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A small number of pianola owners and musicians have been concerned for some time at the unnatural break between the world of music rolls and the world of music. Few members of the musical public know much about player pianos, and the Institute aims to bring about a better understanding and appreciation of the instrument in a number of ways.

The Institute publishes a regular journal, puts on public concerts, and has plans for a lending library of rolls, a travelling exhibition, and in addition a roll and information archive, with a small collection of player pianos for listening and study purposes.

The Pianola Institute will endeavour to preserve, research and document the pianola’s history, to improve the instrument’s present standing, and by the commissioning of new compositions, to ensure that it remains an important musical force for the future.

The directors of the Institute are:
Louis Cyr, Keith Daniels, Mike Davies, Denis Hall, Rex Lawson, Claire L’Enfant.

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Editorial

2004 marks the centenary of the emergence of the first reproducing piano in the world - the Welte-Mignon. Such an auspicious anniversary could not go unmarked, and we are devoting most of this issue to the subject. To what extent the Mignon was commercially successful in its early days, we do not know, but it was only part of M. Welte u. Soehne’s business, and presumably could have been ‘carried’ by the profitable sale of their well established orchestrians and organs. What is so remarkable was the artistic success of the instrument in the number of great pianists who recorded right from the start, and the obvious musical fidelity of the rolls, particularly when compared with the primitive efforts of the gramophone of the time. Who could have imagined that the original reproducing system of 1904 could still hold its own in the market place of the late 1920s against the apparent sophistication of the Ampico and Duo-Art pianos. We are delighted to welcome the Welte specialist, Mark Reinhart, as a contributor to the Journal. Mark’s long experience with the system and his large Welte collection enable him to write with real authority.

Each reproducing system has its own particular characteristics, dictated in part by its strengths and weaknesses. In the case of the Welte-Mignon, from examination of the rolls, it seems apparent that what the roll editors were aiming at was to reproduce the playing of the artist, warts and all, in contrast with Duo-Art and Ampico, where a successful roll reflected a performance of how the artist would have liked to have played. In this respect, Welte rolls can subjectively have a more musical feel. Of course, such subtleties can only be heard on a piano which plays correctly.

One aspect of all the reproducing piano systems which gets scant recognition is the importance of the artist/technician who edited the rolls. I use the word ‘artist’ intentionally, because without some musical discernment, no reproducing roll can be successful. However much data was obtained at the time the pianist played, it was the roll editor who converted it to the dynamic coding perforations at the edges of the rolls, and these are the secret of how the piano plays. These roll editors are the unsung heroes of the reproducing piano.

On 13 November 2004, a very important event in the world of the Pianola took place in Cologne - the premiere of Nancarrow Concerto for Pianola and instrumental ensemble. We are privileged to include the article by Paul Usher, the composer of the concerto, who writes about his thought processes in composing the work, and his fears and delights at the rehearsals and first performance. This is the first major work for the instrument since the Studies by Nancarrow himself.
It will be through works such as this, written for concert performance, that interest in the Pianola will be increased. Hearty congratulations both to Paul and to Rex Lawson, who created the rolls and played at the performance, for the outstanding success all round!
The Welte-Mignon Recording Process in Germany
Mark Reinhart

A century ago, the player piano was changed forever when Edwin Welte and Karl Bockisch introduced the Mignon, later called the Welte-Mignon, to the public. For the first time, a fully automated piano was introduced which played with a full range of dynamics. Today some people have argued the merits of whether or not the system actually reproduced the performances but whatever the actual reliability, the audience which heard these for the first time stood in amazement that anything of this nature was possible.

In May 1904, a patent application was filed in Germany by Welte and Bockisch for the expression mechanism which would become the heart of the Welte-Mignon. In France, Great Britain and Austria, patent applications were also filed in the same period. There were probably other European countries for which patent protection was sought as well. The US filing followed in August 1904. Edwin and Karl knew the value of patent grants to protect their intellectual property. This was a lesson well learned from Edwin’s uncle, Emil Welte, whose orchestrion patents\(^1\) proved to be extremely valuable. The exclusive rights that patent grants offered protected the firm of Michael Welte u. Soechne from competition. Emil Welte patented the Company’s paper roll orchestrion in many countries, allowing exclusive control around the globe. Edwin would have been keenly aware of this, and following this tradition, applied for, and was granted, patents in many countries.\(^2\)

Carl M. Welte, son of Emil, is quoted as saying that the Welte-Mignon was displayed at the Louisiana Purchase Exposition and the Leipzig Trade Fair, both in 1904.\(^3\) Those who heard the Welte-Mignon would previously have had only player pianos and barrel pianos as a reference for automatic playing. Certainly with a skilled operator, the playing of a foot operated player piano can render great degrees of dynamic control. However, the Welte-Mignon was a free standing machine whose only manipulation was the contact ‘on’ switch. Its earliest form was a cabinet upright piano without keyboard. The instrument resembled a sideboard more than a piano. The roll was simply inserted into the front of the cabinet and the contact lever tripped. Those who heard it for the first time must have found this extraordinary.

The Welte-Mignon is considered to have a well controlled dynamic range, rendering the playing of great pianists, which at the time of invention was otherwise unknown. The only other automatic control of dynamics that had been patented by this time was the Aeolian Company’s Themodist. The Themodist distinguished theme from accompaniment as an aid to the pianolist. This was a far cry from the Duo-Art, not introduced until a decade later by Aeolian. Whilst the DEA, Ludwig Hupfeld of Leipzig’s first fully reproducing piano, was introduced not long after the Welte-Mignon, the Mignon enjoys the distinction of being the first of the genre.
The Welte-Mignon mechanism for playback enjoys significant documentation. Everything from the patents and published service material to the existing pianos and cabinet players (vorsetzers) make the playing of the rolls clearly understandable for those who enjoy them. The rolls exhibit complex dynamic coding. Welte-Mignon machines require the servicing technician to follow sophisticated regulation specifications. The roll speed was a single tempo. The expression mechanisms have to meet the rigorous demands of a test tone supplied by the factory. The ppp and mf hook settings are set according to the size and room placement of the piano as well as the weight of the piano action. The test roll requires that the crescendo and sforzando speed be calibrated such that when the roll is played, a very specific set of dynamic responses occur.

Edwin Welte and Karl Bockisch were less forthcoming as to the secret of the recording process. There exists no patent documentation regarding this process for the Welte-Mignon. Edwin and Karl chose to make this a trade secret shared with only their inner circle. All the published accounts note how the process was not disclosed and the recording mechanisms locked between recordings. From the earliest trial recordings by Eugenie Adam Benard, some remaining in the catalog for the entire duration of production, to the Rudolph Serkin recordings of 1928, their process remained a mystery.\(^4\)

In the last 50 years since the release of the LP recordings by Richard Simonton, Sr., there have been published accounts as to the Welte-Mignon recording process. The accuracy of these accounts has been argued at length. Some regard the entire process as being fully automatic and others believe it was the result of a skilled editor inserting the coding following the machine articulation of the notes and pedaling recorded. In any event, no matter what the process, the information necessarily required an editor to determine the physical dynamic coding. In simple terms, even if Welte used a fully automatic recording process, the raw data required a highly skilled editor to interpret and translate it into Welte-Mignon usable coding. Parts of the recording process puzzle exist for our study, others parts remain a mystery. The intent of this article is to identify what facts are known and can be proven whilst setting forth what the technology of the time could also support.

**Historical Overview of Piano Recording Technology**

Keyboard recording has been known since at least 1746.\(^5\) In a description quoted in 1982/3 in *Das Mechanische Musikinstrument*, a series of pencils were operated by a keyboard as a moving web of paper traveled past an array of styli. It should be noted that this recording process was for the purpose of making a graphical representation of the notes played, as a means of determining a written score for the music. This was a field that received much attention from inventors. Many people attempted to develop a process
whereby keyboard performance could be translated into a printed score. This was not in itself intended for automatic playing, but was nevertheless a precursor to the automatic recording and playback technology to come.

By the 1850s, the keyboard recording technology had become more sophisticated, with progress from different individuals. The technology was even given names: Melograph, Notograph, and Pianograph. The trend was towards more accuracy with reduction in the size of the mechanism. The application was for both piano and organ. In 1859, Hirsch Labin developed a system of recording keyboard playing on a barrel of the type used in orchestrions, pianos and organs. Was the Labin system employed to record actual piano playing? It is not known whether this procedure was actually executed. All the documentation for actual practice indicates that barrels were mechanically arranged for the entire duration of production. The Labin development plays a key role in the advancement of keyboard recording for automatic reproduction and was a step closer to the climax of the reproducing piano.

In 1872, Alexandre Amédée Rossignol developed an electrically operated note recording device. Contacts under the keys actuated magnetic armatures which pressed inked wheels against a moving paper sheet, removing much of the mechanical friction from the note marking process. In the USA, Merritt Gally, who was well known in the organette field, began to apply the principle of recording on a paper roll to the field of automatic music, and was granted a patent for a duplication recorder or perforator for note sheets in the late 1870s.

In 1881 Rudolf Wilhelm Kurka experimented with note recording using another all-electrical system whose key contacts utilized carefully regulated contact points. As a point of reference, the illustration for the Kurka contacts places them at approximately the same position under the keyboard as the housing shown in the Welte recording session photographs. While the Welte system probably differed in the contact construction, the positioning relative to the keyboard and underside of the piano is similar in the recording session photographs.

Carl Wilhelm Nyström was granted a series of patents in the 1890s for a keyboard recording and playback system which recorded music on both paper rolls and cylinders. Nyström began filing for patents internationally by 1891 for his system of recording and playback. The system recognized that the recording might take place on a piano and yet be played back on an organ. Most importantly, he recognized the need for recording dynamics and playing back in accordance with them. Nyström used a primitive set of four spring biased contacts for recording different forces of touch. The playback system required the dynamic line be read mechanically. Doubtless there were others working to accomplish the same goals. Nyström was granted many patents and
must have been well known to others who were interested in the field at the time.

Nyström was the first to contemplate a system for dynamic recording and playback in the player piano field. This was a marked advance, since most prior experimentation was for the purpose of indicating suggested performance guidelines on music rolls for the human pianist. Nyström, on the other hand, was attempting to create an automatic system for recording and playback. Study of his patent suggests very primitive technology whose operation in practice must have offered little actual success. However, his accomplishment should not be underestimated.

Perhaps even more significant was the publication of *The Graphics of Piano Touch* in 1896 by Binet and Courtier. In this article, it was disclosed that a deformable ‘India’ rubber tube was placed beneath the keys of a piano.
The board on which the tube rested could be screw-adjusted in height relative to the keys. As the artist played, the varying strength of key touch was recorded on a moving strip of paper. The rubber tube was deformed as the key struck, and a pressure wave was sent down the tube, similarly deforming a rubber membrane at the end. The membrane movement operated a pen, which then scribed the moving paper. The Binet and Courtier device gave a graphical representation of the force exerted on the keys. This differed from Nyström insofar as Nyström registered four discrete dynamic levels, whereas Binet and Courtier recorded a range of dynamic playing.

The Binet and Courtier system was not without its problems. The inventors noted difficulties with recording passages in which there was a great deal of key movement activity. Since the rubber tube was not isolated for individual key recording, the playing of a chord, with multiple keys
simultaneously played, resulted in recorded marks which indicated greater force than the individual keys would have registered. For the purpose of measuring any particular force, the recording would therefore become distorted. The article further noted problems with what the authors identified as a ‘shake’, by which they meant a fast trill.

