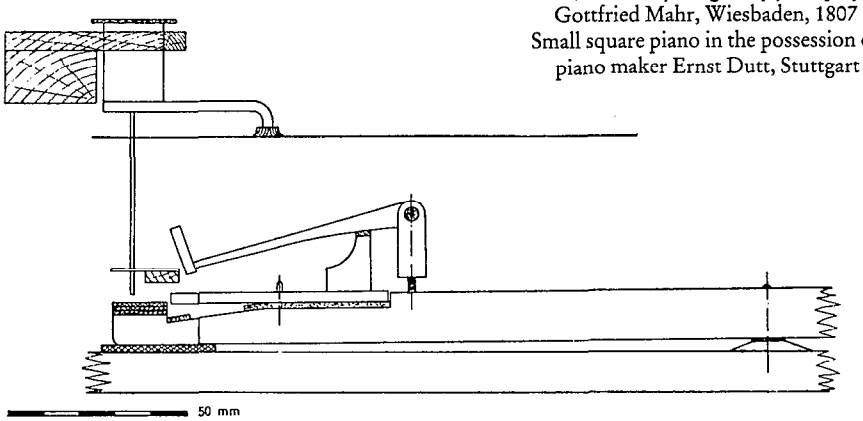


Fig. 7 *"German action"*
Earliest escapement action (Prellzungenmechanik)
Johann Andreas Stein, 1773
Grand pianoforte in the *Landesgewerbemuseum*, Stuttgart

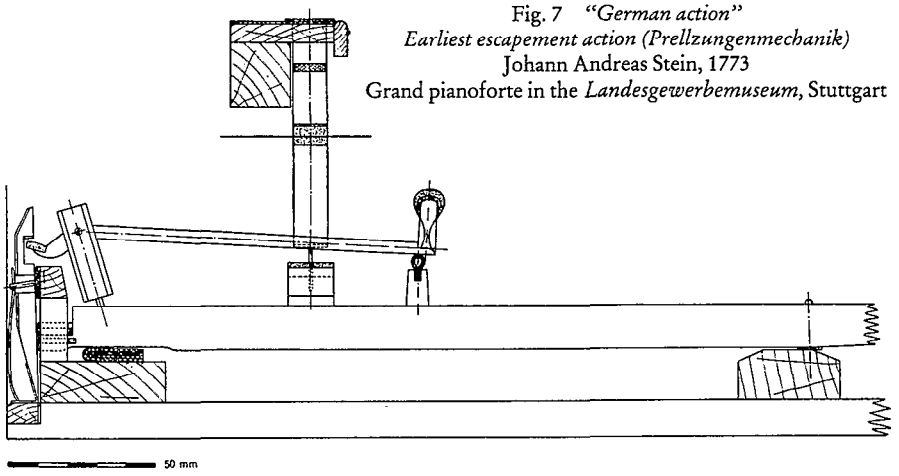
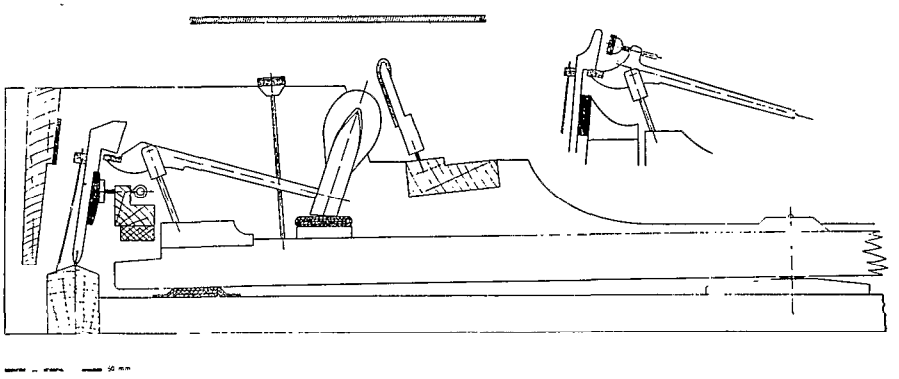


Fig. 8 *"Viennese action"*
Later escapement action in lying form – 19th century
Action model C 30, *Landesgewerbemuseum*, Stuttgart



extent, plus the hammer letoff was not as fast when a note was struck repeatedly; in short, this action, which doubtless had its advantages, was not as well suited to such variegated tonal shadings as the Viennese action. On the other hand, on instruments with the English action choral music acquired a charm and euphony of its own; however, only in a smaller room, not in larger rooms, where, despite everything, they were not as forceful as grands with a Viennese action.

Such was the situation in 1828. But only a decade and a half later we find Karl Kützing writing in the preliminary remarks to one of his works that he was not mentioning the Viennese action because it was behind the times; it therefore seemed to him to make better sense not to aid and abet it by describing it in a work on the art of fortepiano building.

On the other hand, as late as 1864 Welcker was still largely taking sides with the Viennese hammer action: "Of all the actions invented up to now, the German action is the simplest and most durable. True, many piano virtuosos prefer the jack action to the German, but without being able to state any reason why they do so. Prominent pianists whom I asked for their honest opinion explained that the reason for this preference was to be sought in what the player was accustomed to."

Not here in Germany, of course — we have, in a manner of speaking, grown up with the jack action — but in Austria, its homeland, the Viennese hammer action to this day still has those who truly cherish it, perhaps no longer in too secure a position, but who evidently cling all the more ardently to their traditional bumping action. Thus in 1931 August Kögler in Graz — the repetition device shown in our Fig. 11 is by him — wrote in the *Zeitschrift für Instrumentenbau* that even today many were still sold on the grand with the Viennese action, particularly among piano teachers and professional musicians. As late as 1942 Wolfgang Hutterstrasser of the firm Bösendorfer in Vienna reported a similar situation in a letter to the author.

What might have caused Kützing to reject the Viennese action? In his works we find no direct information on the subject; we must therefore rely on conjecture. But if his reasons were valid, even we of today should be able to rediscover them. It could not have been a matter of repetition, which tends to be of primary importance to us of a later period of time, because otherwise Kützing would at least have been more affable than he was toward a repetition action such as, for example, that of Erard. However, in his *Theoretisch-praktisches Handbuch der Fortepiano-Baukunst [Theoretical and Practical Handbook of the Art of Fortepiano Building]*, we find comments which in a certain respect serve to put us on the right track: in connection with letoff[12], he writes that among the decisive features of a good hammer action are that it is quiet in operation and that the hammer lift and letoff are not too noticeable; it is also important that the player not feel the falling back of the hammer, because this produces a decidedly annoying sensation.

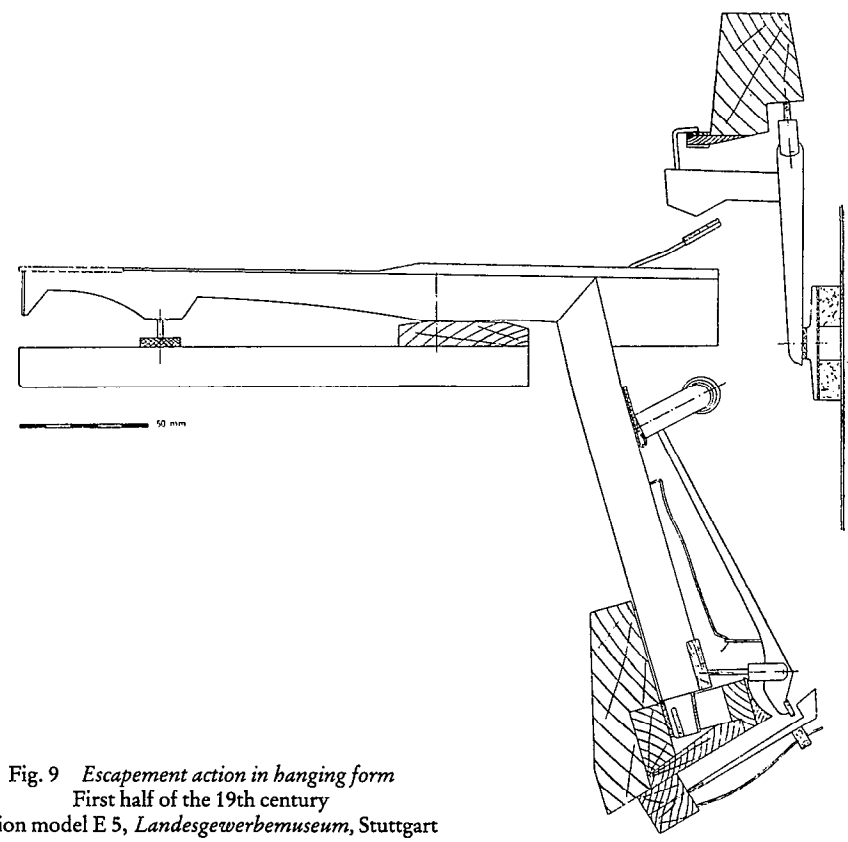


Fig. 9 *Escapement action in hanging form*
First half of the 19th century
Action model E 5, *Landesgewerbemuseum*, Stuttgart

And how does the Viennese action rate in this regard, especially in its heavier forms? To be quite frank, compared with *today's* jack action, to someone with an exacting touch it feels somewhat bumpy and has a certain noisy sluggishness and stiffness; in other words, it is precisely those characteristics which Kützing correctly regards as the hallmark of a good hammer action which the Viennese action does not possess. In this action quite a number of things occur simultaneously: the bumping of the hammer tail against the lip of the escapement, particularly in the case of rapid, repeated blows, where the hammer is prevented from falling back very far; also the hammer striking the string, then catching on the back check; finally, the falling back of the hammer, which has either not been caught by the back check, or has been released by it. In short, when the hammer is attached to the key, everything which suddenly affects — or to a certain extent disturbs — its movement can be felt by the player via the key as roughness. The heavier the hammer, the shorter the front lever arm of the key, the greater the key dip and the older the felts and/or cloths[13], the more pronounced this effect becomes. Due to the hammer being attached to the key, the player is actually more or less compelled to experience in some way along with the hammer everything which happens to its movement. Not that the jack action is free from perceptible resistances, but its touch is so much softer and more yielding

than that of a Viennese action, there is just no comparison.

"In order to lighten the touch[14]" in the Viennese action, Simon Sabathil has constructed a hammer helper spring, bent at an angle, which is inserted between the key and the hammer shank. It is screwed tightly to the key and reduces the weight of the hammer to the extent that it just barely falls. "The weight of the hammer is almost lifted by the spring," Sabathil wrote to the author. Following Sabathil's specifications, we made such a spring, installed it in our action model and obtained a touch which was lighter by half and, in addition, *substantially more yielding*. Of course, this still leaves a question in our mind, which we cannot answer one way or the other because the experiment was made only on a single action model, completely divorced from the sound-producing portion of the instrument in question: whether the advantage of such a drastic counterbalancing of the weight of the hammer is not achieved *at the expense of a considerable loss in* dynamic possibilities[15]. For further details see Sabathil's article „Eine Verbesserung der Flügelmechanik Wiener Systems" ["An Improvement on the Viennese-Type Grand Action"] in the *Zeitschrift für Instrumentenbau*, Vol. 55, 1934/35, p. 293.