Since the Binet and Courtier article received wide circulation at the time, their concepts were known to many others. Their article was published in both France and the US in scientific journals. The US article was kept among literature of the US Patent and Trademark Office. The firm of Hupfeld in Leipzig may have used a similar device in its recording sessions, although the surviving session photographs do not indicate any visible dynamic marking devices of this nature.\(^{(12)}\) Hupfeld literature indicates that the rolls were recorded pneumatically, and some of the Hupfeld recording session photos, published recently in the book _Im Aufnahmesalon Hupfeld_,\(^{(13)}\) illustrate tubing that connected to the underside of the recording piano.

Binet and Courtier’s device is still remarkable, since it would have allowed a broad spectrum of dynamic information to be recorded. Their system, as they themselves acknowledged, was not without its flaws. Some of the data acquisition problems could have been solved with more experimentation, such as isolating separate tubes for different keys, in order to provide different
Binet & Courtier, L’Année Psychologique, 1896, figure 39

Binet & Courtier, L’Année Psychologique, 1896, figure 40
dynamic tracks. In any event, the Binet and Courtier mechanism would have provided much more useful dynamic information than the Nyström system.

The Deluxe Reproducing Roll Corporation, makers of the Welte-Mignon Licensee rolls, began their own recordings in 1920. Prior to this time they had relied entirely on the library recorded by M. Welte & Sons, Inc., the New York branch of M. Welte u. Soehne of Freiburg. The Deluxe Reproducing Roll Corporation developed its own recording system, quite independent of the M. Welte u. Soehne system. Initially they did not record dynamics. William C. [Billy] Heaton, the former president of the Company, told Ron Sanchez, a California collector of Welte-Mignon Licensee rolls whom he knew in the 1950s, that he devised the idea of recording dynamics as a result of a newspaper article showing a seismograph recording earthquake movement about 1923. In this connection, an illustration sometimes used by Deluxe showed a portion of a recorded roll of the Chopin F major Etude, Op. 25, No. 3, with no pianist

How to Test and Regulate the Welte-Mignon Licensee, 1924, page 23
disclosed. This image first appeared in the 1924 Licensee service manual and later, for owners of the Welte-Mignon Licensee pianos, in the 1927 permanent catalog. The edge tracing of the illustration shows a seismographic dynamic line. The response curve in the illustration is remarkably similar to that of Binet and Courtier. Deluxe never disclosed the specifics of how the dynamic line was created, and so this remains a mystery to this day.

Another mystery of the Deluxe recording process is that the recording master in the illustration mentioned above, the Chopin F major Etude, was never released as a Deluxe recording. The only published recording of this particular Etude in the Welte-Mignon library was the Ernest Schelling performance, roll number 1446. The Schelling recording was made in Germany by M. Welte u. Soehne. Could the illustration in the Deluxe catalog actually be the recording master of the M. Welte u. Soehne roll of the Schelling performance? In fact, this turns out not to be the case. If one compares the published Schelling T-100 red paper Welte-Mignon recording to the roll in the Deluxe illustration, one finds significant note playing differences, as well as distinct rubato variations. Thus, the Deluxe recording section illustrated in the Licensee service manual and catalog could not have been the Schelling recording. Sadly, we shall never know why this important piece of Deluxe advertising was taken from an unissued roll. It does appear that the Binet and Courtier system could have influenced the recording process at Deluxe and perhaps was the source of their recorded dynamic data. Still, the Deluxe recording system was considered distinct from that used by M. Welte u. Soehne. Karl Bockisch considered the Deluxe system inferior to the system and method he used in Freiburg im Breisgau.

Another interesting note recording device was shown in an Austrian patent granted to Richard Turba and Emil Margreiter of Vienna. Their system, published in 1903, employed inking wheels of varying width. In fact the varying width notation was for the purpose of identifying notes which were sharps or flats, as distinct from naturals. Still, what is remarkable is that a note recorder employing differing marking width was known so close to the time that Edwin Welte and Karl Bockisch were studying and ultimately making decisions on how to accomplish the recording of their Welte-Mignon music rolls.

Gerhard Dangel, curator of the Edwin Welte collections at the Freiburg Augustinermuseum, has patent files belonging to Edwin Welte for the Lichttonorgel, or Photo Tone Organ in English. This organ was Edwin’s last significant invention. Among the files is an extensive collection of period electronic organ patents. Edwin Welte was fully aware of the technical state of the art at the time. Most likely, prior to applying for patents for the Lichttonorgel, Edwin sought to determine the extent of patent protection available. Likewise, one can conclude that Edwin and Karl were fully aware of
the extent of keyboard recording technology at the time they were developing their recording process for the Mignon.

**Documentation for the Recording Process of M. Welte u. Soehne**

The recording process for the Welte-Mignon was a closely guarded secret. There exists some documentation from the time of recording, as well as published accounts by Richard Simonton, Sr., who visited Freiburg and interviewed Welte and Bokisch shortly after the Second World War. Edwin and Karl photographed the recording sessions and used these photographs in their advertising leaflets and catalogs. The studio session photos offer some evidence of the recording process. In the 1905 photograph of Raoul Pugno, Edwin Welte is pictured sitting at the recording machine, with the roll take up spool clearly showing. In the 1905 photo of Erno von Dohnanyi, Karl Bockisch sits at the recording device, and there appears to be a portion of paper roll wound on to the take up spool. Both of these session photos were taken at the Leipzig studio of Hugo Popper. By 1907, the session photos show the addition of a box atop the recording machine with large holes in the side. The purpose of this additional unit was never disclosed. What can be gathered from this photographic evidence is that the recording process was an evolving one, and apparently changed over time as improvements were developed. This would be a logical expectation since, just as Edwin Welte and Karl Bockisch made
improvements to the Welte-Mignon player, they likewise would have made improvements to the recording machine. By contrast, the 1926 recording session of Vladimir Horowitz or the 1928 Rudolf Serkin session would have been achieved with all the improvements to the recording machinery that might have been made by that late date, and so are likely to have been very different from the much earlier sessions of 1905.

For some twenty years after the end of the War in 1945, Richard Simonton Sr. produced a series of LP recordings of the Welte-Mignon. Some of these recordings were made with the help of Edwin Welte and Karl Bockisch. The recording process was explained on the liner notes. The 1950 Columbia recording notes, as Denis Hall observes, are probably the earliest published account of the Welte-Mignon recording process. As time went on, the recording description became more embellished by others, who never met Edwin or Karl, thereby adding to the story their own interpretation and speculation. The Ben Hall account in the *Encyclopedia of Automatic Musical Instruments* is a prime example.\(^{(18)}\) There is no documentary evidence to support the additional interpretation. The Simonton explanation for the recording process suggests a singular method of recording keyboard dynamics. It is likely that there was at least a transition, with improvements, as evidenced by the recording session photos. Perhaps the recording system was completely revised over time. The session photos suggest that this was a possibility. Those who knew Richard Simonton, Sr. have noted that he was not mechanically inclined.\(^{(19)}\) Perhaps Karl Bockisch in his explanation to Simonton recognized this, and kept the outline of the process to its most simple form.

The 1950 Simonton explanation, as addressed in the liner notes for the Columbia recordings, stated that the recording machine used a paper roll with 100 lines marked across the width.\(^{(20)}\) The roll was placed in the recording machine, in which there were inked wheels whose positions aligned with the marked lines. The wheels were described as being similar in composition to printing press media, which is deformable. The recording piano was described as a standard Steinway grand\(^{(21)}\) with a trough of mercury beneath the keys. The key contacts were described as carbon rods. As the artist played, the carbon rods dipped into the mercury, with their electrical resistance varying by the depth of penetration. The completed electrical circuit would have activated the inked wheels, so causing contact with the paper. ‘Depending on the blow or touch exerted upon the keys of the piano, there was a corresponding difference in the inking of the paper on the master roll.’\(^{(22)}\) How these marks were interpreted is not stated, nor are any other features of the recording process disclosed. Furthermore, the fact that a Feurich grand was used in many of the early recording sessions was not disclosed in Simonton’s liner notes. Feurich was the house piano for M. Welte
u. Soehne and was used in many keyboardless Welte-Mignon pianos. There was more than one recording piano. The session photos from the 1920s suggest that the Steinway won out as the recording piano of choice.

Knowing as we do the state of recording technology at the time of invention in 1904, we can reasonably conclude that the inked wheel note recording was a practical possibility, not only by examining the published patent literature outlined above, but also since the organ recording machine from M. Welte & Sons, Inc, of New York, still survives today in the Weiss-Stauffacher collection in Seewen, Switzerland. Examination of the organ marking machine further supports the theory that the inked wheel system was the process that was actually used. However, the marking wheels on the organ machine are rigid and not at all deformable. But we know from these sources that not only is the process of note recording with inked wheels a possibility, but is also very probable, given this existing embodiment of a Welte recording machine.

We also have some of the original inked recording masters from the Welte-Philharmonic recording machine extant. Examination of these Welte-Philharmonic ink originals shows that the white color paper used to record the organ playing was first marked with red lines for each playing note. Color ink contrast was not disclosed by Simonton, but is found on the organ

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Welle-Philharmonic recording master (original)
originals. The note recording lines were in black ink. The contrast makes the note playing easier to distinguish from the background lines. One might ask why the blank paper was lined first, and the answer is to be found in the duplication process. Since the notes had to be punched by hand, the red lines made it easier for the person punching the roll to distinguish the different channels. This was a long standing process with Welte. The earliest copies of Welte-Mignon rolls sold to the public were all hand punched on red paper, with black lines throughout for each channel. The duplication process for Welte-Mignon rolls was later automated and the lined paper abandoned. This part of the Simonton explanation is supportable with known examples of Welte organ recording machine originals.

In an original account of the operation of the American Welte-Mignon recording mechanism published in 1917, we know that the recording was made on a roll with the same playing scale as the commercially produced pianos. 'A master roll is created at this time, and when the master roll or its duplicate is drawn across the tracker bar of a piano equipped with this marvelous reproducing device, the original interpretation is reproduced, or re-created, with all the subtle tonal shadings, accentuations and expression, all the nuances, in fact, everything that characterizes the charm and individuality of the artist.' The recording master or original was described as being playable on any Welte-Mignon piano. This again agrees with the 1950 Simonton explanation. While some more recent explanations of the recording process suggest machine readable magnetic or conductive ink, this is not supported by either the technology of the period or contemporary accounts of the process.

Ludwig Peetz of the Gesellschaft für Selbspielende Musikinstrumente, presented his explanation of the Welte-Mignon recording process to the membership of that society at its annual convention in 2003, and some of the presentation was published online. Later, an expanded version of his article was published in the society’s journal, Das Mechanische Musikinstrument, in the issue for April 2004. Ludwig Peetz’s theory is that the width of the mark could indicate the force applied to the keys. This too may be possible, but it suffers from two drawbacks. Firstly, key felt is not especially compliant and may not be a good ‘spring’ source, since its uniform calibration would be difficult at best. Furthermore, the width of the mark would be controlled by the degree of deformation of the wheel. Wheels whose deformation is extensive, as happens with very soft rubber, would directly impact the note recording part of the equation. Wheels whose deformation was smaller would yield only slight width differences whose measurement would be complex and render the dynamic data difficult to interpret.

Denis Hall’s theory (q.v.) speaks of measuring the velocity of key movement, while the Peetz explanation depends on the force of movement.
Additionally, the latter requires that the key be depressed into the supporting felts in order to indicate the degree of force. This would only be present in chords, and in single notes played without much repetition. In passages whose key playing was more complex, the keys would be less likely to descend fully into the key felts, since the dynamic control from the pianist would come at the start of key depression rather than at the end.

Miss Lydia Reinbolz was a longtime employee of M. Welte u. Soehne at Freiburg, who worked in the roll duplication department. Miss Reinbolz stated that the ‘mother rolls’ were recorded at twice the speed of the playing copies. This was relayed in an interview with Hans-W. Schmitz of Stuttgart.\(^{(25)}\) The reason for this, as understood by Miss Reinbolz, was that the higher linear speed produced more accurate sound quality. The Welte-Philharmonic recording masters that survive were all recorded at the normal playing speed. If Mignon masters were recorded at twice the normal speed, this suggests a purpose other than accurate note placement.

Denis Hall describes a plausible method of interpretation of the dynamic data, in that the rate of deformation would be proportionate to the speed of key movement.\(^{(26)}\) The rate at which the carbon rod sank into the mercury, thereby making electrical contact, would provide a proportionate rate of deformation of the inking wheels on the recording paper. The length of deformation would provide a measurable relationship to the rate at which the piano key was depressed. This is indeed possible. More intriguing is the fact that Miss Reinbolz’s comment, that the recording masters were recorded at twice the linear speed, would in addition to improving the note placement accuracy, allow the line deformation to be more easily read and interpreted by the editors.

The Kent A. Holliday book, *Reproducing Pianos Past and Present*, illustrates what appears to be a Welte-Mignon recording machine original of roll number 4119, *Moment Exotique*, composed and played by Vladimir Horowitz. The roll appears to have a wavy line marking dynamics along one edge. The width of the individual note marks appears to be substantially uniform. The roll’s actual whereabouts is unknown today. Ken Caswell, who once had the roll, states that it is ‘at USC with the rest of the Simonton collection.’\(^{(27)}\) Since the roll appears to be missing or lost, it cannot be examined to clarify the situation. While it seems to argue against any inking wheel causing width deviation, it should be noted that roll 4119 was recorded in 1926 in Freiburg, towards the end of the recording session era. The recording process in place for that session may have been profoundly different from the majority of the rolls recorded over the twenty-two previous years. Perhaps the wavy line was an experiment with a Binet & Courtier like process which would record the average dynamics of the playing. The wavy line marking source would have been displaced slightly from the inking wheels since both could not occupy the same working space.
The illustration of 4119 also suggests that the roll was recorded at the same speed as the playing copies. Clearly this would have been a change from the earlier process described by Lydia Reinbolz. When did such change occur, from the high-speed recording masters to the normal-speed recording masters? The 1917 description above that the recording masters were playable on Welte-Mignon pianos suggests that by 1917 the recording masters were being recorded at the normal playing speed. It is probable that 4119 was not a late exception, but that the recording process was improved and in use by 1917.

Peter Hagmann, in his book, Das Welte-Mignon-Klavier, die Welte-Philharmonie-Orgel und die Anfänge der Reproduktion von Musik, depicts the recording process as being shrouded in mystery, with his description relying on the Simonton explanation.\(^{(28)}\) He further adds speculation about the case
extension atop the recording device. In the recording session photos, the extension appears as a box with holes in the side, located above the earlier photographed recording machine. The original literature does not describe the function of this box. Hagmann hypothesizes that the box could have contained a cylinder phonograph of the Edison type, in order to make an audio recording simultaneously with the paper roll. Hagmann also notes that Gerhard Pätzig rejects this theory, in that the phonograph recording technology of the time was too primitive.\(^{(29)}\)

Briefly mentioned by Hagmann is a statement attributed to Franz Scheerer. Scheerer was a piano builder who was called upon to service the piano action for one of the Welte-Mignon recording pianos. Herr Scheerer found five slightly curved copper wires behind each key.\(^{(30)}\) He assumed that they existed in order to measure the touch of the key, according to key movement. Unfortunately there was no additional information presented. Herr Scheerer did not say when the action was serviced, and there was no mention of carbon rods.

Alfred Hollins wrote of his Welte-Philharmonic recording sessions in his 1936 biography. He credited Karl Bockisch as the operator of the recording machine. He also stated that he was asked to bring printed scores for all the compositions he was planning to record. A Herr Buchali was described by Hollins as a bear of a man who would follow his playing on the scores to note his registration. He was asked to first play the piece for Herr Buchali, and then a second time, with Bockisch operating the recording machine. Since the note playing and pedal function were recorded automatically, as evidenced by the existing Philharmonic recording masters, it seems likely that Buchali was noting the performer’s dynamics for the automatic operations of the organ swell shutters. Confusion arises from the Hollins Welte recording session photograph. Berthold Welte, father of Edwin, is shown with the music scores. Berthold’s imposing size certainly matches the description of Herr Buchali from the Hollins biography. Alfred Hollins was blind, so is it possible that he meant Berthold Welte? There is no clear answer. Berthold Welte would have been trusted and could have been involved in the interpretation of the dynamic data for the finished rolls. He is to be seen in a significant number of the Welte-Mignon recording session photos. An example of this is the recording session of Josef Hofmann in 1913, in which Berthold is seen holding the music scores, while Edwin Welte and Karl Bockisch stand behind him. The specific role of Berthold Welte in the recording process is still unknown.

Those who have an interest in the Welte-Mignon recording process seem to be in polar opposite camps. There are those who believe that Welte and Bockisch had no means to record dynamics, and those who believe that the process was fully automated. Ken Caswell is adamant that Bockisch recorded the dynamics from the very beginning, as specified by Simonton. Like most
things in life, the reality probably lies somewhere in the middle. Given the state of the technology, especially in 1904 at the start of the recording sessions, Welte and Bockisch had very limited resources in electrical technology. If they were able to record any dynamics, the process would have been primitive at best. Probably what they did have was not as reliable as they would have liked. To rely in addition on an editor would not only be prudent but essential, at the very least to interpret what, if any, dynamic markings were recorded. Looking forward to the 1927 Welte-Mignon Licensee catalog image of the
Chopin Etude, even if so much data were available, just imagine translating those lines into the dynamic coding for a viable finished roll. The editor would have to have been extremely skilled to make a reasonable interpretation of what the data actually meant. This cannot be overstated.

The role of the editor is one area which is never addressed in any of the published accounts. The Simonton account states that the dynamics were recorded, but there is no additional explanation as to how this data might result in a finished Welte-Mignon roll. This is not magic; it is the labor of a highly skilled professional to take the raw recording data and to produce a finished roll. The dynamic data, whether recorded on the sheet music score, or by the recording machine as tiny trapezoids on the roll, must be interpreted, analyzed, and the coding marked on the recording machine original. The finished roll must then be played, judged and perhaps re-edited. As Denis Hall has observed, ‘the roll editors were highly skilled people, both musically and technically, and only a handful of people are known to have been employed to edit the important pianists’ recordings throughout the whole period of the reproducing piano.’ The editors at M. Welte u. Soehne were especially mysterious. According to Alfred Hollins, Herr Buchali edited the Philharmonic organ rolls and probably the early Welte-Mignon rolls. Berthold Welte’s appearance in so many of the recording session photos suggests a role in the recording process. Heinrich Burkard edited the Philharmonic organ rolls recorded at M. Welte & Sons, Inc, of New York. Trained in Freiburg, he was sent to handle such things in New York around 1913. In addition to the Welte-Philharmonic organ recordings, Mr Burkard was probably also responsible for the Welte-Mignon rolls recorded by M. Welte & Sons, Inc, and later the Welte-Mignon Corporation of New York. In the 1920s, Hans Haass was the classical editor at M. Welte u. Soehne in Freiburg. Haass was no doubt the Welte-Mignon editor in that period.

Each company that recorded reproducing piano rolls had its own philosophy for editing the recordings. M. Welte u. Soehne considered the roll, once recorded, to be complete, with no input solicited from the performer. The Aeolian Company often included in their contracts the requirement that the artist should approve and/or participate in the editing process of the finished roll. In contrast, Welte sought no input. This neither confirms nor denies whether the dynamics were recorded. The philosophy simply presents a difference in approach to the finished product. In this manner, the Welte-Mignon rolls were produced with the philosophy that what the artist played was what the company strove to preserve in the finished rolls. Aeolian, by distinction, sought to present how the artist wished to be heard. The Aeolian philosophy is certainly closer to what producers seek today in newly released CDs. One might actually draw the comparison in today’s terms that Welte sought the live performance, whereas Aeolian sought the studio performance.
Both are equally valid, but different, perspectives.

Consider the actual finished Welte-Mignon rolls. Rolls such as the Ravel performance of his own *Valses Nobles et Sentimentales* (number 2888) have portions in which the inner voice notes are carefully accented around the other played notes. If the entire dynamic coding was determined by an editor, then all the inner voice notes would have been accented for uniformity. However, some are accented, and some are not. This would give credence that there was influence from some form of recording of dynamics. Another supportive fact for some form of dynamic recording is the prolific volume of recordings in 1905-6, which numbered over 1,000. This would have been remarkable on any level. It took years for Aeolian and American Piano to develop anywhere near the same number of recordings. Given the complexity of Welte-Mignon dynamics, it would seem likely that there was dynamic recording assistance to produce the large catalog of quality recordings in such a short period. Whether produced as described by Simonton, or with help from the likes of Herr Buchali, the rolls are remarkably good.

**Intervening Dynamic Recording in the period 1904 - 1930**

James John Walker of London filed for a music recording patent on 31 January 1905. The Walker device recorded keyboard music, and more specifically was seeking to record the expression. The device relied on contacts or mechanical linkages, which would perforate on a moving sheet two distinct points of key travel. The purpose was to determine the key period and speed of key movement. As the key was depressed, the start of travel would activate a punch. As the key was further depressed, a second contact occurred and a second punch activated. The moving sheet would thus note how fast the key was struck and inversely how fast the key released.

Charles Fuller Stoddard was the primary inventive genius behind the Ampico reproducing piano. While experimenting with his system of reproducing piano mechanisms, he also sought to develop a means to record the pianist’s dynamics. Stoddard’s first recording patent was for a system which measured hammer velocity with mercury contacts on either side of a piano hammer butt. As the hammer moved, contacts completed the circuit for activating a marking stylus. The stylus remained engaged for only part of the hammer movement. The length of the mark on the recording sheet determined the speed at which the hammer traveled. In another embodiment, the contacts were placed beneath the piano keys. All of this was from a patent application filed on 30 April 1908. Stoddard was ultimately granted three patents in keyboard music recording between 1908 and 1921. How long this system of dynamic recording was in use is unknown, although Stoddard himself refers to its limited use in a talk given to the American Piano Tuners’ Guild in the late 1920s.
Claire Rivers Moody, who recorded a few Ampico rolls in 1916, recounted in an interview that the dynamics were added later by an editor and that they were not recorded. Most likely the dynamics were inserted by Theodore Henrion, who was the chief editor of Ampico recordings prior to his death in 1918. Likewise the important Rachmaninov recordings for Ampico were recorded with dynamics added by editor Edgar Fairchild (a pseudonym for Milton Susskind). While Rachmaninov was fully aware that his dynamics were inserted by an editor, he was very satisfied that the results were representative of his playing.