Still another shortcoming can be charged against the hammer attached to the key: since the hammer pivot point is not fixed in position, a blow results which varies according to the pressure applied at the key and, at least in the treble, is not sufficiently precise and clearly defined. As early as 1856 Welcker called attention to this fact: "Owing to the manner in which the hammer and key are linked together, the former, as it travels upward, is not directed toward a specific spot on the string; rather, the striking point can shift forward or backward, depending on the movement of the key. On grands this is less detrimental; however, on square pianos the result is alway disadvantageous. The slightest variation in pressure on the key, which can seldom be avoided, causes the hammer to graze the adjoining unison, producing a dissonance, which is why this action cannot be recommended for diagonally strung instruments." F. A. Steinhausen held this imprecision of the hammer blow to be directly responsible for the fall of the Viennese action: "It is generally known that the key/hammer action is set up in such a manner that the hammer must always strike the string at exactly the same spot. The so-

Fig. 10 *Escapement action in standing form*
Upright piano, Müller, Vienna, *c.* 1800
Musikhistorisches Museum Neupert, Nuremberg, No. 126
From a museum drawing

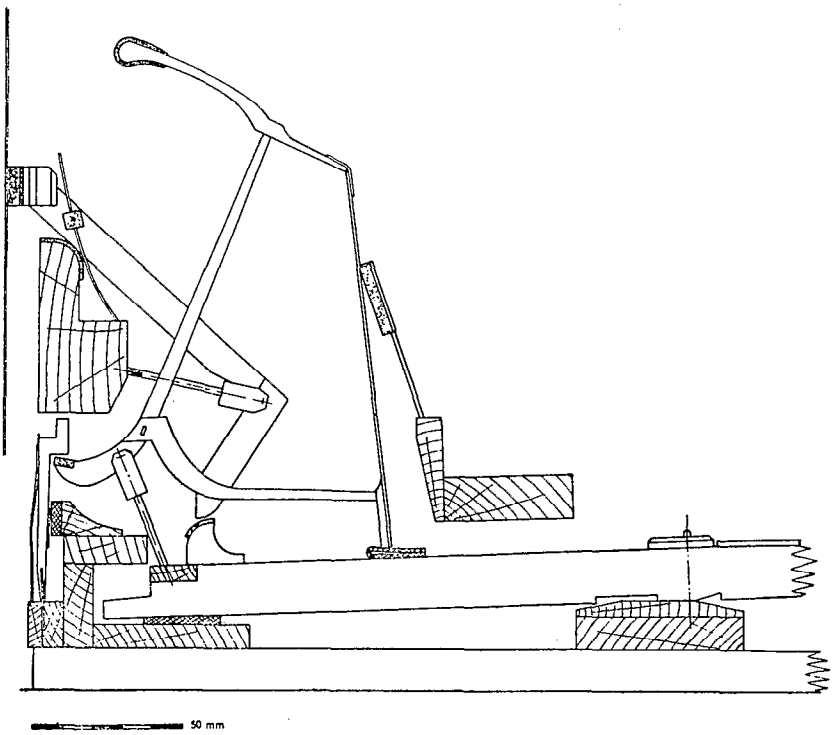
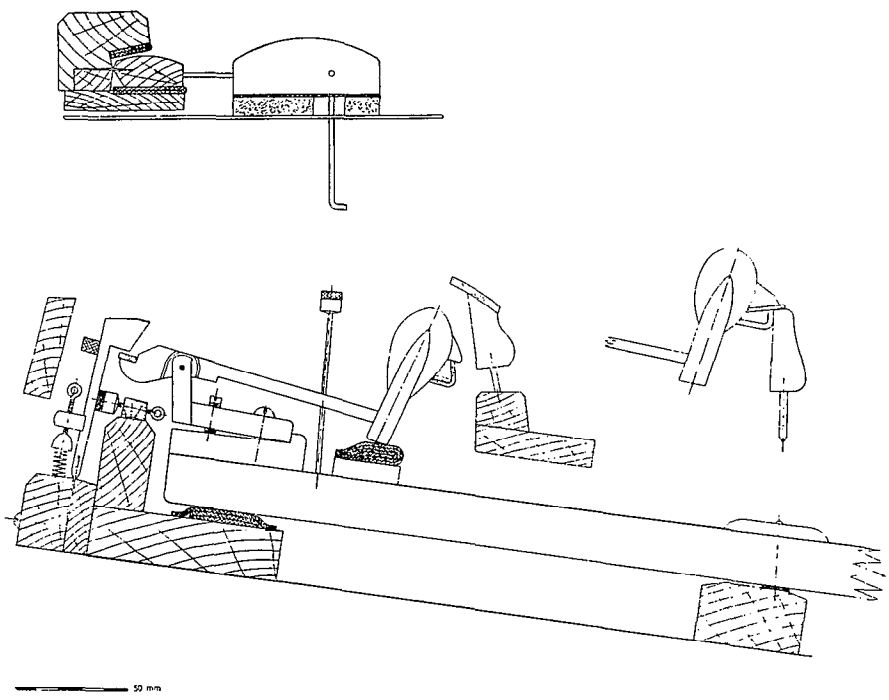


Fig. 11 *Viennese action with repetition device*
August Kögler, Graz, 1931
From the author's action model



called English action owes its victory over the older German action to its greater precision in regard to the striking point."

Aside from that, and from the technical pros and cons, the principal objection to the Viennese action voiced in *our* time is that it has "no repetition" (Kohn[16]). However, to our point of view, this rebuke to a large extent ignores the actual facts: as regards repetition without the hammer having to drop all the way back, the Viennese action is surpassed by few others. It is not until the hammer has fallen a good distance back that the hammer tail cannot catch on the lip of the escapement until the key has returned to its rest position.

Wolfgang Hutterstrasser (Bösendorfer) writes, together with his factory manager Karl Georg Berger, on the repetition of the Viennese action: "If the key dip is 8.4 millimeters and it is allowed to return 4.9 millimeters, which is more than half its stroke, a new blow can be struck with the hammer. However, if one waits slightly longer, the key must go all the way up before the hammer is ready for another blow, because the hammer slides off the back check and back onto the hammer rest felt. Hence a rapid repetition is possible only when the key is released just so much that the hammer has no time to free itself from the back check and fall back onto the key. However, this can be achieved only with a great deal of skill and experience and chance hits will always be a factor." (From a letter)

The repetition of the Viennese action is somewhat similar to that of our present-day upright action, and we daresay that even with a run-of-the-mill Viennese action – provided it is well designed and correctly installed and regulated – the repetition must be more than satisfactory for a player thoroughly familiar with his instrument. In our short book *Flügel oder Klavier? [Grand or Upright?]* we touched on repetition, and what we had to say to the credit of the upright action can by the same token be applied to the Viennese form of the bumping action. Despite our defense, however, the fact still remains that, just like the conventional present-day upright action, the Viennese action exhibits a gap which requires playing skill and proficiency to overcome, and in isolated cases can be bridged only with difficulty without a supplementary repetition device. With the concert hall in mind, this not completely guaranteed repetition must at least be viewed as a shortcoming: in fact, it is one of quite a number of reasons why, for example, Bösendorfer in Vienna began to limit the production of its "Viennese grands" as early as the beginning of this century, and discontinued them altogether in 1909. (Although during the war from 1914 to 1918 a few instruments were made to use up the remainder of the stock on hand.) However, the so-called Viennese action is still being used to this day – at least in Vienna – by the manufacturers of less expensive grands; so even now [in 1947] we still cannot speak of its end.

In summary it can be said that, in contrast to the pushing action, the living conditions for the bumping action have grown increasingly worse, namely because the evolution of the pianoforte was for the most part determined by the desire for greater volume of sound, which called for increased key dip, heavier hammers and more sturdy parts, all things which brought to light defects in the hammer attached to the key which in the beginning – for example, in Stein's day – were scarcely perceptible, if at all. Even the repetition, originally sufficient for all requirements, was changed in the process and became less satisfactory. However, the arguments against the Viennese action are not so compelling that – outside the concert hall – custom and taste cannot still cause one to choose it in preference to the jack action, but, despite this, no one can stay its ultimate demise.

Even the labors of love of August Kögler – successful in themselves – to design a repetition device for the Viennese action will change nothing. After both layers of felt have been glued to the hammer moulding, Kögler attaches a "nose," the bottom surface of which is covered with leather, to the hammer top felt on the side facing the back check, and supports this from underneath by a "brake shoe," which is set back slightly. According to the German patent, the back check, which is fixed in position and not covered with felt or leather, but which should rather be perfectly smooth on the side facing the hammer, must, as the hammer falls back, catch and hold it on the nose-shaped piece; the smaller drawing in Fig. 11 shows the check position. If one releases the key moderately for the hammer to fall back, the hammer remains in its raised position, supported by the nose and the back check, and the escapement can quickly and reliably reengage the hammer tail, and the action is ready for a new blow. Only when the key is released almost all the way can the hammer return to its true rest position.

On the action model given to us by the inventor himself the arrangement differs slightly from that shown in the patent in that the back check – cf. the main portion of Fig. 11 – is provided with a slightly curved, projecting leather top piece 3 to 4 millimeters thick, which can hold the hammer up as it falls back, although not as solidly as a conventional back check. In our model the nose brushes lightly against the top piece as the hammer travels upward, but as the hammer falls back, the nose catches on the top piece, because in the meantime the hammer pivot point, which is not fixed in position, has shifted and brought the hammer head closer to the back check and its top piece. A proper, tight checking of the hammer as we ordinarily know it and as occurs in the conventional Viennese action is, of course, lacking and, after all, can be dispensed with here.

After repeated tests on the action model, we do not doubt that Kögler has managed to improve the repetition of the Viennese action in such a manner that it can truly meet any demand made on it. With all due recognition, however, it must be said that this repetition action, even though it serves its purpose and is, moreover, supposed to be sufficiently durable, still has features which render it decidedly inadequate and incomplete: the top piece on the back check can never be as good as a repetition lever with a spring and the entire arrangement still does not eliminate the other defects of the hammer attached to the key; in fact, in our opinion, it increases the bumpy feel of the Viennese action.■

Footnotes...

[3] *Prellgetriebe* in the German original. Elsewhere Dr. Pfeiffer also uses *Prellwerk*. The above is more customary German terminology and this German word is frequently left untranslated in articles in English on the historical development of the pianoforte. — J. E.

[4] German: *Hammernase, Hammerschwanz, Schnabel*. The latter seems to be the more customary term in Austria. — J. E.

[5] German: *Treiber*. The English term "escapement lever" is from Dolge, *Pianos and Their Makers*. — J. E.

[6] German: *Prell-Leiste*, also spelled *Prelleiste*. — J. E.

[7] German: *Auslöser* or *Prellzunge*. In the article "Pianoforte" in English-language encyclopedias this piece is designated as the "hopper" or "escapement." The term "hopper" is also used for the jack in the English action. Fletcher & Newman, Ltd., London, a world-famous piano supply house, translates the above German terms as "Austrian grand set-off lever"; they informed me that the Viennese action is known in England as the Austrian grand action. — J. E.

[8] According to figures supplied by Otto Marx in Leipzig.

[9] German: *Stösser*, literally: "pusher." In modern German piano terminology the customary term for the jack in a jack action is *Stosszunge*, literally: "pushing tongue." (In the piano supplies catalogue of Louis Renner, Stuttgart, *Pedalstösser* is used with the meaning "pedal dowel." In an article by Franz Rudolf Dietz, formerly employed at Steinway & Sons, Hamburg, he used *Stösser* with the meaning "sustenuto monkey." Klaus Schimmel, proprietor of the Wilhelm Schimmel piano factory in Brunswick (Braunschweig), in his book *Piano-Nomenclatur*, gives the German terms for "jack" as both *Stosszunge* and *Stösser*.) For the purposes of this book, a *Stosszunge* is a jack which pushes and which is pivoted at one end and free at the other. The other types of jacks used in the pushing action are called *Stösser*. In the article "Pianoforte" in English-language encyclopedias I found "jack" or "mopstick" used for *Stösser* and "hopper" for *Stosszunge*. To have followed this custom and rendered *Stosszunge* in every place where it occurred in this book as "hopper" wouldn't have worked. In both British and American piano trade jargon the customary designation is "jack." (In America I also ran across the term "fly.") And I'm sure an English-speaking piano technician would unhesitatingly refer to the *Zugzunge* ("pulling tongue") in a pulling action as a "jack." So, since there seem to be no special terms in English for *Stösser, Stosszunge* and *Zugzunge*, I just translated them all as "jack" with the original German terms in footnotes. — J. E.

[10] Cf. footnote 7. — J. E.

[11] Here the German text literally reads "lend soul to his performance," i.e. that the Viennese action permitted the player to precisely transform his thoughts and moods into music. Since both Mr. Hummel and the author had in mind classical music, I hesitated to use the English word "soul," which is now used mainly in reference to a typically black style of arrangement in popular music. (The English word "soul" in this latter sense has been borrowed into many foreign languages.) — J. E.

[12] British English: "set off." — J. E.

[13] British English: "baizes." — J. E.

[14] German: *Anschlagsarbeit*, literally: "work of striking." — J. E.

[15] German: *Ausdrucksmöglichkeiten*, literally: "possibilities of expression." — J. E.