The automatic recording of piano dynamics for the Ampico was not
widespread until the later development of the spark chronograph in 1926 by Dr. Clarence N. Hickman. Stoddard and Hickman used contacts on the hammer action of the piano to mark two points of travel. The mark’s displacement was used to measure the speed of hammer travel. An extensive description of the process, and of how rolls were made as a result, appears in Re-Enacting the Artist by Larry Givens. There is no doubt that this system played a significant role in the quality of the later Ampico recordings. While the spark chronograph may have provided better opportunities for Ampico editors to realize dynamic coding that was more accurate than that on earlier recordings, it is clear that the quality of Ampico rolls was consistently high,
and certainly no artist of merit would have agreed to release rolls produced through the earlier process if they were deemed inferior. Indeed, Edgar Fairchild achieved exceptionally fine results without the aid of the spark chronograph. It is interesting to note that Charles Stoddard was interested in measuring hammer speed as early as 1908. It is also interesting that it took 18 years before his concept was put into practice. The embodiment that was finally introduced was structurally quite different from the system Stoddard had conceived in 1908.

Samuel L. Dickinson of Cranford, New Jersey, was granted two patents for recording dynamics.\(^{35}\) The Dickinson model used a revolving cylinder which recorded the strength of the hammer blow with a blunt contact at the point where the hammer met the strings. The blunt contact was to be driven into a soft wax surface. The first application was filed on 13 January 1912. It seems

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Dickinson, US Patent 1126724, filed 1912, figure 1
unlikely that this system was ever actually employed. Dickinson was granted the patents in his own name, with no assignment listed. It was known that Dickinson worked for Aeolian. It is possible that he was trying to work out a recording device for their soon-to-be-introduced Duo-Art.

The Aeolian Duo-Art, for the entire production of its music rolls, relied on editors to insert the dynamics. In a simplified explanation, we find that in the USA, W. Creary Woods, chief recording producer, operated the recording console that controlled the perforation of an initial dynamic framework as the artist played. Later a trial roll was re-edited, generally under the supervision of the artist. In some cases, and Paderewski is a case in point, fellow pianist Rudolph Ganz sometimes assisted in editing the finished rolls. In London, Reginald Reynolds operated the recording console and was responsible for the recorded output. With the work of these very skilled editors, the results were astonishing. Signed testimonials from the artists underline the fact that the finished rolls are, in fact, representative of the performer’s playing. Perhaps it was said best by Gordon Butler Iles, who worked for the Aeolian Co. Ltd. in the 1930s, that the reproducing piano is more a portrait than a photograph of the artist.

In the USA, pianist, inventor, Welte-Mignon and Duo-Art recording artist, Josef Hofmann, worked to develop a means to record the note dynamics for the Duo-Art in a fully automatic manner. Using a workshop at his home in Aiken, South Carolina, he employed a grand piano action to achieve this goal. At the International Piano Archive of the University of Maryland, there is a drawing by Hofmann of this recording system. An armature was connected electrically from the bass and treble ends of the piano. As the pianist played, voltage was generated representing the force of playing. The armature would respond to differences of voltage between bass and treble, so causing it to tip. As the armature made contact, the system would trigger which range of the piano was regarded as theme and which as accompaniment. A perforator attached to the armature contact could then insert a ‘snakebite’, or theme perforation, on the appropriate side of the music roll, sensing variations in voltage to differentiate between what should be a theme note and an accompaniment one. There is no explanation to be found on the document at the IPA as to how the keyboard voltage was generated.

Josef Hofmann was also granted patents for another keyboard dynamic recording system, which apparently worked in tandem with his armature device. In a nutshell, the keys impacted a bar that ran across the length of the keyboard. The bar moved a spring-biased lever, which translated the motion into a rotational position, thereby actuating up to four contacts. The contacts were thus representative of the force applied to the keys. It was a very clever design. Hofmann fully understood the structure of the Duo-Art in carrying out his work towards the recording of piano dynamics. Sadly, there is
no evidence that his system was ever completed, since it could have greatly simplified the Duo-Art recording process.

Melville Clark developed a recording piano, used by QRS to record all its hand-played music rolls and, later, for rolls issued for the Artechco and Apollo reproducing pianos. There were no dynamics recorded; only the notes and the sustaining pedal were preserved. For sheer durability, it is important to note that the same recording piano was used for the modern QRS Celebrity Series. No other recording piano can claim as long and useful a life as the Clark instrument. QRS used different artists to edit their reproducing rolls. For a time, Marguerite Volavy was the classical editor and so was probably responsible for the editing of the majority of the Artechco/Apollo reproducing roll dynamics.
Philip J. Meahl filed for a US Patent on 13 June 1912. The Meahl system relied upon the piano hammer movement to mechanically lift a spring biased lever in order to measure the applied force from the keys. A moving web of paper recorded the force of hammer blows as a seismographic trace. The mechanism would, as disclosed, have interfered with the piano operation and would have caused difficulties in the performance of the music. Since some of the hammer force was transferred to the recording mechanism, the pianist would have been required to play with greater force than normal. Noise from the recording mechanism would also have been a distraction to the performer. 

Joseph Klepac was granted patents for his novel dynamic recording device in which a weighted lever was attached to the hammer shank, so that
as the piano hammer moved, the weighted lever passed a series of contact points. Probably no pianist of merit would ever have considered recording on such a system, given the added weight placed upon the piano action. Like the P. J. Meahl system, the Klepac recording mechanism would have significantly impacted on the touch of the keyboard.

Dickinson, Klepac and Meahl explored dynamic recording systems in order to measure hammer force. Each of these hammer force measurement systems has serious mechanical drawbacks that would have affected the touch of the piano it sought to record. Hofmann’s system was apparently never put into practice, given the absence of any documentation that a completed instrument ever existed. Walker and Stoddard sought to record the key or hammer velocity as a means of determining the dynamics of the pianist. The Walker and Stoddard devices have a simplicity of operation to commend them, and Stoddard’s was successfully reduced to practice.

Conclusion
From the vast amount of documentation that has survived, we can tell that the technology necessary to record the notes and basic pedal functions of the piano existed prior to 1904. The use by M. Welte u. Soehne of inking wheels, as described by Simonton, was not only possible but probable, since both the technology of the period and the existing Welte-Philharmonic organ recording machine confirm this form of note recording. The existing Philharmonic organ masters also support the use of a recording medium that could be played on a T-100 scale Welte-Mignon piano. That is, recording originals must have been scaled for use on Welte-Mignon pianos. This is reinforced by the existence of the recording original for Welte-Mignon number 4119, which can be seen to be playable on a T-100 scale piano.

Insofar as recording of dynamics is concerned, the proof of what actually happened is somewhat more tenuous. Looking more closely at the inventions documented between 1904 and 1930, it should be noted that most of the dynamic recording devices had significant drawbacks, incorporating mechanisms that would have affected the piano action itself. Taking the temperamental nature of many great pianists into account, it seems unlikely that anyone would have agreed to have recorded their playing on a piano whose action was compromised by such a mechanism. However, there are no accounts of any pianists complaining about the touch of the Steinway or Feurich recording grand pianos used by M. Welte u. Soehne of Freiburg im Breisgau. The issue then becomes one of evaluating what it might have been possible to record with the systems that were the least invasive to the operation of the piano action and also the most effective in recording dynamics.

Hammer velocity is a function of key displacement. The practice of measuring key displacement for the purpose of recording dynamics was known
and published close to the time of the initial production of the Welte-Mignon. The patent specifications of Walker clearly support an evaluation of the dynamics of piano playing from key displacement. Walker filed for patents in 1905. It is logical to conclude that Welte and Bockisch were exploring similar methods of recording dynamics. Denis Hall’s explanation certainly gives support to the idea that Welte and Bockisch may have used displacement time measurement in determining a reasonable outline of the dynamics recorded by the performer. This does not conflict with the 1950 published Simonton explanation either. The documentation published between 1904 and 1930 would seem to support the method of determining dynamics from key or hammer velocity as the most viable form of dynamic recording. Master rolls running at a higher speed, as described by the Welte factory technician Lydia Reinbolz, would have permitted better data interpretation, and would have facilitated a line width source of dynamic data, especially if this line width was used to determine hammer speed for the earlier Welte-Mignon rolls.

It is likely that the Welte recording process was improved over time. There may well have been more than one recording method employed by M. Welte u. Soehne. The original recording master of Welte-Mignon number 4119, recorded in 1926, suggests yet another explanation for dynamic recording. The pencil waveform has the appearance of having been drawn by an editor. Was this a notation made by an editor, as the original was being recorded, like the Woods/Reynolds dynamic data recording for the Duo-Art? Perhaps this was drawn by hand as the performer played. Perhaps the line was drawn after evaluating additional data. At this time, the source of the dynamic line is unclear.

The fact still remains that any recorded dynamic data had to be interpreted and analyzed in order to convert it to the coding needed by the Welte-Mignon reproducing mechanisms. How much of the Welte-Mignon magic was in the recording process and how much was in the skill of its editors will never be known. Whether the dynamics were recorded or not, the Welte-Mignon rolls are a testament to the talent and skills of all of the editors who worked to produce these fine rolls throughout the years of production. Whatever the answer, the portraits of the pianists found on Welte-Mignon rolls are especially attractive. In the absence of more concrete first-hand information about the recording process, more detailed explanations are in the realm of speculation.

Hans-W. Schmitz has shared his recollections of Mr. Arthur Leptien, who serviced Edwin Welte's piano in the firm's later years. Mr Leptien was a young employee at M. Welte u. Soehne in Freiburg. He had seen the recording machine many times but it was always locked and sealed. Once he asked Edwin Welte about the process and was told, 'Well, it functions rather simply.' Years later he wondered if perchance he should have been more inquisitive but stated, 'For me, the machine was a part of my daily life - quite normal.'
Acknowledgements
There are several people whom I wish to acknowledge for their generous help and support in making this article possible. I must add that there are others not named here whose input I value and have gratefully accepted.

First I must thank Denis Hall and Rex Lawson of London who first suggested I consider writing on this topic. They were generous with information and suffered through endless drafts of this article. Denis and Rex were always encouraging and supportive, yet made me justify my position on the facts to keep me honest. Denis in particular was a true expert in diplomatically asking me to support my conclusions. I appreciate their candor and friendship.

I must thank Gerhard Dangel of Freiburg im Breisgau who shared his information with me. Gerhard, as curator of the Edwin Welte collection at the Augustiner Museum, was able to help me understand more of Edwin Welte’s own perspective and approach to research and patents.

Equally generous was Hans-W. Schmitz of Stuttgart, long time Welte-Mignon authority, who not only shared his knowledge but also interviews he had conducted with people who worked at M. Welte u. Soehne. This information would otherwise have been unavailable to me.

Ken Caswell of Austin, Texas, who has been active in all things Welte-Mignon longer than anyone, was kind enough to give input into the conclusions drawn. This I greatly appreciate.

Another virtual font of Welte-Mignon information was Jim Miller of Tarzana, California. Jim, over many years, has shared his thoughts and experiences with me. I found Jim always retained his sense of questioning and curiosity, which enabled him not to accept blind statements from collectors, but always to seek the truth.

Lastly, but by no means least, I should like to thank Jim Keaton of Charles Town, West Virginia, whose unbiased eye always gave me valuable feedback in the many drafts I asked him to review. Jim was always able to look at my statements objectively and to keep me focussed on my goals.

To each of these I give my heartfelt thanks. This would not have been possible without you.

Notes
1 Emil Welte orchestration patent examples US 287,599 granted 30 October 1883; DE 48741 issued 22 March 1889; CH 1216 issued 25 June 1889.
2 Welte-Mignon Patents DE 162708 filed 21 May 1904; FR 354182 filed 20 May 1904; GB 10219 filed May 1904; Österreich patent 24496 priority DRP 20 May 1904; USA 1,008,291 filed 17 August 1904.
3 The Welte-Mignon, Its Music and Musicians; Charles Davis Smith-Richard James Howe, AMICA 1994, p. 15
4 Hans W. Schmitz reports that there are recording label dates for some of the earliest Welte-Mignon rolls played by E. Adam Benard for 1904. The
late Rein Groos provided a photograph of an Adam-Benard label for roll number 104 whose indicated recording date is 21 May 1904. Curiously, the 21 May 1904 recording date is the same date that Welte & Bockisch applied for their German patent. The concert artist recording began in January 1905 with Alfred Grünfeld.