[16] Dr. Arthur Kohn, „Was soll der Klavierspieler vom Bau des Klavieres wissen?" ["What Should a Pianist Know About Piano Building?"]. Offprint from the *Musikpädagogische Zeitschrift*, Vienna, 1925/26; also an article by the same author in the 1928 Universal-Edition Yearbook, entitled *Das Klavierbuch*, published by Dr. Eduard Beninger, Vienna: „Ich schlage eine Taste an", („Zur Physiologie des Klavierbaues") ["I Strike a Key," ("On the Physiology of Piano Building")]. Also worthy of mention are Kohn's retorts to the articles by August Kögler, *Zeitschrift für Instrumentenbau*, Leipzig, Vol. 52, 1931/32, pp. 89 and 175, the last of which is obviously first and foremost an attempt to shout down his supposed antagonist, resulting in a loss of objectivity, Kohn, "a skilled piano maker" according to a note in the *Zeitschrift für Instrumentenbau*, is an adept writer, but is too cocksure at times. In the above-mentioned *Klavierbuch*, he criticizes Rudolf Breithaupt: according to the latter, in the conventional Erard-type grand action the front lever arm of the key is twice as long as the back lever arm; but, according to Kohn, anyone can plainly see the error of Breithaupt's statement in the accompanying illustration. The true state of affairs, he writes, is rather that the front lever arm of the key in a grand is always shorter than the back lever arm, and even considerably shorter in the Viennese action. Here, with reference to the present-day jack action, Kohn misses the mark with astonishing ignorance: It is clear from his drawing and description that he figures the length of the back lever arm of the key from the balance pin all the way to the back end of the key, and that he therefore includes a portion of the key which has nothing whatever to do with the lever-arm lengths in question. Hence the fallacy which misled him to attack Breithaupt, although the latter's statement is correct in every way. [Translator's Note: The back lever arm of a key is *not* the same as its back half, but is rather a straight line drawn from the key balance point to the point of contact between the capstan screw and the whippen cushion, i.e. the line *WP* or *h* in Fig. 1 on p. 15 of *The Piano Key and Whippen*. The explanation of why this is so is found on pages 14 and 16 of the same book. — J. E.]

Tuner-Technicians Forum

by Jack Krefting, Technical Editor
6034 Hamilton Ave., Cincinnati OH 45224

How many of the following piano terms can you define?

1. Bridge cant
2. Rasten
3. Coll
4. Excursion
5. Compression ridge
6. Lubricous
7. Flitch
8. Console (on a grand piano)
9. Cope
10. Necking down

The average tuner-technician is probably conversant with fewer than half of these terms, so if you did better than that — congratulations! At any rate, the answers appear at the end of the Forum in this issue. If you like this feature, let me know and I'll try to come up with another list in a future issue. If you got all 10 right without peeking at the answers, you are a member of the elite minority, or maybe you've just done a lot of brain-picking at conventions and seminars like I have. If you have some unusual terms to share, like Paul Bergan's "fraising tool" (still a mystery to me), send them along and we'll print them. Some of us will learn something, and that's what this column is all about.

PLATE ACOUSTICS

Question: *No technical editor has ever talked about the acoustical function of the plate (if there is one). I'd be interested in your opinion on whether or not the plate contributes to piano tone.* — Joel Engelsberg, Long Island, New York.

Answer: The manufacture of piano plates is an exacting business, and has rightfully been called the *blue chip* of the casting industry. Most castings are subsequently machined; therefore tolerances are relatively great. The piano plate must be cast oversize to allow for shrinkage to precise dimensions without machining. The biggest difference, though, between ordinary iron castings (engine blocks, etc.) and piano plates is the requirement of acoustical neutrality. That is, a plate must be made so that it neither transmits nor absorbs energy from the strings.

We have all seen plates embossed with the inscription "bell-metal." This is salesmanese in its purest form, because a plate with the chemical makeup and acoustic properties of a bell would be totally unsuitable for use in a piano. The noise would be unacceptable. By the same token, a plate which is cast from energy-absorbing material is equally undesirable, which is the main reason the aluminum plate never caught on. Due to cost considerations, the plate of the future may be made of welded steel, but the best plates have always been made of low-grade gray cast iron. This material is relatively soft and has no resonant characteristics.

Plates are cast from a controlled mixture of new iron, scrap cast iron, scrap cold-rolled steel, and chemicals. The proper mixture of these ingredients is vital to the acoustical neutrality of the finished product. Like a foreman in a huge bakery calling for more yeast or sugar, the foundryman who mixes the materials for plate iron must know exactly how much of each ingredient is needed. He sits in the cab of a crane near the ceiling of the foundry, alternately dipping a huge electromagnet into cavernous bins containing the separate ingredients. As the magnet picks up the iron or steel, an integral scale weighs it. If he has picked up too much from one bin, the operator slams the magnet into the side of the bin, shaking some material loose. If the scale shows insufficient weight, he dips the magnet down again to pick up more material from that bin. When the mixture is correct it is melted down in furnaces and poured into the molds. When the new plate is removed from the mold, unwanted flashings and sharp edges are ground off, hitchpin holes are drilled, and hitchpins are driven in. The plate is then bronzed and crated for shipment to the piano manufacturer, provided no flaws are apparent to the inspector. Flawed plates are broken up and recycled into the scrap cast iron bin to be melted down again with old engine blocks and other scrap castings. All American piano plates, from the cheapest vertical to the grandest grand, are made from the same mixture in Springfield (Ohio) by one or the other of the country's two plate foundries.

The round or decorative holes just behind the hitchpins on grand plates are sometimes referred to as "tone holes," the untutored theory being that they allow the sound to get out from under the plate. Actually there are two reasons for these holes, neither of which has anything to do with tone quality, volume, or appearance. The first reason that these holes are necessary is that, since cast iron shrinks as it cools, it must have some opening from which to shrink. *Shrink holes* would be a far better name for these openings than *tone holes*, though I doubt the advertising boys can do much with that one.

The second reason for the shrink holes has to do with evenness of cooling. The thinnest parts of a casting will cool off quicker than the thicker parts and, if the disparity between the two is too great, an inherent

weakness will be built into the casting. For optimum strength, the entire casting should cool at a relatively even rate. This means that massive areas of solid iron will actually be stronger with holes in them than without.

The only desirable acoustical function of the plate is that of reflection of sound. If one third of the area of the top of a grand soundboard is covered by the plate, then one sixth of the board's total area is affected by the reflective properties of the plate. Hypothetically, some vibrations are redirected to the soundboard from the underside of the plate. In efforts to maximize this effect, some rebuilders have filled and bronzed the undersides of plates before reinstalling them. The effectiveness of this procedure has not been definitely established, which is not surprising when one considers the vast number of variables involved in tone quality, so the practice has not yet become widespread.

There is no question that sound can be reflected, as proven by the simple phenomenon of the echo, which is why people like to sing in the shower. Pianists have proven that a small variation in the length of a lid stick can make a big difference in the projection of the sound, especially in a large hall. When the lid is lowered, the tone is muffled; remove the lid and the tone scatters, losing focus. That is easily demonstrated on any grand piano. Now if someone will devise a way to remove, refinish, and replace a plate that is as easy as lifting and lowering a piano lid, we'd be in a better position to immediately evaluate some of the effects of plate reflection. Since it's so much trouble to remove a plate, we do several things to the piano while the plate is out; and when we replace it, we don't know which change or changes caused the major difference in the way the piano sounds.

If I had to answer this question in a single sentence, as many of you probably would have wished, I would have to say that the plate probably has little or no measurable acoustic effect on piano tone.

BRIDGE TILT, CANT, AND ROLL

Question: *I hear the terms "bridge cant," "bridge tilt," and "bridge roll" from other technicians. I'm embarrassed to say I don't know the difference. Please do not print my name. . . .*

Answer: These terms are used to describe changes in the horizontal attitude of the bridge during tuning, pitch raising, and chipping. Cant and roll are roughly synonymous terms which describe a tipping motion toward the tuning pins. The entire bridge tips occasionally due to excessive friction at the bridge pins or excessive downbearing. More often, though, only the high treble portion will roll. Why the high treble? Because that portion of the bridge is more nearly perpendicular to the pull of the strings; therefore it is inherently far more vulnerable to being pulled over. The practice of undercutting bridges, especially at the last treble break, further weakens the resistance of the bridge to the rolling force. This is not to say that undercutting is undesirable, for it is valuable in the maintenance of scale evenness across the breaks as well as aiding soundboard flexibility; but it is a contributing factor toward the weakness of the bridge's rolling resistance.

I have said that cant and roll are roughly synonymous because they are often used interchangeably by knowledgeable technicians. Some, however, make the following distinction between the two terms: **Cant** is the term to describe a bridge which has tipped and pulled away from the soundboard in back; **roll** describes the same tipping motion, but the bridge remains tightly glued to the board. The board itself twists slightly in an S-shape.

Tilt, on the other hand, refers to a situation where one portion of the bridge moves downward (on a grand; inward on a vertical), causing an end-to-end tipping of the bridge. Because of the angle of downbearing, the sudden increase in tension of a string pushes that part of the bridge and soundboard down. There is a basic law of physics which states that for every action there is an equal and opposite reaction. Push one end of a seesaw down and the other end goes up; fire a bullet from a rifle and the rifle kicks you in the shoulder. The same thing happens to a piano bridge. Although our finest tuners will tell us that bridge tilt is a factor in even a concert tuning, we can all observe its effects during pitch raising.

Bridge tilt should be considered normal and is to be expected, considering the design of a piano. It is an unavoidable condition when string bearing forces oppose the forces of the soundboard's crown unevenly, as is the case during pitch raising or chipping. The technician cannot move all tuning pins simultaneously; therefore a certain amount of give and take must be dealt with. Again, our finest tuners tell us that even tiny changes in the tension of one string will affect the tension of the neighboring strings, so bridge tilt is always present during tuning. In the case of fine tuning, the change may be so small as to be undetectable; but, theoretically at least, it is there.

Bridge **roll** is undesirable and should be considered abnormal when it changes the shape of the soundboard, because it has a negative effect on the designed crown and downbearing, especially on the front side of the bridge. Worse yet, extreme rolling allows the string to lift slightly from the front of the bridge, forcing it to creep upward on the front bridge pin. This will to some extent modify the terminus of the speaking length at the bridge end, resulting in a wild string. A centerpin laid crosswise under the unison just behind the front bridge pins might serve as a temporary cure, but ultimately the soundboard will have to be replaced. The condition was caused by insufficient lubrication of the bridge, excessive downbearing, or excessive stagger. If the string cannot move freely across the bridge, it tends to pull the bridge forward. I consider this condition irreversible, although lubricating the bridge might keep the condition from worsening.

Bridge **cant** is reversible, however, so long as the technician has a way to pull the bridge back to its designed attitude without damaging it or the soundboard. The method used will depend on availability of certain tools,

as well as the severity of the cant. In any case, the object is to refasten the bridge in its original position. It must be reglued, and screws or dowels must be inserted from underneath (in a grand) to strengthen the joint.

A typical case would be a rather severe cant at note 88, decreasing gradually to normal at around note 73. Back the tuning pins off in this area until the strings can be removed from the hitchpins and tied out of the way. Now bend the end of a soundboard steel into an L-shape, and use it to scrape the old glue from the defective joint. Be careful not to remove any wood, just old glue. Blow out the bits of hardened glue that remain under the bridge, and keep that bent piece of steel handy because it will make a good glue applicator. Before applying glue, get everything set up (rib jigs, blocks, soundboard buttons, and screws) to refasten the bridge. Think the procedure through from start to finish, and have everything handy. For instance, check for clearance on the opposite side of the soundboard. If the beams or the back of the keybed is in the way, special tools will be required. Figure 1 illustrates one way of pulling the bridge back into position.

Please note that the drawing is in cross-section, showing only one pulling jig although several may be required. Block A should be of hardwood, since its purpose is to distribute stress evenly along the top of the bridge without stressing the bridge pins. Block B is merely a spacer. Its thickness should be such that it will be slightly lower than Block A when the cant has been reversed. If it is too high, the jig will not pull the bridge all the way back into proper position because of its interference.

When the jigs are wired in position, make a dry run by applying tension on the jigs' wires until the bridge assumes its normal attitude. While everything is clamped, drill holes for the screws or dowels (see Figure 2) that will reinforce the new glue joint. Check the fit of all parts, then release tension on the jigs and apply glue under the bridge. Retighten the jigs and install screws with soundboard buttons from underneath. In extreme cases, dowels with gussets may be helpful between screws. At any rate, some kind of fastening should be incorporated every 2 inches or so in the area of the bridge cant. When the glue has thoroughly dried, clip the jig wires and remove jigs, blocks, and anchors. Buttons, screws, dowels, and gussets will remain in place permanently.

Mix a pasty solution of alcohol and graphite and apply it to the top of the bridge with a Q-tip, brush, or rag. The alcohol will quickly evaporate, leaving the graphite. Polish the graphite to a sheen with a soft rag or cloth wheel, put the strings back in position, and tune the piano.

FIGURE 1

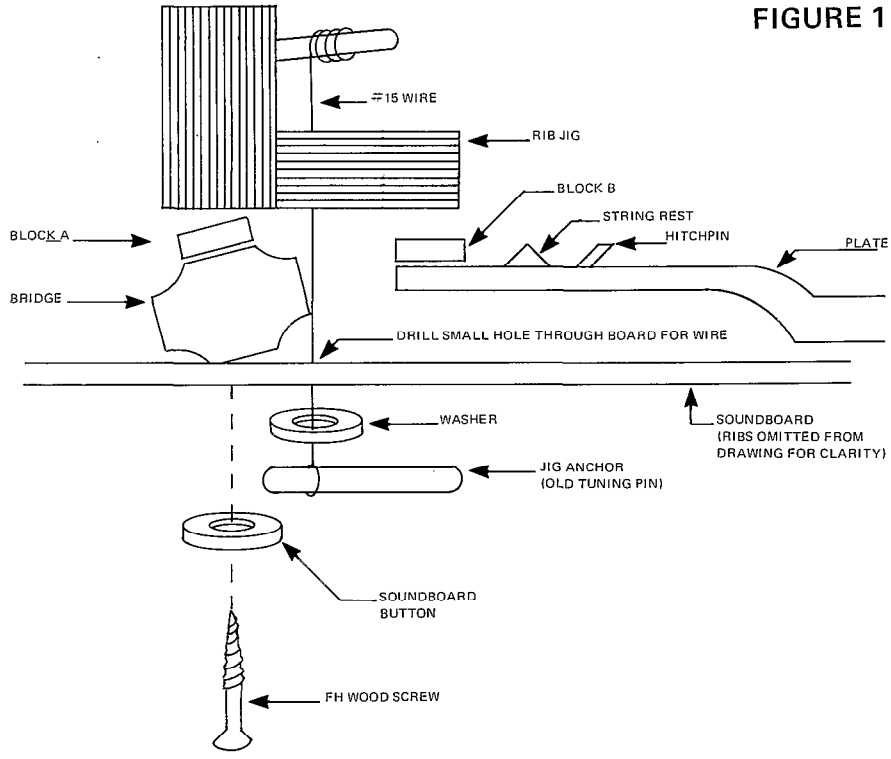
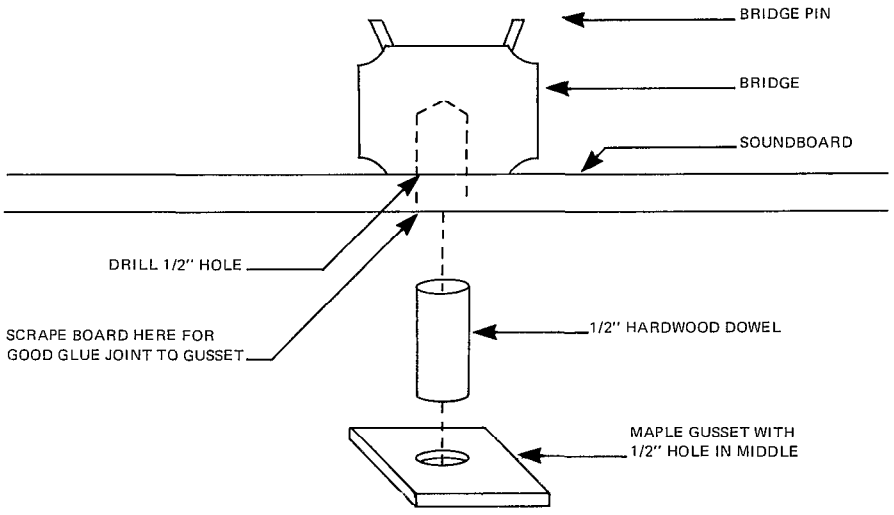


FIGURE 2



JUMPING PINS

Question: *Is there anything that can be done when new oversize tuning pins jump? On a grand you can replace the pinblock, but few vertical pianos are worth all the work involved. I've heard of coating the new pins with powdered resin, but where do you buy it and how do you use it? The only cause I know of is that pin tightener was once used. Are there other causes? I have just repinned a 9-year-old console that was once smoke-damaged. It couldn't have been too near the fire since the finish wasn't damaged. The old tuning pins*

turned smoothly, but they weren't holding. I started repinning with 4/0 pins, but switched to 3/0 because the 4/0 pins jumped badly. The 3/0 pins are just barely tight enough, but don't jump too badly. I can't see any sign of tuning pin tightener. Tuning is now difficult, but it seems to hold. Could soot from the fire have penetrated the wood of the pinblock, causing a jumping condition with the new tight tuning pins? — Leslie Conover, Albuquerque, New Mexico.

Answer: From all experiments I have conducted with pinblocks, I have concluded that jumpiness is primarily caused by the glazing of the walls of the holes. This could have occurred when the block was drilled, if the drill bit was allowed to get too hot. It can also occur during the removal of the old pins, if they were removed by a power tool. If an old pin is too hot to hold comfortably in the palm of the hand immediately after being removed from the block, chances are the hole has been glazed.

Jumpiness also occurs frequently when a block is allowed to remain empty (that is, unpinned) for more than a couple of days. I don't know why, but the immediate stringing of a drilled block seems to produce a more tunable piano. The third reason for jumpiness that I have observed has to do with nickel-plated tuning pins. The old nickel pins, plated along their full length, sometimes had a tendency to "shed their skins," the result being a steel pin turning in its plating instead of a plated pin turning in the block. Nowadays, pins are threaded and blued after the plating process is completed, which would appear to be the best of all possible worlds. The visible portion is shiny, but the working portion is plain blued steel. It seems like the ideal pin.

But is it really better? Not necessarily. A few years ago, wondering why the new plated/blued pins were jumpier than the traditional blued pins, I made some tests. I miked several sets of pins and found that, regardless of make, the blued pins were more consistent in diameter than the plated/blued pins. Even more startling, I found that plated/blued pins tend to be fatter at the bottom than elsewhere along their threaded length, sometimes by as much as 0.0006 inch. This explains, to me anyway, why plated/blued pins are jumpier than plain blued pins — especially in a dense pinblock like Falconwood or Amberlite. For that reason, I use only blued pins unless my client insists on plated pins.

Powdered rosin, used by baseball pitchers to improve their grip on the baseball, is also used effectively by piano technicians when they string a piano using a cheap block. The rosin markedly improves the pin torque because it increases friction. In the case of an already jumpy block, the addition of rosin would probably only make the jumpiness worse because it would increase the resistance to turning of the pin. Additional friction is not what is needed. Some technicians will remove a jumpy pin and rub chalk on it. This seems to work, although the actual removal and replacement of the pin may have had as much to do with the improved tunability as the application of the chalk. The glazing may have been partially broken, especially if the pin was driven in rather than screwed in. Each time a pin is removed and replaced, by whatever means, it loses torque because the dimensions of the hole have been altered, however slightly.

In this particular case, I would recommend chalking the 4/0 pins, at least to test the results. If they are still jumpy, a shorter pin of the 4/0 size might be better than using 3/0 pins, which probably torque at well under 100 inch-pounds even now, right after stringing. Before long, they will probably be too loose to hold. The initial torque reading should be in the 180 to 200 range, which will settle to about 125 within a few months. I consider this to be ideal for year-round tunability, though some would argue that pins don't really need to be quite that tight to hold reliably. The type of block construction and the anticipated humidity of the piano's environment will dictate the degree of tightness required. A four- or five-ply block will, for example, change dimensionally far more than a multilaminate from one season to the next; and a block that holds pretty well in San Diego year after year might not survive a single winter in Cleveland.

In general, technicians should be wary of pianos that have been damaged by fire or flood. The hidden damage to glue joints may not become fully apparent until a year or two after the disaster, and owners and insurance companies are understandably reluctant to wait that long for a diagnosis. So technicians are frequently pressured into making snap judgments for which they will be held responsible long after the insurance claims have been settled. In the long run, discretion may indeed be the better part of valor. Rather than saying, "This piano is all right except for thus and such, etc.," the technician would be well advised to say, "The immediately apparent damage is thus and such, although further damage could become apparent at some future date." The owners won't like that kind of qualification much, and the insurance men will like it even less; but if the technician doesn't protect himself, who will?

The final observation I would like to make on this subject is that tuning pins vary in size and roundness. A spot check of three sets of 2/0 pins will reveal that, while one set might average a diameter of 0.2805 inch, another set will be 0.2815 inch and the third can measure out to 0.282 inch. Some sets contain pins that are out of round. Slight differences in pin diameter can be compensated for if the technician is aware of the variance before starting the job. When drilling a new block, the technician can alter his normal rate of feed or change spindle speed, because the size of the hole depends primarily on the temperature of the drill bit. A hotter bit produces a larger hole because of the expansion of the bit, while a cooler bit will make a slightly smaller hole. He can also compensate for high or low torque readings by changing to a shorter or longer tuning pin. Assuming two pins are identical in diameter, the longer one will be tighter because it goes further into the block.

There is no way to compensate for a pin that is out of round. Such a pin will be tight and jumpy until it becomes loose and jumpy some years

later, but it will never be any good. Ideally, every pin should be miked for middle diameter, bottom diameter, and out-of-roundness before it is installed. I'm sure there are some craftsmen who do this, and I applaud such attention to detail, although I must admit that I only mike a pin here and there as long as they feel good when they are being driven in. But I'm talking about a new block, and the question involved an old one. Regardless of the care taken in the precise measurement of tuning pins, that old block will be unpredictable whether it has been exposed to fire or not. There are elements in the job that are beyond the control of the technician, for which he should disclaim responsibility.

SPACING STEINWAY SHANKS

Question: *. . . I know how to space grand shanks, but I'm confused about spacing on a Steinway. Is it all right to file the ridges under the flanges, or not? Two different technicians have told me how to do it, and their methods are different. One says to file the ridges, the other says to burn the shanks. Who's right?*

Answer: First of all, be certain of the proper position of the action in the case. When the hammershank flanges are screwed to the rail, they should be directly above their respective whippens, and most of the hammers in the agraffe area should be centered to the strings. If not, the position of the action should be changed by adding or removing paper shims from the stop block. Be sure that the action return spring is operating properly to shift the action back to the left all the way to the block. One way to test this is to depress the left pedal (fallboard removed, but keyblocks screwed in place) and insert a piece of newspaper between the keyframe and the stop block. Release the pedal and try to pull out the paper. If it comes out without tearing in half, the action is not returning properly. Either the spring is too weak or there is excessive friction from keyblocks, dags, front rail, or glide studs. Locate the problem, correct it, and try again. When the necessary adjustments have been made so that the majority of the hammers in the agraffe area strike properly, spacing can begin.

Make a note of which hammers are not striking properly and remove the action. Check for warped shanks and burn them straight wherever they occur. On the average, two or three of the 88 will be warped. When all shanks have passed the eyeball inspection for straightness, those that still do not line up must be spaced with paper. This is how it's done: Lay a piece of 220 open coat sandpaper on the bench and place a straightedge on it so that approximately 5/64 to 3/32 inch of one edge is exposed on one side of the straightedge. Run a sharp blade across the paper, cutting a thin strip. This will be your spacing paper, and can be used as travel paper also. Loosen the flange screw and place the end of the strip under the front edge of the flange on one side or the other — to the right for spacing right, to the left side for spacing left. Don't put it all the way under the flange as you would when traveling shanks, but just under the front lip. Tighten the screw and the hammer will have moved. If it doesn't move quite far enough, add a strip of 320 paper. If it moved too far, loosen the screw and slide the 220 paper outward (away from the screw) or change from 220 to 320 paper.

There is a slight difference between the diameter of the screw shank and the bore diameter of the flange, which is sufficient to move a Steinway flange to one side a little. This can be used instead of, or in conjunction with, the paper spacing described above. The way to do it is to loosen the flange screw, gently insert a second screwdriver blade between flanges, and retighten the screw. It should not be necessary to file the underside of a Steinway flange under any circumstances.

Above the agraffe area, the problem is greatly minimized by spacing strings under the capo bar, although this should not be taken as a license to radically space strings to line up with erratic hammers. Your good judgment, as always, will tell you what is radical and what isn't.

Technical Tips

At a recent meeting of the Los Angeles Chapter, Craftsman Harry Berg was asked how to order hammers when the hammer angle is greater than the string angle. He suggested either drilling the hammers yourself or writing to the supplier, calling his attention to the problem and sending enough numbered samples so the supplier can judge the differential and compensate accordingly. Berg was then asked how to cure the problem of key balance holes that have been overeased by a previous technician. Harry responded by saying that if the technician did not want to use inserts he could fill the hole with Thermoset 100 and drill it to specification when dry.

Some time ago, George Morgan of Seattle reported excellent results in forming neat tuning pin coils by using a tack lifter (a 6-inch tool similar to a bent screwdriver with a split blade). According to Morgan, the gentle curve of the shank makes this tool more satisfactory in some situations than the standard coil lifter or string hook.