Horton US 13,946 patented 18 Dec. 1855; Bond US 26,244 patented 29 November 1859.

Hirsch Labin patent GB 1866 dated 12 August 1859, no published figures.

Alexandre Amédée Rossignol patent GB 990 published 4 April 1872

Merritt Gally patent DE 4034 published 20 February 1879.

Carl Wilhelm Nyström, Swedish patent 16256 published 13 October 1898.

Scientific American 22 February 1896 pp 16801-16802 Supplement No. 1051; published previously in the French publication Revue Scientifique

Reported by Ludwig Peetz in his paper Reconstruction of the Welte-Mignon T100 Recording System Technology, section 1, paragraph 3, 5 May 2003.

Im Aufnahmesalon Hutfeld, 2001, edited by Eszter Fontana.

How to Test and Regulate the Welte-Mignon Licensee Reproducing Action, © 1924 by the Auto-Pneumatic Action Company, New York.

The Welte-Mignon Licensee image of their dynamic recording appeared in the 1927 catalog but not in either the 1923 or 1924 catalogs which preceded it. This suggests that the system may not have been fully operational as early as has been speculated.


Austrian patent 12126 to Richard Turba & Emil Margreiter published 10 June 1903.

The Ben M. Hall explanation added features to the explanation for which there is no antecedent basis. See the Encyclopedia of Automatic Musical Instruments, p. 327, Q. David Bowers, Vestal Press,

This has been repeated by Ken Caswell on several occasions.

In the US, these lined rolls are referred to as ‘ledger line’ rolls by many collectors.

The Simonton description mentioned only a Steinway recording grand, it is well documented that a Feurich grand was also used in some of the early recording sessions.

Great Masters of the Keyboard, Columbia Masterworks ML4291-5

The Auto De Luxe Welte-Mignon Player Action © 1917 Auto Pneumatic Action Co. pp 4-5. All rolls sold by Auto De Luxe prior to 1920 were produced by M. Welte & Sons, Inc. of New York. Since this booklet was copyrighted in 1917 the only source of music at the time was M. Welte & Sons, Inc.

Lydia Reinbolz was interviewed by Hans-W. Schmitz with the permission of Elisabeth Welte circa 1976. The substance of the interview was presented in an e-mail 7 July 2004 from Hans Schmitz to Mark Reinhart.

The Denis Hall explanation mirrors that of Jeffery Morgan whose explanation is published in the *AMICA Bulletin*, vol. 37, no. 2, March-April 2000.

Conversation between Ken Caswell and Mark Reinhart in January 2004.

Peter Hagmann, *Das Welte-Mignon-Klavier, die Welte-Philharmonie-Orgel und die Anfänge der Reproduktion von Musik*, published by Peter Lang of Bern, Frankfurt am Main, New York.

Hagmann, p. 63

Hagmann, p. 64


GB Patent 1895A to James John Walker filed 31 January 1905, US Patent 872,267 to James John Walker which was a divisional patent from serial number 275,611 filed 24 August 1905, divisional serial number 314,595 filed 30 April 1906, patent granted 26 November 1907, Dansk Patent 9196 granted 7 January 1907. There are German and Swiss patents also.

US Patent 1,095,128 to Charles Fuller Stoddard of Boston, Massachusetts, filed 30 April 1908 and granted 28 April 1914.


Interview between Claire Rivers Moody and Mark Reinhart in her son’s home in Washington DC in the early 1980’s.

US Patent 1,126,724 to Samuel L. Dickinson filed 13 January 1912 and granted 2 February 1915, and US Patent 1,126,725 to Samuel L. Dickinson filed 1 April 1913 and granted 2 February 1915.

US Patent 1,614,984 to Josef Hofmann was filed 5 May 1925 and issued 18 January 1927. Also DE 439724 issued 19 January 1927.

US Patent 1,082,499 to Melville Clark filed 13 September 1911 and granted 30 December 1913 was the precursor to what Melville Clark ultimately developed. US Patent 1,132,441 to Melville Clark filed 5 December 1912 and granted 16 March 1915 represents what QRS uses for recording celebrity artists.

US Patent 1,074,556 to Philip J. Meahl filed 13 June 1912 granted 30 September 1913.


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The Early Recordings for the Welte-Mignon
Denis Hall

The story of the recording of the first reproducing piano rolls, those for the Welte-Mignon, the earliest system, seems so improbable that it almost reads like fiction. At the beginning of the twentieth century, the concept of a piano which could play by itself, and reproduce not only the notes, but all the subtleties of touch and phrasing, was a complete novelty, and yet this was the achievement of two young men, still in their twenties, Edwin Welte and his brother-in-law, Karl Bockisch. Welte and Bockisch worked for the firm M. Welte u. Soehne, which had been producing musical clocks and mechanical pipe organs since 1832. These latter instruments were operated by pinned barrels up until the 1880s, but after that paper rolls were used. So the young men were equipped as well as anyone at that time with the right technology to develop a self-playing piano. Nevertheless, they still needed the imagination to want to produce such an instrument. How they achieved this is told elsewhere.

Carl M. Welte, one of Edwin Welte’s cousins, who lived in America, wrote in 1950 that he visited Freiburg, where Welte’s factory was situated, in 1900, and that at that time he recalled Edwin and Karl were working on the invention. By 1904, what we now know as the Welte-Mignon had been perfected so that it could be shown in the Welte showrooms in Germany and America, and at the St Louis World Fair, also in 1904.

Many Welte-Mignon rolls show a date on the label which is, almost certainly, the recording date. These dates start to appear regularly from 19 January 1905. By that time, roll numbers had already reached #168. Prior to that, the one name which dominates the listing is that of Eugenie Adam-Benard, a shadowy figure who is thought to have been a local Freiburg
musician, possibly a music teacher, and a friend of Welte or Bockisch. At any rate, she must have been a remarkably patient lady to have played time and again for the young inventors, to have enabled them to present a respectable library of music with which to launch the instrument. We do not know when she first played for the Mignon, but by 21 June 1904, she had recorded roll #104 (Liebestraum No. 2/Liszt). In the most comprehensive Welte-Mignon roll listing so far, that by Charles Davis Smith (The Welte-Mignon: Its Music and Musicians), there are gaps in the early sequence, presumably titles which only survived for a very short time, or may never have been issued. Since there are some blocks of numbers missing, it is also possible that other pianists may have made recordings which have been lost. Frau Adam-Bennard’s rolls are variable, some compromised by Welte’s and Bockisch’s inexperience in roll editing, but even the best of them show that she was hardly a world-class pianist. She was, nevertheless, good enough for a selection of her recordings to have remained in the catalogue right up to the end in 1932.

In January 1905, everything changed. Hugo Popper, owner of the firm Popper & Co. G.m.b.H. of Leipzig, manufacturers of orchestrions (self-playing pipe organs and pianos fitted with percussion instruments), was at that time in his fifties. He held the agency to sell Welte products in Germany, and what was more important, was a well-established figure in musical Leipzig. Through his enthusiasm for the new invention, he was keen to promote it, and made available his music salon as a recording studio for the Mignon. And so he started to persuade (if that was necessary!) some of the greatest pianists of the day to come and play. From January 1905 to April 1906, when Welte and Bockisch were active in Leipzig, a cross section of pianists visiting that area made recordings.

We can only guess as to the format of these early recording sessions, but from the evidence in the rolls which have survived, I have the feeling that they were probably quite relaxed, and very different from the clinical present-day approach to recording. There is a freedom in the playing which sets it apart from the style exhibited in the later Ampico and Duo-Art rolls, and no particular concern for absolute accuracy. We are led to believe that wrong notes were corrected, but obvious mistakes are not infrequent on the published ‘red’ rolls, and the occasional what must have been memory lapses were not corrected. From this, can we deduce that the pianists did not return to the studio to approve their rolls, or did they accept less than 100% accuracy as the norm? In any event, it gives us a fascinating insight into music making 100 years ago.

The consecutive numbering system used by Welte together with the dates on the roll labels show that a pianist would sometimes record up to a dozen or even more items at a single session. At that rate, there would be little or no time for a second attempt at a piece. So, were the artists seated at the
recording piano and merely invited to play whatever they liked? Some of the items from these early sessions would, on the face of it, appear to be highly uncommercial. When compared with the disc and cylinder sound recordings of the day, how extravagant do Carreño’s recording of the complete Schumann Fantasia, Op 17, or Lamond’s Op 111 sonata of Beethoven seem? And yet these rolls were recorded in 1905 and published.

During the 16 months between January 1905 and April 1906, no less than 1109 titles were recorded, a remarkable achievement by any standards. One wonders how all this activity could have been crammed into such a short time. An analysis of the dates on the roll labels starts to show how it was done. By months, the numbers of pianists attending looks like this:

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Breaking down the statistics another way, the recording team was active in Leipzig during the following dates:

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During the total period of 464 days, which includes weekends and public holidays, they recorded on 97 days. At busy times, they even managed to record more than one artist on a single day.

During this first flurry of activity, one factor becomes evident, I think, and that is, the data which Welte and Bockisch needed to manufacture a completely coded roll for the Mignon must have been obtained as the pianist played; consultation with the artists was not needed, and in fact not sought. Editing and correcting rolls could be done later. This is, to some extent, confirmed by the number of rolls actually published around that time.

I have been unable to consult any early German catalogues, but there exists an American issue which was published in the autumn of 1907 and which shows indications of having been based on a German catalogue. Welte-Mignon catalogues are normally divided into two listings - one by artist and the other by composer. In this particular American book, there are no less than nine instances where the key signature of a work is printed using the German notation, i.e., ‘H’ = ‘B’, and ‘B’ = ‘B flat’. Curiously, in the composer listing, all but one of these examples have been corrected for the American reader. It is very likely that the German and American catalogues are the same. It is interesting to note the following:

1. Of the first 167 rolls (pre-19 Jan 1905), 36 Adam-Benard titles were included.
2. Of the 1109 rolls recorded between January 1905 and April 1906, 355 were listed.
3. Between the end of the Leipzig sessions and the time the catalogue was published a further 52 rolls were recorded, and of these, 26 were included.

At the back of this American catalogue, there is a short supplement which is thought to date from the spring of 1908. Listed there are a further 42 titles from the rolls recorded up to April 1906.

From this will be seen that many rolls were not issued until some considerable time after they were recorded, or else may have been issued and deleted by the autumn of 1907. Nevertheless, a library of 417 rolls is no mean achievement. One wonders just how many copies of these rolls were actually sold at that time, bearing in mind how few instruments would have existed.

What, to us 100 years later, is of more interest than mere numbers is surely the prestige of the artists who recorded, and in many cases the outstanding quality of the rolls themselves. By the beginning of 1905, it must have been obvious to Popper that the Mignon was technically a success, which would have given him the confidence to approach artists whom he knew, and invite them to come and make records. As Welte always claimed that once pianists had played, they took no further part in the preparation of the rolls, the
recording process, as far as they were concerned, was not in the least onerous. Disc and cylinder recording was very primitive at that time, at least for the piano, and so one can well understand a pianist’s curiosity at the prospect of hearing himself on a real piano. On the face of it, then, Popper would have had little difficulty in attracting some of the greatest names, as well as a number of lesser mortals who were at least competent, and in many cases very fine artists, although probably only known locally.