H. Gene Wilkison of the Orange County Chapter writes a glowing review of a chapter tech program featuring George Defebaugh. The topic was pitch raising, and Defebaugh used video tape to demonstrate his "Anticipated Drop Technique." After the usual preparatory lubrication of bearing points, checking of bridges, and tightening of plate screws, George determines just how flat the piano is to the fork and sets his reference A pitch above 440 cps by 30 percent of the amount of flatness. For example, if the A is 6 bps flat, he would set it at 2 bps sharp. He then strip mutes the entire piano and sets a quick temperament based on the just-tuned A. To prevent bridge roll, George tunes all center strings to this temperament, then all right strings, starting from the top and pulling out the strip mute as he goes. Then he starts again at the top, tuning all left strings. By this time, the long bridge should be stable and the piano can be tuned normally.

PIANO TERM DEFINITIONS

1. Bridge cant: An undesirable condition wherein a bridge, or a portion thereof, tips toward the tuning pins. Condition is usually reversible (see text).

2. Rasten: An alternate term which describes the inner rim.

3. Coll: A jig or fixture used for clamping or otherwise holding piano parts in position during manufacture.

4. Excursion: The deflection of a piano string during and immediately following the impact of the hammer. Since the string is deflected out of its normal straight plane, it becomes momentarily and very slightly longer during excursion than when at rest. The elasticity of the string allows it to resume its original position and dimensions, except under certain conditions (see necking down, 10 below).

5. Compression ridge: A long, thin raised area on a soundboard. Caused by excessive crown and/or downbearing resulting in compression beyond the elastic limits of the wood, the ridge will exhibit itself as either an inverted vee at the glue line between flitches or as grain slippage. In the latter case, one or more annular rings will slip upward (the ribs prevent downward slippage), destroying the wood cells adjacent to the slippage. Because these wood cells have been crushed, the elasticity of the board is lost in the area surrounding the slippage, and two or more cracks will appear when the ambient humidity is reduced.

6. Lubricous: Literally, oily or slippery. In piano technology, the term is used to describe the natural lubricity and resistance to galling of two different metals in rubbing contact. Brass and steel, rubbing against one another, are *lubricous*, which is one reason that agraffes are made of brass rather than steel. This term is not to be confused with the term *lubricious*, which means lewd or wanton.

7. Flitch: One section of a board, edge-glued to another section or *flitch*. Soundboards must be made of several flitches, since few if any trees would be of such great diameter and evenness of grain as to allow the quartersawing of an entire board in one piece. Quartersawn pinblocks can be identified by the relatively large number of flitches glued together in the alternating layers, as well as by the direction of the grain. Pinblocks that are flatsawn will have fewer flitches, and scrollcut blocks will appear to have no flitch lines at all.

8. Console: A flat board immediately above the third leg on a grand piano. The console is sometimes used as a spacer under the backbottom to compensate for the thickness of the keybed, thus allowing all three legs to be of equal height. Occasionally the console replaces the backbottom, providing structural strength to the tail of the piano. In this case, the third leg is frequently longer than the front legs.

9. Cope: The upper half of a plate casting mold. The lower half is called the *drag*.

10. Necking down: The thinning of a portion of a piano string just prior to breakage. Caused by tension greater than the elastic limit of the string due to improper scaling, tuning above proper pitch, or excessive excursion due to repeated hard blows in quick succession. A string which has necked down anywhere along its length has become fatigued and must be replaced. Sorry, fellas, I know some of you were hoping for a more exciting definition of this term, but that's what it means, honest.■

Coming Events

Note: *All seminar dates must be approved by the Conference and Seminar Committee. Please submit all dates to the home office on the appropriate Request for Seminar Approval form.*

JANUARY 11-13, 1979
ARIZONA STATE SEMINAR
Tuscon, Arizona
Write: Neal Flint
4861 S. Lantana Circle
Tuscon, AZ 85730

JANUARY 26-28, 1979
NAMM WINTER MUSIC
AND SOUND MARKET
Anaheim, California
Write: NAMM Winter Market
35 Wacker Drive
Suite 3320
Chicago, IL 60601

FEBRUARY 14-15, 1979
MIDYEAR BOARD MEETING
Hollywood, California

FEBRUARY 16-17, 1979
CALIFORNIA STATE
CONVENTION
Hollywood, California
Write: Gene Rudder
Box 4653
Carson, CA 90745

MARCH 3, 1979
BALTIMORE
CHAPTER SEMINAR
Baltimore, Maryland
Write: Morris Millman
8326 Scotts Level Road
Baltimore, MD 21208

MARCH 22-24, 1979
TENTH ANNUAL
PACIFIC NORTHWEST
CONFERENCE CONVENTION
Olympia, Washington
Write: Al Seitz
PNW Secretary-Treasurer
1517 Medfra
Anchorage, AK 99501

MARCH 24-25, 1979
CENTRAL WEST
REGIONAL SEMINAR
Lincoln, Nebraska
Write: Richard West
Westbrook Music Bldg.
University of Nebraska
Lincoln, NE 68588

Accent on Tuning– Treble Trouble

by Newton J. Hunt
124 W. 93rd St., New York NY 10025

The original elements of any fine tuning fall into two categories: 1) The piano and its design, scaling, and fabrication; and 2) the tuner with temperament, octaves, and unisons. The piano whose design and/or redesign has a profound effect on the tuner's realization ability is best discussed elsewhere in this *Journal*.

The foundation of a good tuning is the best possible temperament. Because of scaling inequalities and human error, the degree of tuning accuracy tends to drop off toward the two extremes. A minor error at the beginning usually becomes a major one at the end — hence the great stress on super-fine temperament.

It has been my observation that the problem of the majority of tuners is consistency — the ability to invariably duplicate octave tuning from octave to octave throughout the scale, especially in the extremes. The major problem does not appear to be the ability to tune an octave, but rather in the proper use of tests and checks.

Once one realizes it is impossible to tune precisely expanded octaves without the use of tests and checks, it then becomes a matter of choosing which tests to use and developing a work procedure to use them. There are also tuners who use too many tests, with no consequent improvement but a severe loss of time and a large expenditure of energy. We must each find the balance between investment and result.

There has been a debate for years as to which should be tuned first — the bass or the treble. If thought is given to the fact that a piano cannot be tuned unless it is in tune, then the choice is determined by the personal preference of the tuner. My choice is to tune the bass first, then the treble; but for some incomprehensible reason I am going to discuss treble tuning first and next month I will do the bass.

One of the easiest checks to use going into the treble from the temperament is the fifth/fourth. This is especially valuable if the piano has been pitch raised and an octave can be anywhere, or if the piano was recently tuned and a quick evaluation is desired without going to the trouble of removing your hand from the hammer. As an example, to tune G_4 to G_3 play the C_4-G_4 fifth and store the beat rate. Next play D_4-G_4 fourth and compare that beat rate with that of the fifth. If the fifth is slower than the fourth, the octave is expanded; if the fifth is faster, the octave is contracted.

Having evaluated the octave, it is not necessary to wonder where it is — you *know*, and need only to move the string in the indicated direction (going to where it needs to be and no further). What is needed here is for the fifth to be as pure as possible without an overly fast fourth and with an octave that is pure, yet expanded at the 4:2 coincident partials. (To establish that the octave is properly expanded , drop down and compare the $D^{\#}_3$-G_3 third to the $D^{\#}_3$-G_4 tenth. Verify that the tenth is about 1/4 beat per second faster than the third. If it isn't, then make it so and recheck the fifth/fourth and the octave. If no errors were made, everything should balance nicely.) This procedure can be used until either the fourth or the fifth fades into uselessness, generally around F_5.

As one can begin to appreciate, the proper tempering of fourths and fifths in the temperament is taking on a high priority since they affect what comes after. As you tune further into the treble, attention should be given to the necessity from evenly ascending thirds, tenths, and later to seventeenths. Pure fifths have already been mentioned. This can be expanded to include the twelfth (a fifth plus an octave), which also should be pure and will be mentioned again later.

There is an important element here that has been largely ignored by most, and I admit to discovering it by chance myself. There is a rather narrow point where, if an octave is tuned gradually and miniscully above and below "the pure point," with consistent soundings of the perfect octave, it develops *a peak of power*. I can only conjecture, without sophisticated laboratory verification, that that narrow range is the one and only point where as many as possible of the coincident partials come into the closest possible agreement, and therefore develops the maximum of power. Whatever the reason, it checks right, tests right, and sounds right. To catch this effect one must have fine hammer control and good coordination, as well as a good piano — and you must be primed to hear the effect when it happens. This is my goal. The net result is a piano with inordinate power, projection, and sustaining ability.

By the time enough notes have been tuned to allow the use of double octaves, they should be incorporated in the testing sequence as a means of testing the single octaves and to assure that the earlier tuned octave has not slipped or otherwise gone out of tune. Another point is that the beat in a double octave is often more evident than that of the single octave.

When the time comes, the use of triple octaves on a good instrument is an excellent source of information about the degree of expansion for that piano, how accurate your tuning is, and how well the piano is stay-

ing. On many small pianos pure triple octaves are impossible, but the beat can be used to control octave expansion.

The reason the dampers are discontinued in the treble is that the notes an octave above the terminal point have little or no self-sustaining ability. This aspect of piano construction can be used to your advantage and to that of the piano. If you are tuning F_7 as an octave, you can play just that single string and change the pitch in small increments until that one string activates the second partial of F_6 sympathetically. Sometimes it is helpful to tune all three strings in this manner singly and then check them together as a unison. Care must be taken that you don't get so far off that you are a half tone sharp or flat. It can happen – it has to me, and once when I was teaching a class! Most embarrassing!

When you are tuning C_8, and on some pianos two or three notes below C_8, you will be listening to not only the three strings of C_7 but also to the third partial of F_6, which can introduce confusion unless care was taken in tuning the notes. Everything is related to everything else in one way or another.

On some pianos the duplex scale can be a most frustrating thing to tune against. Occasionally, I take a piece of masking tape and mute the duplex scale with it until I have finished the tuning and then I remove it. If the tape is not removed, it will kill the tone of the piano and become hard to remove if left on too long. I do not trust what the glue can do to strings.

Finally, a word about unisons. What can be said about them is really very little, except they must be as finely tuned as possible. They are usually what causes nontuners to think a piano is out of tune. Unisons are the most difficult to tune because they are the richest in coincident partials. By listening to the upper partials, it is generally easier to hear when two or three strings are in the best possible unison (except in the bass, which is another story). ■

Chips Off the Old Bloch

by John Bloch
1584 S. Broadway, Denver CO 80210

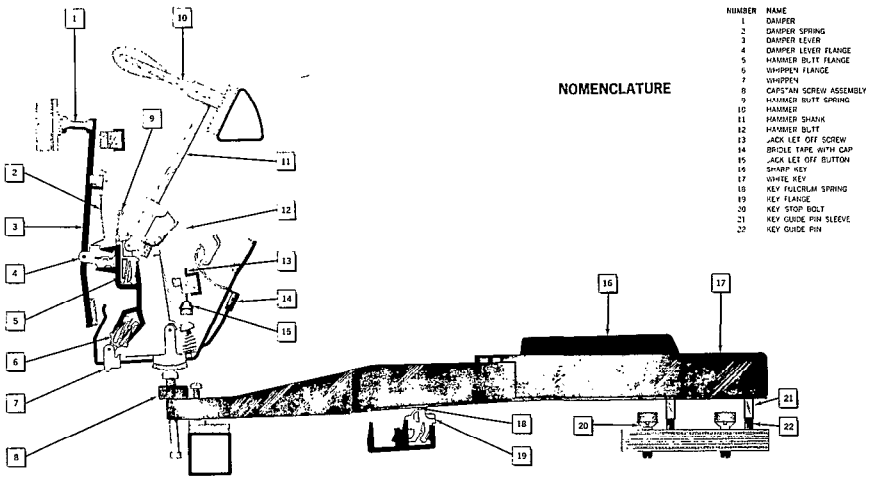
Plastic action parts have come, gone, and come back again. The question is — have they come back to haunt us, or will their increasing use lead to more trouble-free pianos?

Nearly every technician can relate a personal story about plastic parts that crumble with the slightest touch of a regulating tool, screwdriver, or finger. A familiar question with older spinets goes like this installment from PTG's *Newspaper Advertising Kit* by Martin Tittle, RTT:

> **Question:** One key on my spinet piano stays down and won't play anymore, what's wrong?
>
> **Answer:** In some spinet pianos, small right-angle parts called "elbows" are used to link the keys of the piano to the action. In the late 40's and early 50's these elbows were made of plastic. Unfortunately, the catalyst used to make the molten plastic harden never stops working so the elbows get harder and harder over the years until, at age 20-25, they begin to shatter in normal playing. Replacement of the elbows restores the piano to its original usefulness.

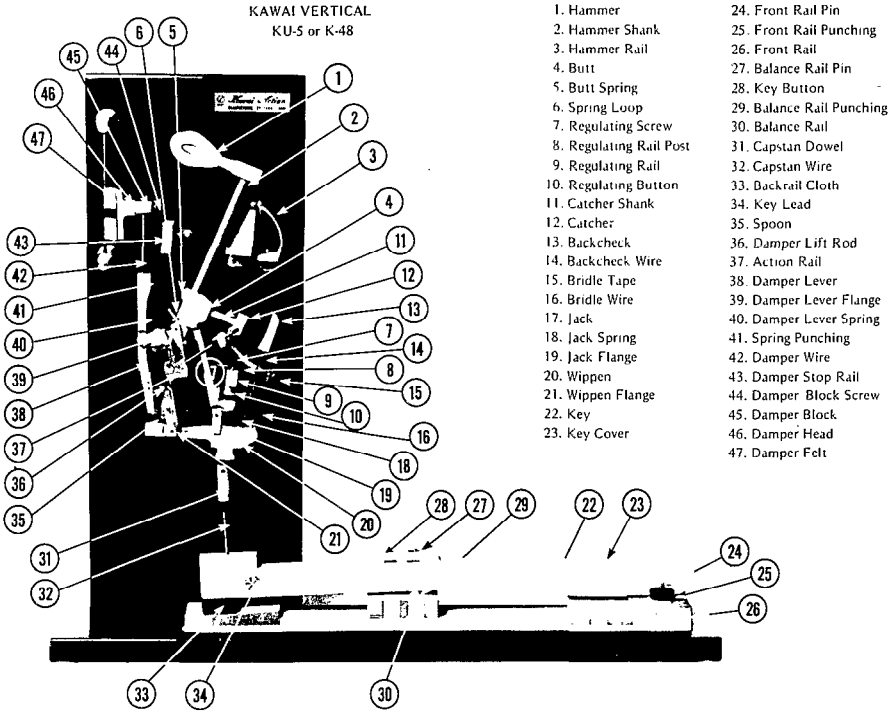
The piano supply houses sell replacement elbows in your choice of either wood or plastic. We always price the job both ways. When using the wood we will order the elbows, wires, and buttons of the proper length. We do not, however, like the wood elbow replacement by itself because the grain is running the wrong way and they tend to break.

In addition to such plastic action parts as jacks, flanges, damper levers, etc., the Thomas piano of 1964 even had plastic keys — everything was plastic except the hammer and shank (see Picture 1). Although there are still some of these pianos around and working, the parts just haven't lasted. I have had other technicians tell me that some of the parts in these Thomas pianos looked "like they had exploded." Great advances in plastics technology makes the big difference between plastic action parts of the 40's and 50's and those of today.



Several years ago our Denver PTG Chapter was privileged to have a 1-day seminar with George Defebaugh, RTT from Kawai Piano, as our instructor. (See Picture 2 of a Kawai piano action that has some plastic parts.) We asked George some questions about plastic action parts.

> Kawai's ABS Styran is as different from ethyl cellulose plastics of 1974 as a "child's toy" plastic is different from the ABS plastic used in Apollo spacecraft. ABS Styran is a mixture of acrylo nitrile butadyene (synthetic rubber) and styrene.



George further discussed some of the tests that had been going on at Kawai for over 15 years:

1. In one test we have automatically "played" an action model containing these plastic parts 400 million blows. This is equal to more than 16 years of home use. Though felt brushings and pads wore out and had to be replaced, there was no weakening or deterioration of the plastic itself.
2. Torture tests included freezing parts in a refrigerator and heating in a controlled "hot box" up to 300 degrees F. Above 190 degrees F there was slight measurable expansion and extra pliability. We seriously doubt that the rest of the pianos would survive long in temperatures of this severity. Under "normal" temperatures of 14 to 104 degrees F there was no measurable change in dimension or pliability.
3. Another torture test was direct exposure of damper levers to ultraviolet lamp so we could measure a slight lowering of tensile strength and pliability. However, since our main source of ultraviolet rays in the home is direct sunlight, your piano would never receive 80 hours of direct exposure in its entire life. We see no possibility of brittleness or breakage.

Whatever the disadvantages of the modern plastic action parts may prove in time to be, there do seem to be some advantages. George went on to say:

1. The piano action is really a machine. Precision is of the utmost importance and molded parts which are exactly the same thousand after thousand give us a precision we cannot achieve with wood since wood is cut, shaped, and drilled by tools which get dull as they are used.
2. Wood parts shrink and expand to such a degree with humidity changes that the touch resistance of the keyboard actually changes measurably. This is not true of plastic parts since they are unaffected by humidity changes.
3. The use of nylon-polyacetate parts in friction areas such as jacks and capstan dowels produces a lower friction coefficient than wood burnished with graphite.
4. Plastic parts can be molded with "directional strength" reinforcing while wood grain variations must always be considered in stress and bend situations.
5. Hardwood action parts often produce what technicians call "resonant wood noise." Plastic does not have this characteristic.

As a closing thought, Alfred Knight Pianos has been using nylon jacks and other plastic parts for many years, and they have done very well. ■

Stray Thoughts

by Leslie J. Hoskins
10850 E. Floral Dr., Whittier CA 90606

We have only the calendar to remind us that a New Year is at hand. Without that, there is nothing to distinguish January 1 from December 31. It is, however, at this time that people customarily pause to review the preceding 12 months to see what lessons can be learned therefrom – a sort of "stock-taking" time. It is also a time when new methods, new materials, and new tools will be brought into view.

Old things, too, must be looked at carefully before being cast aside. The axiom "familiarity breeds contempt" often causes ways and means to be discarded just because they are considered old-fashioned, even though they have long been used successfully. Progress, of course, depends on finding better ways of doing things and the search goes on continually. We must progress or stagnate, but we must also learn the difference between that which is new and better and that which is merely new.

What we really want is the best possible results from our skill and labor and we need to use every legitimate means to bring this about, whether new or old.

– – – –

Congress has been getting some pretty harsh criticism lately and much of it seems to be deserved. The newscasters have been calling attention to a rip-off in food stamps that they say amounts to billions of dollars. At the same time, the government agency which handles this program is said to be asking for a big increase in its budget and Congress seems to favor the request. Perhaps we shouldn't believe everything we hear as news, but when the same subject comes up time after time – as does the food stamp waste – we can believe that where there is smoke there is at least some fire.

Here is another first for Japan; it has more vending machines per capita than any other nation—one for every 53 persons. But according to the International Herald Tribune there are some problems, one being that the machines which vend pornographic reading matter are available to any child who has the necessary coins. Just another perversion of an intended benefit.

– – – –

"Hello Sucker!" Remember Texas Guinan? That's the way she used to greet arrivals at her fasionable night club. Suckers still abound it seems. One is reported to have paid $25,000 for "gold bars" which turned out to be lead. So any day now we can expect to hear that the Brooklyn Bridge has been sold once more.

– – – –

Thought for the month: "There was never a good knife made of bad steel." – Old Saying

Get Hooked With PTG

by Bob Russell
1414 Lander Rd., Mayfield Heights OH 44124

Everyone wants a chance to receive prestigious President's Club awards or to sport a Booster/Restorer's Club ribbon at the 1979 Annual Convention. To ensure that every Booster Club point is credited to your account, and that every Restorer of a former member is recognized, the Membership Services Department requests the following:

1. Please **print** your name after your signature when you endorse a person's membership application. (Many signatures are difficult to read.)

2. If the member is a restored member, please **write this fact on the application.** (Many of the Membership Services Department's "inactive files" are inadequate and only retained for a certain number of years.)

The following points are scored for signing up the various ratings: Craftsman, 6 points; Apprentice, 5 points; Allied Tradesman, 4 points; Associate, 3 points; Affiliate, 2 points; Student, 1 point, When you get a total of 24 points you become a member of the President's Club, all others are Boosters.

BOOSTER CLUB
(1 to 23 points)

Avolese, Frank — Long Island-Suffolk 11

Bach, Philip F. — Twin Cities 7
Baskerville, Henry 1
Bell, Hamilton — Cleveland 1
Bloch, John — Denver 1
Boyd, Thomas W. — Philadelphia 1
Brandon, William S. — Kansas City 6
Brownfield, Gary — Boston 6

Carbaugh, Bob — Chicago 5
Carr, R.V. — Central Florida 6
Coleman, J.W., Sr. — Phoenix 1
Coleman, Loring — Las Vegas 1
Conner, S.J. — Hampton 6
Crabb, Larry — Atlanta 2
Cunningham, Jess — New Orleans 13

Dege, Ernest — Los Angeles 5
Desmond, Frank — Dallas 11
Donelson, James H. — San Francisco 1
Drewa, Edward — Twin Cities 1
Dye, William — Santa Barbara 6

Eaton, Wendell — Washington D.C. 1
Edwards, William E — Detroit-Windsor 1
Epman, Lawrence — Wisconsin 5
Evans, Dan — Los Angeles 5

Fingers, Chris — Denver 1
Flegle, R.H., Sr. — Twin Cities 6
Freeman, Marion — N.C. Louisiana 1

Geiger, James — Dayton 6
Geller, Evan — New York City 5
Gold, Jimmy — Texoma 6
Griffith, LaVerne — Buffalo 2

Hauck, Jack — Phoenix 1
Heischober, M. — L.I.-Nassau 5
Hershberger, Ben — South Bay 1
Hopkins, David — N. Virginia 6
Hulme, Gregory — Kansas City 6

Johns, B.J. — Northeast Florida 1
Joseph, Paul — Philadelphia 6
Juhn, Ernie — Philadelphia 6

Kast, Frank — Northern Virginia 5
Kelley, Allen — W. Massachusetts 6
Killberg, George — Twin Cities 5
Krystall, Darwin — Los Angeles 1

Lamb, D.E. — Los Angeles 5
Lawrence, P.A.U. — Blue Grass 6
Leach, W.F. — Richmond 5

Macchia, Allen — NW Indiana 5
MacConaghy, Henry — San Diego 12
Marten, Gilbert — Central Iowa 6
McDonald, Robert K. — Mississippi-Gulf Coast 5
Mensing, Daniel — Chicago 5
Miller, D.L. — Minnesota-North Iowa 6
Monroe, Paul — Orange County 5
Moore, Donald — Fresno 6
Morton, W. Don — Los Angeles 3
Murdaugh, Rodney — SW Missouri 1

Neie, Gary — N.C. Louisiana 5

Persons, Glenn — Tucson 6
Peters, Patricia — Central Florida 1
Peterson, Jerry — Western Michigan 7
Pizza, Anita — Miracle Strip 6
Preuitt, Ernie — Kansas City 6

Ralon, Carlos K. — Washington D.C. 1
Richardson, J.W. — Idaho West 10
Russell, Bob — Cleveland 5

Schoppert, Robert — S. Dakota 18
Seller, Marion — Twin Cities 6
Seitz, Al — Alaska 6
Sierota, Walter — Philadelphia 1
Sims, Willard — Cincinnati 3
Stegeman, W.J. — Minnesota-North Iowa 1
Stern, Walter — St. Louis 6
Story, Everett — E. Washington 6

Tapp, Kenneth — West Memphis 18
Thatcher, Walter — St. Louis 6
Tipple, Robert — St. Louis 6

Wheeler, Clifford — Boston 6
Whitby, Elmer — Paducah 6
White, T.E. — Northwest Florida 6
White, Walter — Baltimore 6
Willis, Aubrey — Central Florida 3
Winslow, Allyn — Boston 6

Zehme, Uwe — South Florida 1
Zellman, Adelaide — Connecticut 1
Zeringue, Nolan — New Orleans 1

RESTORERS CLUB

Juhn, Ernie — Philadelphia
Preuitt, Ernie — Kansas City
Welton, T. Scott — Connecticut

Your Security Blanket

by Eloise M. Ross
510 NE 65th Street, Seattle WA 98115

Ah! A new year — the last of the seventies. Even at the end, it is not too late for a "bit of a change" in format. To begin with — a few memory-joggers!

1. Tool and Bailee Customer: Have you renewed your coverage? If you are not already a participant — have you applied?

2. Have you applied for the latest insurance plan available to PTG members, the Low Cost Group Term Life Insurance — Level Term (which means it is always the full amount; it does not decrease) in the amount of $10,000. Please refer to your September *Journal* for the Tool and Bailee Customer Plan and the November issue for the Group Life Insurance. Both articles explain the coverages and there is an application for the Tool and Bailee customer.

3. Have you added Occupational Coverage to your Comprehensive Health and Dental Plan? Remember, it is only 15 percent added to the medical premium! Please jot a note on your statement asking for the coverage and/or premium cost.