The first pianist of note to record (19 and 21 January 1905), and the earliest by birth-date, was Carl Reinecke (1824-1910). To place him in context; when he was born, Mozart had been dead for only 33 years, and Beethoven was still alive. He studied with Mendelssohn, and was a friend of Robert Schumann. He was considered a Mozart specialist, and wrote cadenzas for

Carl Reinecke

some of the concertos. His rolls of Mozart are therefore of great historical interest, and come as quite a shock when compared with our ideas of ‘authenticity’. Yet his playing was described by Rudolph Ganz, a pianist of at least two generations later, as ‘delightful’. By the time Reinecke made his rolls (both Welte and Hupfeld), he was not prepared to tackle big virtuoso works, and the playing is that of an old man, but it still displays an elegance from an earlier age. His rolls of Mozart and Schumann in particular are of great interest.
Around the same time, the Viennese Alfred Grünfeld also recorded. Grünfeld (1852-1924) was a court pianist in Vienna, and enjoyed a great reputation as a salon pianist, dispensing his own arrangements of Strauss waltzes as well as other light music. However, he should not be written off as merely a society charmer; his Welte rolls include music by Schubert, Chopin, Schumann and Beethoven, and his many disc recordings prove that Bach, Brahms, Grieg and even Korngold and Debussy were not beyond him. It is, however, his playing of Strauss waltzes which show why he was so popular with Viennese society before the First World War.

A considerable number of the pianists who recorded for the Welte-Mignon in the earliest days are, regrettably, no more than names to us. One such, Alexander Krah, has left five titles, two of which are big Liszt virtuoso items; he must have been a major artist. Then there is Anatol von Roesssel, whose 25 rolls include several by Russian composers; another completely forgotten pianist.

On 23 January 1905, Arthur Friedheim (1859-1932), the virtuoso who did not hide the fact that he had been a pupil of, and secretary to Liszt, made his first five rolls. All but one are of music by Liszt. His autobiography, *Life and Liszt*, includes over 150 pages of his reminiscences of his teacher.

In March of the same year, Xaver Scharwenka (1850-1924) visited Leipzig, and played for the Mignon. To my generation, his name conjures up the blue and white covers of the Augener Klindworth/Scharwenka edition of Chopin, but in his time, he had an international career as a performer in the German tradition, and he set up teaching conservatories in both Europe and America. Today, if he is remembered at all, it is for his *Polish Dance*, rendered as a piano duet by thousands and thousands of amateur pianists. His own interpretation on his Welte roll is full of delightful quirks and subtleties.

April produced Popper’s biggest international success to date - the Venezuelan virtuoso, Teresa Carreño (1853-1917). Carreño had started her career as a child prodigy, performing at the White House for President Lincoln when she was nine years old - and complaining about the condition of the piano! In later life, she not only played the piano, but from time to time led her own opera company, sometimes conducting, and even going on stage to sing. Her private life was equally tempestuous, but not particularly happy. She married four times, the last being to the brother of her second husband (this was considered bad form), but in fact her only happy marriage. She was a big player, storming her way through the major works of the piano repertoire. She never recorded for the gramophone, and so we must rely on her rolls for some idea of her interpretations. In a single visit to Leipzig, she managed to record 14 rolls, which include the complete Op. 17 *Fantasie* of Schumann, Beethoven’s *Waldstein* sonata, and two of Chopin’s *Ballades*. Her Duo-Art rolls, made probably in 1915, are too early to be successful, and do little or nothing for her reputation.
A name which was to become much better known between the Wars, Ossip Gabrilowitsch (1878-1936), made his first recordings for Welte on 7 April. A pupil of both Anton Rubinstein and Theodor Leschetizky, he made his debut in 1896, and first visited America in 1901. He became conductor of the Detroit Symphony Orchestra in 1918, a post he held until his death, but he continued to give piano recitals, particularly with his friend and colleague, Harold Bauer. Their Victor recording of the Waltz from Arensky’s Suite for Two Pianos, Op. 15, remains probably the subtlest and most musical piano duo recording ever made. Gabrilowitsch was known as the ‘Poet of the Piano’, and his choice of repertoire for the Welte-Mignon reflects this. He married Clara Clemens, the daughter of Mark Twain (this was his professional name). Clemens wrote two books, My Husband, Gabrilowitsch and My Father, Mark Twain!

On 8 May, the celebrated Austrian pianist and Beethoven specialist, Artur Schnabel (1882-1951) made his first recordings. Schnabel famously refused in the 1920s to record for the Duo-Art, and is thought by some to have dismissed the piano roll medium, but he did in fact make nearly 60 roll recordings for Hupfeld, Philipps and Ampico as well as for Welte. The Welte rolls show a much freer approach to his playing than the more considered, and to some, academic interpretations of his 78 rpm discs from the 1930s and 1940s. It is sobering to listen to the recordings made 100 years ago and realise that he was still playing after the Second World War. His Welte roll of Weber’s Invitation to the Dance bears little resemblance to the 78 rpm disc recording he made in 1947.

Considered by some to be Liszt’s greatest pupil, Eugen d’Albert (1864-1932) made his first Welte rolls in May 1905. In spite of his foreign sounding name, d’Albert was born in Glasgow. He felt little sympathy with Britain, and as early as 1884 declared his allegiance to Germany. He was married six times, his second wife being Teresa Carreño. In later life, d’Albert gave up playing the piano in public in favour of composition, his works including some 20 operas. His Welte rolls, dating from 1905 and 1913, enable us to hear some large-scale works which would never have suited the early gramophone. His freedom with the texts would be unacceptable today, but the grandeur of some of his playing is impressive. Particularly important are his performances of Liszt (including the Sonata) and Beethoven, and his fine roll of the Grieg Ballade from 1913 shows that he was still a master of the keyboard at that time.

During June, three pianists visited the music salon in Leipzig. Mark Hambourg (1879-1960), the wild and undisciplined Leschetizky pupil, recorded a handful of rolls, although his memory is much better served by the many 78 rpm recordings he made between 1910 and 1935.

The four rolls which Gustav Mahler (1860-1911) made are in a very different category. His reputation posthumously rests on his compositions, but during his lifetime, he also had a career as a conductor. These rolls are the
only records of him as a performer. He was probably no more than a competent pianist, and the rolls are transcriptions of his orchestral music. Musicians playing on their own do not necessarily reflect how they performed, for example, as soloists in concertos, or as orchestral conductors, and I think it is a mistake to read too much into these rolls. Nevertheless, they represent how Mahler played on that day in 1905, and they are of great historic interest in being the only evidence we have of how he viewed his own music.

The great Italian pianist and composer, Ferruccio Busoni (1866-1924), made his first recordings for anyone on 10 June 1905. He is repeatedly quoted as having been very unhappy about the disc recordings he made for Columbia in 1919 and 1922, the two sessions producing only four double-sided 78 rpm discs. His experiences with the reproducing piano roll companies must have been rather better, for he recorded for Hupfeld, Philipps Duca and Aeolian’s Duo-Art as well as for the Welte-Mignon, a total of 63 solo rolls and 8 duets with his pupil, Michael Zadora. The Hupfeld, Philipps and Welte rolls are particularly valuable for two reasons - firstly the rolls captured Busoni while still at the height of his powers, sometimes in large scale works, and secondly, the piano roll medium does not have the 4½ minute 78 disc time constraint which Busoni seems to have found so irksome. Busoni’s reputation today rests on his great intellect, and the influence he exerted on the musical world of his time. His playing as portrayed on the Welte and Duo-Art rolls can seem strangely mannered. Perhaps the choice of repertoire, particularly the small
pieces on his discs, did not interest him enough. However, the big Liszt operatic fantasies which he recorded for Welte show him in a very different light, and enable us to understand why so many of his contemporaries regarded him as the greatest pianist of his time.

During July and August 1905, no recordings were made.

It was back to work in September. The first visitor, on 10th, was the famous orchestral conductor, Felix Weingartner (1863-1942). Of his six rolls, four are of his own compositions, and the remainder, more familiar territory, the two rolls of Beethoven’s Sonata, Op. 109. On 12 September, Michael Zadora (1882-1946), the Busoni pupil, and Josef Slivinski (1865-1930), a now-forgotten Leschetizky pupil made recordings. Between them they played twenty titles. It must have been quite a day!

During the same month, two important names first crop up - Erno Dohnanyi (1877-1960) and Egon Petri (1881-1962). We think of these pianists as belonging to a later generation, understandably, since they both lived and played long enough to make LP recordings. Dohnanyi is remembered today for his witty and brilliant Variations on a Nursery Tune for piano and orchestra; otherwise, his compositions, many for piano solo, have largely dropped out of the standard repertoire. His Welte rolls allow us to hear him in the early years of his career playing music by Bach, Beethoven, Schubert, Chopin, Schumann, Liszt, Brahms as well as himself. Egon Petri, a pupil of Teresa Carreño and Busoni, is still held in high esteem among piano devotees, as witness the CD reissues of some of his disc recordings. His playing, even on these early Welte rolls, is of a more modern style, acceptable to our ears conditioned by the accuracy and technical proficiency which has become the norm. Petri’s titles are of considerable substance, and include Schumann’s Abegg Variations, the 32 Variations in C minor by Beethoven, four of the Années de Pèlerinage of Liszt, and two items by Alkan.

Later in the month, Raoul Pugno (1852-1914) made his first rolls. Pugno, one of my personal favourites, was an exponent of the old French jeu perlé style of playing - incredible lightness of touch, coupled in his case with a quite phenomenal technique. His initial career was as an organist, but by the 1890s he had switched to the piano. As well as a solo recitalist, he excelled in chamber music, enjoying a long-standing partnership with the Belgian violinist, Ysaye. Pugno made a long series of gramophone records in 1903, and many of the titles are duplicated on his Welte rolls, offering the chance to make comparisons, which show the two versions very similar, and giving credence to the Welte-Mignon. The Chopin Grande Polonaise Op. 22 is a good example of Pugno’s fluency in fast passage work, and the eleventh Hungarian Rhapsody of Liszt is irresistible.

Liszt’s last surviving pupil, Frederick Lamond (1868-1948) also made his first recordings in September 1905. Born in Glasgow, Lamond lived much of
his life in Germany, but returned to Scotland at the outbreak of World War II. He had a big reputation in the works of Liszt and Beethoven, and the Welte roll titles reflect this. Just about all the works he recorded in 1905 were played again for the gramophone during the 1920s. As with many other artists, he also made rolls for Hupfeld, Philipps and Aeolian.

During the second half of October 1905, there was considerable activity in the Popper music salon, but most of the pianists were local artists who are not even remembered by the most avid piano historians. There were, however, three important exceptions - Josef Hofmann, Engelbert Humperdinck and José Vianna da Motta.

Hofmann (1876-1957) started his career as a child prodigy at the age of 6 and was exploited to the extent that the Society for the Prevention of Cruelty to Children stepped in, and he was withdrawn from the concert platform until he reached the age of 18. In later years, he regretted this break in his public performances, saying that it took him some considerable time to regain the confidence he had enjoyed as a child. His teachers were Anton Rubinstein and later Moszkowski. He developed into one of the greatest pianists of all time, making much of his career in America. His recordings are unusual. After the group of 1905 Welte rolls, there is a gap until more Welte rolls in 1913. Then a long series of disc recordings for Columbia followed from 1914. From 1919, Hofmann recorded rolls exclusively for the Aeolian Company’s Duo-Art system. He was apparently very happy with these rolls, and he continued to work with Aeolian until the demise of the reproducing piano around 1930. Hofmann’s final issued disc recordings were made for Brunswick in 1922. Strangely, he never allowed his playing to be recorded by the superior electrical process developed for the gramophone in 1925, except for one or two abortive experiments during the 1930s. Fortunately, in addition to his published discs, there were amateur recordings of some public recitals and concerts.

Humperdinck (1854-1921) made just three rolls of his own music. His fame springs from his compositions, and so he is in the same category as Mahler - historically rather than artistically important from a pianistic point of view.

Da Motta (1868-1948) is of much greater interest for us - another important Liszt pupil. He was Portuguese, and for much of his life lived in Lisbon. He could not have been attracted to recording, as the 10 Welte rolls and a handful of Pathé discs made in the late 1920s are all the commercial recordings he made. The Chopin fourth Scherzo Op.54 shows him to have been an interesting player, but with a few of the eccentricities typical of pianists of 100 years ago.

Although not in the top rank of pianists, I cannot pass over Yolande Merô (1887-1963). This young lady on her 18th birthday, made her first recordings,
including the Staccato Caprice by Vogrich and Liszt’s second Hungarian Rhapsody, which both clearly show her great spirit and individuality.

By November, the remarkable catalogue of world-famous artists visiting Popper’s music salon had more or less dried up. Presumably those international artists whom Popper knew had already been lured into the studio. However, there was one fine pianist who made his first recordings that month - Emil Sauer (1862-1942). Sauer was a Liszt pupil, and one of the really great ones. He became Court pianist to the Kings of Saxony, Rumania and Bulgaria, entitling him to be known as Emil von Sauer. His choice of repertoire gives us the opportunity to hear something of the range of his pianism, from several of his own compositions, to big barn-storming Liszt pieces - the Don Juan Fantasy and Mazeppa, to items requiring a poetic approach, such as a Chopin Nocturne and Mendelssohn’s On Wings of Song. He repeated his own Echo de Vienne and Flammes de Mer both for the gramophone and Duo-Art rolls during the 1920s.

A few artists visited Leipzig in December, including the composer Max Reger (1873-1916). Reger is known today as a composer, but he was also a noted pianist and organist, and devoted time to teaching. One rather dubious attribute is that shortly before his death, he composed an organ work celebrating Germany’s winning the First World War! His 10 rolls are of his own compositions, and all, regrettably, minor pieces. In addition to his Mignon piano rolls, in 1913 Reger also recorded for the Welte Philharmonic
organ. There is a splendid photograph of him being driven up to the Welte studio in an open car!

Three important pianists made their debut in December - Saint-Saëns, Sapellnikoff and Stavenhagen. Camille Saint-Saëns (1835-1921), in addition to being a prolific composer, was an outstanding pianist of the French school. Technique seems to have been no bother to him whatsoever, and as a musical mind, he was in the same class as, for example, Mozart. The speed of his fingerwork on roll is dazzling, and in some cases would be hard to believe were it not for his disc recordings of some of the same pieces. Saint-Saëns was a child prodigy, and after a recital at the age of 11, he offered any one of the 32 Beethoven sonatas as encores! He claimed that composing came ‘as easily as a tree produces apples’, and his four symphonies, four symphonic poems, five piano concertos and 13 operas testify to this; his piano playing apparently gave him just as little effort. After the tragic death of his two children in the 1860s, he never had a permanent home, living in hotels and travelling widely for the rest of his life. All his disc recordings and most of his piano rolls are of his own music, which of course he played incomparably, but he did include pieces by Chopin, Beethoven and Schumann in his Welte rolls which he approached in a rather dry, detached way, presumably in the French style of the first half of the nineteenth century.

Vassily Sapellnikoff (1867-1941), a pupil of Louis Brassin and Sophie Menter, was also a friend and pupil of Tchaikovsky, and one of Sapellnikoff’s claims to fame was that he made his debut in Hamburg in 1888, playing the Tchaikovsky first piano Concerto with the composer conducting. In 1926, he made a disc recording of the work for English Vocalion, but while the playing is fine, it is not considered one of its definitive recordings. His playing of the Liszt Rhapsodie Espagnole and Liszt’s transcription of the William Tell Overture are two of the great performances of the early Welte rolls.

Bernhard Stavenhagen (1862-1914) was yet another Liszt pupil. He is one of those shadowy figures who apparently was not particularly interested in having his playing preserved for posterity. We have to rely on a handful of Welte and Hupfeld rolls to hear how this major artist sounded. On the strength of the Welte rolls, he was an impressive artist who treated the printed score with some freedom, as was the practice in the nineteenth century. Nevertheless, his roll of the Chopin/Liszt My Joy is full of magic, and Liszt’s twelfth Hungarian Rhapsody, played as his Master might have done, is in the grandest possible manner, and totally convincing.

January 1906 was a lean month as far as recording was concerned, but come February, Welte and Bockisch were busy again in Leipzig, recording no less than 18 pianists. First, in terms of this survey of the more important artists, came the Russian Annette Essipoff (1851-1914). She studied with Leschetizky, and for a time was one of his several wives. She had an alarmingly efficient
approach to the piano, without, according to Shaw, ‘anything so weak as tenderness!’ She gave hundreds of recitals both in Europe and America, and after her divorce from Leschetizky in 1892 taught at the St Petersburg Conservatory for the rest of her professional life. Among her pupils was the young Prokofiev. The few Welte rolls are her only recorded legacy.

Artur Nikisch (1855-1922), the famous Hungarian conductor and accompanist, made his only visit to the Welte recording studio on 9 February, and recorded some very Hungarian Hungarian Dances of Brahms, and the German pianist Elly Ney (1882-1968), whose long career continued into the 1950s, made her first recordings that month.

Much more importantly, Carl Friedberg (1872-1955), a major pupil of Clara Schumann, made his first recordings. In the early years of the twentieth century, he recorded 61 rolls for Welte, Hupfeld, Philipps and Aeolian, but refused to record for the gramophone until the LP era in 1952. His rolls, along with those of his fellow Clara Schumann pupil, Fanny Davies (who recorded for Welte in London in 1909), are of great historical and musical importance.

On 15 February, the Belgian pianist Arthur de Greef (1862-1940), yet another Liszt pupil, made his first recordings, but his major output was for the gramophone. The composer/conductor, Richard Strauss (1862-1949) played for the Mignon on 16th of the month, leaving transcriptions of excerpts from Salome and Ein Heldenleben as well as a few minor items. As can be imagined, piano solos are not the best way of hearing large orchestral/operatic scores,
and Strauss left a considerable volume of gramophone recordings of himself conducting, a far more satisfactory legacy.

Theodor Leschetizky (1829-1915), the most famous nineteenth century teacher, along with Liszt, and the second earliest pianist to have recorded (after Reinecke), made his only recordings for Welte on 18 February. As the pedagogue responsible for hundreds of the most famous pianists from Essipoff (born 1851) to Horszowski (died 1993), it is fascinating to hear just how the master played. On the strength of these few rolls, there is no doubt that he was indeed a great artist who kept his technique up to scratch right up to his 77th year, when he played for Welte. Of course he played a number of his own compositions, which are hardly the greatest music, but fortunately, he also played a Mozart Fantasia in C minor and two works by Chopin. Leschetizky was already 19 by the time Chopin died, which makes his Chopin playing particularly interesting. The Nocturne Op 27 No 2 is a beautifully considered performance in the rather free 19th century style, and includes a number of variants from the published score, which Leschetizky may well have learned from contemporaries of the composer. It is interesting that two Leschetizky pupils, John Powell and Frank LaForge, both made recordings of this Nocturne, and incorporated the same textual variants as their teacher.

On the following day, the mischievous, self-publicist, ‘greatest Chopin player of his time’, Vladimir de Pachmann (1848-1933) came to the studio. He tends to be remembered today as an eccentric old man whose playing was, to say the least, erratic. This is to do him a great injustice. He was famed for his exquisite tone production, and he must have had a considerable stage presence, neither of which can be captured on roll or disc. Nevertheless, his playing on his many early gramophone records suggests a major, serious artist with a fine technique. Sadly, the only sizeable work he recorded for the gramophone was the Chopin Ballade No. 3, Op. 47 (the two sides are available on two separate Arbiter CDs, 129 and 141). The Welte rolls from 1906 are played, generally, in a more straightforward way than by many of his contemporaries. Apart from the Mozart Sonata K331, Pachmann chose to play only small works, depriving us of hearing how he tackled large scale works from his repertoire, which the Welte rolls would have allowed him to do. In old age, he is quoted as having said that he preferred his rolls to his discs, but I think this generalisation needs to be taken with a pinch of salt! Certainly his Welte Licensee rolls from the mid-1920s are much more successful overall than his Duo-Art rolls or some of his late discs. Pachmann can be seen in a short silent film, made around 1922, where he is supposed to be recording a Duo-Art roll. In that, he appears completely compos mentis, and the ease of his style of playing is a joy to watch. So far, no-one has worked out what he is playing!

At the end of the month, Popper made his greatest catch - Ignace Jan Paderewski (1860-1941). Paderewski - the most famous pianist in the world!
Not only was this artistically important, but its commercial value was immeasurable. The photograph of him sitting at the Feurich recording grand in the studio was used extensively in Welte’s publicity material for years to come. These recordings from 1906 were Paderewski’s first essays in the medium, and one wonders how he viewed them. Compared to his later records, both for the gramophone and for Duo-Art, they show considerably more freedom - some might say self-indulgence. They are variable, as was his playing on the concert platform, on occasions marred by wrong notes, and even wrong harmonies, which makes one doubt just how much the roll editors took it upon themselves to correct mistakes, and whether in fact the artists bothered to approve their rolls before issue. Realistically, if the pianists were not able to return to Leipzig or Freiburg, they could not have passed the rolls to the satisfaction of Welte or Bockisch. Paderewski’s Welte rolls of his own Nocturne Op 16 No.4 and Liszt’s tenth Hungarian Rhapsody are the finest performances these works he has left us. The Chopin Polonaise Op 53 is wild but exciting, and shows what the old man had in mind when he made his HMV disc recording in 1937. As a group these rolls do not represent Paderewski’s playing at its best, but they are an insight into how he sounded at the height of his powers and when public adulation for him was at its zenith. And they were of fantastic importance for Welte - to have recordings of such a personality who, today, would be lauded like one of the most successful pop stars.

There was only one recording session in March, of little historic importance.

This phase of recording for the Mignon finished on 17 April when the elderly Edvard Grieg (1843-1907) came to play three of his own short pieces. He was not well at the time, but that does not seem to have affected his playing, which is delightful. Grieg was a superb pianist, as can be heard on his nine admittedly primitive disc recordings which he made in 1903. The playing on the Welte rolls is obviously by the same man, and we have a testimony by Fanny Davies that his roll of Schmetterling has the same delicacy that she remembered from hearing him play.

This brings to an end this survey of a truly remarkable 16 months of recording by Welte and Bockisch, a period of such artistic activity which would not be repeated during the life of the Welte-Mignon. After the Grieg session, the recording apparatus was moved back to Freiburg, and no further recording was undertaken in Popper’s salon again. Was it that there was a falling-out between Welte and Popper, although Popper continued to hold the Welte agency after that? Or were Welte and Bockisch wanting to experiment with improvements to their recording methods? In the photograph of Josef Lhévinne recording in October 1906, there appears for the first time the small cabinet on top of the main recording console. Or had
enough recordings been made to satisfy the demand for a good catalogue for some time, and it was more important to consolidate their activities and prepare rolls for issue? We may never know the answer. What is without doubt, however, is that these rolls form a most important page in the history of piano playing.