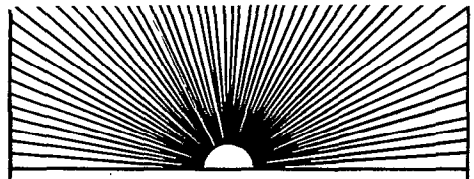
Now for the next item, which is not new either but equally as important! February 1 is the anniversary of the Accidental Death and Dismemberment Coverage. You have no idea the pleasure in announcing that there is no increase in premium! How can this be? And in these times of inflation — which seems to be running rampant!

Enough of this. Now to get to the plan. You decide for yourself — can you really afford to not have it? You may buy for yourself and/or family in amounts from $10,000 to $50,000 for annual premiums of $8 to $40 for yourself and $12 to $60 for yourself, spouse, and/or family. Protection is 24 hours a day, at work or at play! Do you realize the dismemberment part pays for loss of hand, foot, eyesight — one, both, or a combination! If you are under 70 years of age you are eligible! All you have to do to get the protection for you and your family is apply. This is the way to do it!

Complete, sign, and send this application, with your check, to Sunset Insurance Associates — the address is shown above. The amount for you to send is dependent upon the amount of coverage per the schedule below:

Principal Sum	Annual Cost Individual Plan	Family Plan
$10,000	$ 8.00	$12.00
20,000	16.00	24.00
30,000	24.00	36.00
40,000	32.00	48.00
50,000	40.00	60.00

A Certificate of Insurance will be sent to you showing the amount of coverage, effective date, premium, etc.



Sunset Insurance

510 NE 65th Street
Seattle, WA 98115

ENROLLMENT FORM

POLICYHOLDER: The Piano Technicians Guild, Inc.

MASTER POLICY NO: EAP 9903498

APPLICATION is hereby made to the American Home Assurance Company for Accident Insurance under the terms of the Master Policy identified above.

(PLEASE PRINT OR TYPE)

1. _____
Member's Full Name

2. _____
Date of Birth

3. _____
Street Address

_____
City State Zip Code

4. _____
Member's Beneficiary

_____
Relationship

5. _____
Amount of Insurance (Principal Sum) Desired

6. Type of Plan (Check One)
☐ Individual ☐ Family

7. _____
Annual Cost

Unless additional beneficiaries are named in a separate statement attached hereto the beneficiary for a spouse and dependent children will be the insured member named on the top line of this enrollment form.

_____
Member's Signature

_____
Date

Wives' Lives

by Luellyn Preuitt
4022 Fuller, Independence MO 64052

It is with great sadness that this writer must begin by telling you of the death of Jane Jones. Jane, as those of you who have attended our conventions will know, was the inseparable companion of Ruth Pollard. Ruth wrote of Jane's death on October 31, just after copy for the December column had been sent. Jane is survived by her brother and sister, a daughter and son, and four grandchildren. Jane was a bright and sunny personality. At 80 years young, she added much to our meeting in Cincinnati and will be greatly missed in years to come. Ruth wrote a little personal note as follows:

> Jean and Bill Jones came from England in 1949. Bill went to work for Carter Brothers Store and worked there until his death. Jean was so devastated after he was gone that Allan told her to come over and work in the office. She worked here until she retired. We became close friends and she continued to attend the conventions and Auxiliary meetings. . . .

This month we have a note from Bea Kurk, Twin Cities member of the Auxiliary:

> Greetings everyone from the Twin Cities of Minnesota. We have a fever here — convention fever, that is! We hope you catch it! We are working and planning so all of you will have a memorable time here come next July. Believe it or not, attendance at our local Auxiliary meetings has doubled since knowing we were selected to host the '79 convention. In July Minneapolis will be in the midst of its famous Aquatennial and on Wednesday evening you can become a child again by attending its night-light parade. Make plans now to come to the heart of our great midwest — Minnesota, of course!

Here's an idea from Marian Damon:

> Did you ever wonder where all those little bees provided by Aeolian went? I collect t-shirts. The day before we left for Cincinnati I had the misfortune to get a blob of Nu-Skin on a new t-shirt. None of the commercial cleaners would remove it so when we came home I appliqued two of the Aeolian bees over the spot and *presto* — I have a t-shirt which is a conversation piece. When questioned, I can truthfully say that the bees came from the Piano Technicians Guild convention!

When Ruth Pollard was national president of the Auxiliary, she wrote an open letter to members (this was the American Society of Piano Technicians, by the way). Written in the fall of 1957, it is perhaps even more appropriate 21 years later.

> Greetings. By now you probably are well into your season's program of getting acquainted and of learning how a piano technician's wife can fit into the world of piano technology. Finding new friends and learning new ideas through working out shared problems are some of the beauties of organization.
>
> Every piano tuner's wife helps her husband in some phase of his work — answering the telephone, keeping his appointment book, mailing out cards, doing action repairs, or planning the social and recreational parts of his life. I know of one member who actually does the refinishing work in her husband's shop, and she's an artist at it! The most interesting and pleasing result of well-planned assistance to our husbands is the greater financial income for the family which this help brings — more money to spend.
>
> But our meetings should not be all on the technical side. Although our men never seem to tire of talking "butts and flanges," they should have a party or a picnic once in awhile. We all, including our husbands, need a social and recreational side to our lives and the Auxiliary is in an excellent position to provide the major portion of this. Because of our kindred interests and individual experiences, we can take even the germ of an idea that might be of benefit to us, and as a group discuss it in our meetings and develop it into fruitfulness. Through these discussions we have a valuable opportunity to create for ourselves a much broader happier life, fuller of satisfying usefulness to others and to ourselves.
>
> The scope of possibilities our organization has for us is far greater than the horizons of our own local group. We now have sister chapters all over the United States and a growing number in Canada. Without the Auxiliary, each of us — so far as the world of our husband's profession is concerned — would be restricted to her own family and immediate neighborhood. With the Auxiliary we fast are becoming a world-wide group of women sharing the same problems and, if we make these problems generally known, someone in one of our chapters will come up with an answer — an answer which will aid all of us.
>
> Let us help this possibility along. Plan your meetings in advance, appoint a reporter, and send reports of what you do [here this writer is changing Ruth's words] to the writer of "Wive's Lives," whose address appears in the *Journal*. Read the reports of other chapters, keep informed of what is happening in our movement, and help keep your husbands informed. If they do not read the *Journal*, read it for them and make sure that they get the good there is in it for both of you. This may sound like a Sunday sermon, but all of it is true; and if you will take advantage of your membership, it will pay off in eventual dollar dividends. What is really more important — it will pay off in a depth of self-satisfaction greater than you have ever known before.
>
> I hope you will write to me, each of you or as a chapter, and tell me your thoughts about possible improvement of our organization — ideas for meeting programs or any

other matter which needs developing. A problem expressed is well on its way to being solved.

This month your writer had intended to bring some more nontechnical technical to you, and this may still happen if the following thoughts do not flow in such a manner as originally intended. What I want to do is to reflect upon, and update, Ruth's comments. By "update" I certainly do not mean "put down." Ruth's philosophy is as true today as when it was written, perhaps even more so. Let's face it, spouses, where would "ye olde piano technician be without us?" Nowhere, right? Now where does this put us? Right on the spot! Either we produce or nothing happens. We can produce in a variety of ways.

Some of us choose to remain in the little old vine-covered cottage cooking, washing, and dusting. Some choose to join an organization in our church and work our fingers to the bone taking Thanksgiving dinners to the needy. Others follow our husbands around saying, "I'm with you. Anyone who disagrees with you is wrong. Also dear, here's what I would like you to say at the next Chiropodnists meeting." Some of us choose to do our own thing, whether it be working in an office, teaching in a public school, nursing, painting, doing social work, or just loafing.

I guess what I am trying to say is that, if you qualify your life by connecting it with another life, you had better be prepared to accept some revisions. We all need connection with something, someone. The problem for most of us is that we also need a sense of identity, a sense of aloneness, the assurance that we *are*.

And this brings me to my update in Ruth's letter. What we need is a sense of identity as a group. How shall we attain this? I have been asking myself this question since attending the 1963 national convention in Houston. Not one Auxiliary person spoke to me. Granted, at this time I was still wandering around in my own little cloud, not knowing from one moment to the next what decision to make. The leap into Auxiliary matters was really made by the connection with the technician, who was already accepted as a Craftsman member and wanted some support. Being a part of the team, I resolved to give him this support. Perhaps my experience has been unique in receiving support in return for my efforts; not all of us are so lucky. Would it be fair to suppose that about 50 percent of us are thus supported? If so, just imagine what that 50 percent of us could do!

Do you like this column? Will you support it? If so, are there 50 percent of you who would do so? If so, you would deluge me with so much material that I would be writing letters of apology for 2 years explaining how I am scheduling your material for the next issue — as it is, I have just one contribution from a volunteer which I am planning to use in February. **Help!**

Times really have changed, and with the change the name of this column has become outdated. A few months ago I asked for suggestions for a new title. In Cincinnati we put up a suggestion box, which about three people took advantage of. One title is being seriously considered, but we would like a little competition. How about it!

Next time, if you don't overwhelm me with contributions, we will have a nontechnical technical. In the interim, Happy New Year. **Minneapolis is fine in '79!** ■

Welcome Aboard New Members!

BLUE GRASS CHAPTER
DAVIES, CLAIR L., Craftsman
848 Arrowhead Drive
Lexington, KY 40503

CENTRAL IOWA CHAPTER
COOK, GREGORY D., Craftsman
P.O. Box 7
Polk City, IA 50226

CHICAGO CHAPTER
McNERNEY, MARY F., Apprentice
9317 South Major
Oak Lawn, IL 60453
MRAVLE, JUDY L., Apprentice
2509 George Avenue
Joliet, IL 60435

CLEVELAND CHAPTER
KELLEHER, WILLIAM T., Apprentice
1865 Allendale Avenue
East Cleveland, OH 44112

CONNECTICUT CHAPTER
BROOKS, VIVIAN A., Craftsman
376 Shore Road
Old Lyme, CT 06371

DAYTON CHAPTER
KEAN, KERRY A., Craftsman
368 Stanton
Springfield, OH 45503

DETROIT WINDSOR CHAPTER
BROWN, JAMES P., Craftsman
2529 Southlawn
Ypsilanti, MI 48197
CLARK, TERRENCE L., Student
19380 Klinger
Detroit, MI 48234
FOREMAN, MURRAY N., Apprentice
105 Princeton
Alpena, MI 49707
SCHMITT, KAREN, Student
15731 Rosemont
Detroit, MI 48223

EASTERN WASHINGTON CHAPTER
STORY, MARK E., Craftsman
314 Gregory Drive
Cheney, WA 99004

FRESNO CHAPTER
NUNNELEE, GAIL I., Student
20255 Avenue 360
Woodlake, CA 93286

HOUSTON CHAPTER
CRAVEN, MARK S., Student
2711 Teague, No. 531
Houston, TX 77080

IDAHO WEST CHAPTER
FAIRBANKS, LEROY S., Apprentice
Box 83, Route No. 1
Star, ID 83669

LONG ISLAND-NASSAU CHAPTER
HEISCHOBER, JEROME, Apprentice
840 East 8th Street
Brooklyn, NY 11230

NEW ORLEANS CHAPTER
GOFF, PAUL H., Student
Route 4, Box 156
Hammond, LA 70401

NORTH CENTRAL LOUISIANA CHAPTER
BAER, DOUGLAS M., Apprentice
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Monroe, LA 71203
COCO, CHARLES B., Student
Box 31 RFD
Moreauville, LA 71355
WELLS, STEPHEN J., Student
124 Behan Street, Apt. B
Natchitoches, LA 71457

PADUCAH CHAPTER
NICOLAIDES, HENRY D., Craftsman
506 West Walnut Street
Carbondale, IL 62901

PHILADELPHIA CHAPTER
BENVENUTO, VICTOR A., Craftsman
506 West Mt. Pleasant Avenue
Philadelphia, PA 19119
BOYD, JEFFREY L., Student
19 South LaClede Place
Atlantic City, NJ 08401

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5901 Calle de Norte
Phoenix, AZ 85018
KNOX, JACK H., Student
P.O. Box 642
Cottonwood, AZ 86326
VAN WAGENEN, ALAN K., Student
5431 North 81st Place
Scottsdale, AZ 85253

REDWOOD CHAPTER
FALCONER, MARVIN L., Craftsman
4430 Lakeshore Blvd.
Lakeport, CA 95453

RHODE ISLAND CHAPTER
BALIGIAN, ARLIN, Apprentice
65 Oakhill Drive
Cranston, RI 02920
CASE, ROBERT, Apprentice
24 Sunnyfield Drive
Westport, MA 02790

SAN DIEGO CHAPTER
THILE, SCOTT, Student
3310 Eureka Place
Carlsbad, CA 92008

SAN FRANCISCO CHAPTER
WILLIAMS, PETER B., Student
3411 Humphrey Avenue
Richmond, CA 94804

TWIN CITIES CHAPTER
BRUNER, JOANN, Craftsman
911 22nd Avenue South
Minneapolis, MN 55404

ELDER, LARRY, Student
3824 45th Avenue South
Minneapolis, MN 55406
FLEGEL, RICHARD A., Jr., Craftsman
3085 Old Hwy 8, No. 21
St. Paul, MN 55113
MARTINSON, ROBERT B., Craftsman
1425 Taylor Avenue South
St. Paul, MN 55104
MENTH, JULIANNE E., Student
1445 East Upper 55th Street
Inver Grove Heights, MN
WHITE, WAYNE A., Apprentice
1630 Fountain Lane
Wayzata, MN 55391

WASHINGTON D.C. CHAPTER
GORDON, RUSSELL H., Student
4911 43rd Place Northwest
Washington D.C. 20016

WISCONSIN CHAPTER
BRUSS, DELBERT J., Apprentice
7957 West Fiebrantz Ct.
Milwaukee, WI 53222

YOUNGSTOWN CHAPTER
RUG, JOHN A., Student
20766 No. 16 School Road
Wellsville, HO 43968

RECLASSIFICATIONS

TO CRAFTSMAN:
BINGHAM, GARY
Salt Lake City Chapter
CAMPBELL, PATRICK J.
Phoenix Chapter
DeFONTAINE, DAVID J.
Twin Cities Chapter
ELLISON, CLAUDIE L.
Los Angeles Chapter
FRITZ, LLOYD G.
Fresno Chapter
GREENFIELD, JACK
Chicago Chapter
LAFOON, JAMES D.
Chicago Chapter
MALLOY, DANIEL
Central Iowa Chapter
ROBERTS, WILLIAM S.
Eastern Washington Chapter
SANDERS, BRUCE W.
Los Angeles Chapter
SHOLLENBERGER, KING
Ozark Chapter
VERDUGO, JAMES V.
Los Angeles Chapter

TO APPRENTICE:
DOEPKE, KONRAD H.
Wisconsin Chapter
RICCI, ANTHONY J.
Twin Cities Chapter

Chapter Notes

Note: *Technical information submitted in chapter newsletters has been forwarded to Jack Krefting, Technical Editor, and will be included as part of the Technical Tip section of the Forum, as space permits.*

Buffalo Chapter

Buffalo Chapter is continuing its piano project under the supervision and guidance of Gordon Dunn and Marty Turkiewicz. They're busy leveling white and black keys, shimming up the front rail, etc.

The chapter is proposing that some type of local chapter certificate or diploma be developed and given to all Craftsman members upon completing and passing their examinations, after acceptance into local chapter. The certificate or diploma could also serve as a selling tool for PTG and possibly bring new members into the Guild. — Marty Turkiewicz, Jr.

Chicago Chapter

The next examinations for this chapter are scheduled for January or February.

The Chicago Chapter is giving an extra added attraction to participants in their technical session — a free gift.

Public Relations Committee chairman, Jack Greenfield, has been busy opening new lines of communication with the various local branches of the Illinois Music Educators Association and the Illinois State Music Teachers Association. He is arranging Guild representation at upcoming functions of these two organizations and members are asked to participate in speaking before, or manning a booth at, various functions of these associations. — The Whippen Post

Cincinnati Chapter

The proposed chapter constitution has been sent to Cincinnati Chapter members, with the request that members read and be prepared to vote on it at their next meeting.

Since they have no piano supply house in the vicinity, Cincinnati is proposing an emergency batch of piano supplies. This supply would be owned by the chapter and these provisions would be available to local members. A surcharge of 10 percent or so would go toward reimbursing the treasury and each user of this service would replace whatever supplies he had taken. — Cincinnati Newsletter

Cleveland Chapter

Cleveland Chapter held its Great Booze Auction. They have a few strong spirits left over from their Early-Bird Party at the Cleveland seminar and Al Metz auctioned off the leftovers.

National PTG vice president Bob Russell will teach an all-day mini-seminar at the Perkins School in Elyria, Ohio. Bob will give instruction in pinblock installation, hammer installation, and bass bridge repair. Bob is one of the first and most successful graduates of this nationally recognized institute, and he is returning to share his knowledge and experience with the students of his old alma mater. — Al Metz

Connecticut Chapter

Connecticut Chapter members were treated to a tour of the Cornwall-Patterson factory in Bridgeport. This company, a branch of Pratt-Read, manufactures all metal parts that go into a piano — be they made of brass, copper, steel, or other alloys. Machinery in the very ingenious production lines is reported to have been quite impressive. — Godfrey Tomanek

Dallas Chapter

Dallas Chapter hosted the Texas State Association's annual convention and seminar on October 20-22. Following registration, the opening assembly and forum began with a panel of instructors and other experienced technicians providing answers to all technical questions from the audience. Willard Sims and Cliff Geers gave an excellent demonstration of grand hammer installation and voicing. Color slides provided a presentation of the hammer construction process. Jesse Lyons, along with Mr. and Mrs. Robert Qualls, presented their "Klunker Klinic," a close look at old sick pianos and the possible ways of curing them. LaRoy Edwards and the Yamaha team provided an excellent discussion on "Electronic Tuning Devices in Harmony with Aural Tuning." Honored guests were Jess Cunningham and Chuck Burbach, PTG national presidents. — Mike Sonnenburg

Denver Chapter

Denver Chapter members spent 3 days explaining regulation and the fine points of tuning with hundreds of music teachers attending the Colorado State Music Teachers Convention in November. They passed out PTG literature, promoted qualified piano service, and enjoyed talking to what proved to be a surprisingly informed group of piano people. — Hilton White

Los Angeles Chapter

A memorial program, or concert, in memory of members who have passed away, was held by the Los

Angeles Chapter before their December meeting.

An annual offering for the Salvation Army, which is in lieu of members sending Christmas cards to each other, was received by George Defebaugh.

Ernest Dege reported on his recent trip to the Horugal Company in Seoul, Korea, where he was requested to inspect their pianos and make as many suggestions to them as he could to improve their product. He inspected them carefully and then made only a few suggestions, one of them on quality control. — Harvey Berg

Salt Lake City Chapter

Salt Lake City Chapter members were fortunate to have top-level instructor, Willis Snyder, present some of his educational material at their recent chapter seminar on November 18. Willis' collection of teaching slides is irreplaceable. Willis is recognized, along with others of our organization and chapter, as someone who loves his work. — Arletta Lombardo

North Central Louisiana Chapter

The North Central Louisiana Chapter has made a motion that each Guild member pay $20 a year to the chapter. This money would be spent for educational benefits, speakers, slides, etc. The motion was voted on and approved. — Jack Boyd

Utah Valley Chapter

The Utah Valley Chapter is planning a local convention in March (either the 13th or 14th). Members have been asked to suggest possible instructors. — Vincent Mrykalo

Washington D.C. Alpha Chapter

The Washington D.C. Chapter celebrated its 21st birthday October 9. This was the first chapter of PTG, with the election of its officers on October 7, 1957. The officers, headed by Wendell Eaton as president, served an interim period until officially assuming PTG officership in January 1958. Officers were elected from the parent organizations of NAPT and ASPT. When the first PTG convention convened in Washington D.C. during the summer of 1958, the Washington D.C. Chapter was ready to go!

Twenty-one years later the chapter is still active, completing their vertical rebuilt project and hosting seminars. (An all-day seminar on November 19 was hosted by Washington D.C. and Northern Virginia.)

The chapter would like to extend a "good luck" to all chapters — those of the present and of the future. — Dick Sullivan ■

CLASSIFIEDS

Classified Advertising Rates: Classified ads are 15¢ a word, with a $3 minimum. **Copy due** the first of the month preceding publication. **Address:** Managing Editor-Art Director/Charlona Rhodes, PTG, 113 Dexter Avenue N., Seattle, Washington 98109. Telephone: (206) 283-7440.

WORK WANTED — PTG registered member desires temporary work with technicians while traveling through the southern regions this winter (mainly in Arizona, Texas, and Florida). Have diversified experience with players, rebuilding, and refinishing. Contact: Brent Fischer; 218 12th Street; Bottineau, ND 58318; or call (701) 228-3322.

WANTED — Tune Master II's or IIEA's in working condition. **FOR SALE** — Restored 6-foot 2-inch Bluthner, Aliquot (1886) No. 26,528. Best offer over $7000. Contact: J. Little; 3143 W. Monroe; Anaheim, CA 92801.

POSITION AVAILABLE — Leading high-quality piano manufacturer is seeking a qualified Action Department Supervisor. Must be experienced in all operations from side glue through regulation and be an effective supervisor. Excellent opportunity with comprehensive wage and benefit program. Send resume with salary expectations to: Piano Technicians Journal Classifieds; Piano Technicians Guild, Inc.; P.O. Box 1813; Seattle, WA 98111.

Pianos for Sale — Always on hand, 150 to 300 uprights! Plain case, art case, and players. Also 50 to 150 grands at all times, as is or rebuilt. Excellent brand names — no junk! All set up for inspection. Lowest possible prices. Call for quotes: Owen Piano Wholesalers, 2152 W Washington Blvd., Los Angeles, CA 90018, Telephone (213) 883-9643.

WANTED — Pedal piano (piano with organ pedalboard), any condition, or information leading to one. Contact: N. Guinaldo; 12051 Orange; Norwalk, CA 90650.

APPRENTICESHIP WANTED — Recent graduate of the Pulsifer tuning and repair course in Boston seeks an apprenticeship in rebuilding as well as giving further experience in tuning and regulating. I will consider any situation within the United States or Canada. Please write: Martin Shepherd; 367 Harvard Street; Cambridge, MA 15237.

HELP WANTED — Expert piano tuner-technician wanted. Full time, salary open, prestigious store in business over 25 years. Write details to: Bernard Comsky; Artist Pianos; 5818 W. Pico Blvd.; Los Angeles, CA 90019.

POSITION WANTED — Piano technician, wishing to relocate to Virginia, North or South Carolina, or Tennessee. Twenty-four years experience in any type piano tuning and repair, also experience with players. Send details to: V.J. Mayr; 2854 Castlegate Ave.; Pittsburgh, PA 15226.

Wanted — Starrett center pin gauge or H&S Company T-hammer with wood handle and detachable shank. Please send offers to: David C. Stanwood, 73 Gibbs Avenue, Wareham, MA 02571.

Wanted —Early pianos made prior to 1850. Also purchasing out of print books, manuscripts, advertising, posters, etc., dealing with pianos and harpsichords. Please send photos of pianos if possible — will reimburse for expense. Leo Martyn, P.O. Box 49263, Los Angeles, CA 90049.

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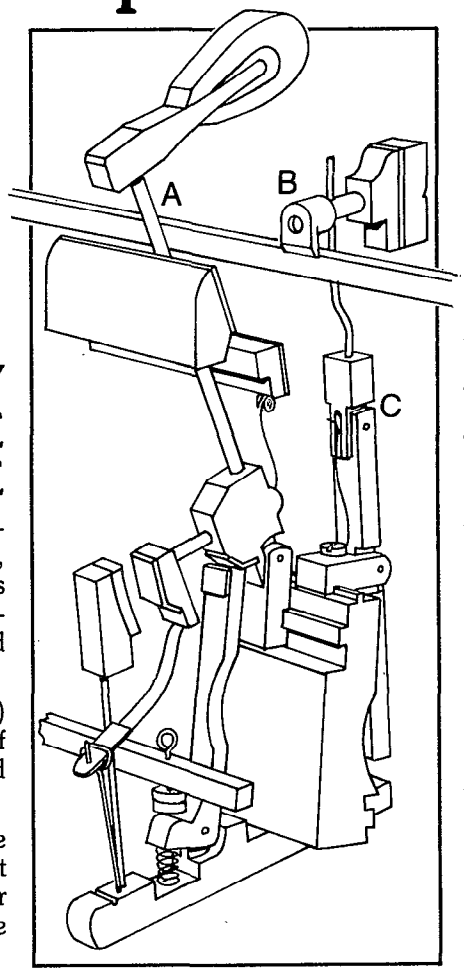
The Wurlitzer sostenuto system -so simple to service



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The sostenuto feature, a popular option on all current Wurlitzer studio, school and chapel pianos (Models 2962 and 2960), follows the principles proved in fine grand pianos and is even easier to service.

Operated from a sostenuto bar (A) actuated by the center pedal, any of 68 dampers may be picked up and held for sustained tones.

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NO NEED TO REMOVE THE ACTION

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A new all-spruce Duraphonic Multiradial™ Soundboard improves tuning stability. In tests with up to 90% relative humidity, solid spruce expanded 5 times more than the new Wurlitzer design, causing more serious changes in string tension.

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