*Josef Lhévinne at the recording piano in Freiburg.  
Note the small cabinet on top of the recording console*

**Acknowledgements**

This article has benefitted immeasurably from the information I have been able to use from Charles Davis Smith’s definitive *The Welte-Mignon: Its Music and Musicians*. It would also be ungracious of me not to thank Mark Reinhart, who has been only too happy to share valuable items from his large Welte collection.
Recording Welte-Mignon Piano Rolls in Germany
Denis Hall

Over the years, enthusiasts for the reproducing piano have become increasingly fascinated by the process used by Edwin Welte and his brother-in-law, Karl Bockisch, for recording the data required to manufacture the Welte-Mignon red T100 piano rolls, a topic all the more intriguing because it was kept secret by its inventors. Since the revival of interest in the Welte-Mignon after the Second World War, a number of theories have been put forward, some more probable than others, and Mark Reinhart, in his major article, discusses these. In this short article, I should like to concentrate on just one, which was described by Richard Simonton Snr. on the sleeve note for the American Columbia LPs of recordings of Edwin Welte’s own Steinway grand. The recordings date from the late 1940s, and the records were published in 1950.

Simonton’s writings have been embellished over the years, presumably with a view to making them more credible, but in fact resulting in the opposite.

This is his original text.¹

‘There was a standard Steinway grand piano, equipped with a trough running the length of the keyboard and immediately under it,’ writes Mr Simonton. ‘In this trough, there was a pool of mercury, and when the key was depressed, a carbon rod attached to the bottom of the key engaged this mercury and caused an electrical contact to be made. The resistance of this contact varied with the pressure exerted on the carbon rod so that actually, depending upon the blow with which the key was struck, there was a corresponding change in the electrical resistance of the contact made. All of the keys were connected by wires to the recording machine, which was usually some feet away from the controlling piano. This machine had within it the conventional rolls of paper which were entirely blank and without perforation, but were ruled their entire length with over one hundred fine lines, each corresponding to the center line of its control mechanism. Above the point at which the impression actually took place on the paper was a series of small rubber rollers of a composition similar to the type used in a printing press, and these rollers were inked with an ink similar to that used by the printing industry. The result was that as the keys of the piano were depressed, these rollers engaged and transferred their inking to the paper in such a way that, depending upon the blow or touch exerted upon the keys of the piano, there was a corresponding difference in the inking of the paper on the master roll. Other functions of playing were also transferred, such as pedalling. After the recording was completed, it was sent to the laboratory and very carefully prepared for being used in the reproducing machine, or used in reverse in order to give a performance and re-create once again the actual playing of the artist as the roll had recorded it. For this purpose, the Weltes had constructed a machine which was the exact opposite of the recording piano. This device had felt covered levers - one for
every key. It was a cumbersome thing that was placed in front of the keyboard of a piano and when a roll master was put inside, it actuated the mechanism within this monster in such a way that these levers came down and depressed the keys with the same dynamics in the same order as in the original performance. Every precaution was taken to get conditions as nearly equal as possible to the original performance so these wooden levers were made the same length as a man’s fingers from the pivot of his wrist to the tips, so that the same power of touch would produce the same dynamic strength on the piano as the artist when he struck the keys during the making of the recording.’

Those people who knew Simonton say that he was not a technical man, and as a result, this description is short on detail, either because there were aspects which he did not fully understand, or because he tried to simplify the description of the process for the benefit of the average reader, and only succeeded in posing more questions than he answered. In any event, this is the description which Simonton wrote while he was still in touch with Welte and Bockisch, and so what he had been told should have been fresh in his mind.

Simonton has written\(^2\) that he had a complete description from Bockisch, and that he (Bockisch) did not refuse to tell him anything about it. It would seem reasonable to assume that the method described here was the one generally used. To have told him otherwise would surely have been perverse, although there is evidence of other methods having been used over the years (see Mark Reinhart’s article).

No first masters to prove this process have survived. However, in its favour is the fact that all the technology required would have been available to Welte and Bockisch at the beginning of the twentieth century. Carbon was used in a number of electrical applications, and rods could be manufactured with known resistances, and could carry heavy currents which are necessary to operate solenoids, which even today are notoriously inefficient. Simonton relates elsewhere that the recording process needed a large amount of direct current, which lends credence to solenoids having been used. Mercury, with its high specific gravity, would not splash when the carbon rods dipped into it, and would therefore give consistent measurements. The recording of ‘hand-played’ rolls, i.e., rolls without automatic expression coding, was being developed by several roll companies around that time. High quality printing had existed for generations.

The recording of the notes, i.e., the pitch, their length and their placing relative to each other, is straightforward enough. The pianist presses the key, the carbon rod fixed to the underside of the key dips into the mercury and makes a contact, and a solenoid activates the inked roller to make a trace on the blank roll. Where Simonton becomes less clear is exactly how the dynamics were recorded. He describes a series of small rubber rollers which, as the piano keys were depressed, transferred their inking to the
paper. Depending on the blow or touch exerted on the keys, ‘there was a corresponding difference in the inking’. What does that mean? How loud a piano sounds is dependent on how fast the hammer is travelling when it hits the string. This can be measured, as was the case in the late 1920s for the ‘new’ Ampico roll recordings, but a reading can also be obtained by measuring the speed with which the piano key is depressed. This is where the carbon rods, fixed to the underside of the keys, with their predetermined resistance, come in. The deeper the rods dip into the mercury, so their resistance decreases, and more current is passed to the solenoids operating the rubber rollers to mark the blank roll. Simonton is not specific in his description of these rollers, but merely says ‘of a composition similar to the type used in a printing press’. However, the fact that the rollers were made of rubber, and not of a hard, unyielding material such as steel, may be interpreted that they had some resilience, and would squash down slightly on to the paper as greater force was applied by the solenoids pressing them down. If one takes it (and it is only one possible interpretation) that the rollers were very narrow at their outside edge, and V-shaped, then depending on how hard the piano key was struck (i.e., how fast it was depressed), a different pattern at the beginning of the ink tracing would be marked. The higher resistance in each carbon rod/mercury circuit at the beginning of the key stroke would produce less power in the solenoid, and therefore less pressure on the rubber roller, giving a narrower trace. At the point when the key was fully depressed and the resistance lowest, a wider trace would be recorded. By observing the ‘V’ shape from the beginnings of the traces at their narrowest point to where they reached their full width, loud playing and accented notes could at least be differentiated from soft playing. A short distance represented a loud note and a longer one a quieter one.

Welte red T100 rolls play at a speed of $9\frac{3}{4}$ feet per minute, which means that the difference in the shape of the beginnings of the traces would be very small. A number of second masters, i.e., those very accurate rolls read by the perforating machines from which production rolls were cut, but all dating from the 1920s, and photos of part of an original roll, show that these were normal length. The distance on such rolls from the initial mark to the full width for a very loud note would be about .06”, and for a quiet note, .16”, (3) probably too short to extract really meaningful data to convert into Welte dynamic coding. However, an elderly ex-employee(5) from the Welte factory in Freiburg had distinct memories of having seen some double length second masters. This would certainly help with interpreting the traces. The relative measurements would then be .12” and .32”, which would be rather easier to read. During what period these double length masters were used we do not know.
The very high quality and subjective musicality of even the earliest T100 rolls can only make one admire hugely the skill of Welte, Bockisch and their staff. Simonton got to know Welte and Bockisch, interviewed them, and wrote his LP sleeve note only a short time after he had been in Freiburg, and indeed while he was still in touch with the two men.

We may never know the Welte secret, but it is interesting to speculate. The process described here seems barely adequate to produce the data in sufficient detail to create such subtle rolls, but there is strong evidence in the comparison with early disc recordings made from 1903 on that the Welte roll performances recreate those on disc to a remarkable degree.

Notes

(1) American Columbia LP No. ML4291-5.
(3) Cleaning the Windows of Time - Rex Lawson (Pianola Journal No 12 p 17).
(4) Interview of Lydia Reinbolz by Hans W. Schmitz 1976.
Scriabin and the Welte-Mignon: A Different Perspective
Mark Reinhart

Douglas Riva’s article on Enrique Granados’ playing in the Pianola Journal No. 15, 2003, presents a thoughtful analysis that the Duo-Art, Odéon, and Welte-Mignon recordings represent a more advanced perspective of how Granados ultimately realized the performance of his own works. Since Granados drew upon the art of improvisation, he continued to develop some of his works beyond what was earlier published. In this respect, the playing can be considered more mature and definitive of what the pianist was seeking in his works. As Mr Riva shows, this was supported by the interpretations of the Granados students.

It was the Riva article and the completion of the most recent Kenneth K. Caswell CD, Alexander Scriabin: The Composer as Pianist that motivated me to think about Scriabin’s playing for Welte-Mignon. The Caswell CD contains a collection of nine pieces on six rolls that Scriabin made for M. Welte u. Soehne in January, 1910 in Moscow. In addition, the CD contains other Welte-Mignon pianists playing Scriabin, including Josef Lhévinne, Constantine Igumnoff, Alexander Goldenweiser, Austin Conradi, Leff Pouishnoff, and Magdeleine Brard. Of particular note is the inclusion on the CD of the pianists Igumnoff and Goldenweiser, whose Welte-Mignon recordings were also recorded in Moscow in January 1910. Igumnoff and Goldenweiser, if not actually recorded in the same session, played within days of the Scriabin session.

The playing by Scriabin [1872-1915] on his Welte-Mignon rolls is much freer than is encountered in the published score. This is in contrast to other pianists on the CD. Alexander Goldenweiser plays the Mazurka, Op. 40, No. 2 much closer to the published score than does the composer. The question arises; is the Scriabin Welte-Mignon performance truer to the composer’s wishes than the published score? The Riva article certainly resolves this question for Granados, but what about Scriabin? A valid question indeed!

Review of the Grove Dictionary of Music and Musicians offers little insight into the live playing of the composer as pianist. Most music dictionary biographies consulted for this article focus on the use of colors in some of Scriabin’s orchestral performances but little on his actual performance as pianist. The Faubion Bowers book, The New Scriabin Enigma and Answers, offers more insight.

Bowers writes that Scriabin called the art of performance, ‘the art of experience’. According to Bowers, Scriabin said, ‘a composition is many faceted... alive and breathes on its own. It is one thing today, and another tomorrow, like the sea. How awful it would be if the sea were the same every day and the same forever, like a movie film!’ It is interesting in retrospect that
some of the Welte-Mignon advertising described the recording process as a ‘photograph’ of the artist’s playing. The Welte advertising contrasts Scriabin’s philosophy that music is constantly changing rather than static. This is vividly expressed in the freedom of Scriabin’s playing in his Welte-Mignon rolls.

Scriabin must have frequently altered his playing in public from the printed score, as is also reported by Bowers. Yavorsky, a serious student of Scriabin in concert, attended performances with the music score in his hands. In 1913, a critic asked Yavorsky about the variations in the Master’s playing, ‘Scriabin always plays more or less as he has written his pieces. On occasion he plays them entirely different ... and opposite from the way that they are marked.’ Yavorsky answered, ‘More important is that when he changes them, it is always for the best.’

Bowers adds that Scriabin, in general, did not like the piano playing of his works by others. The exception was the playing of his friends. They pleased him in their interpretation of certain pieces, ‘but certain pieces only.’ Josef Lhévinne began playing Scriabin in 1896, introducing a set of Études to his Paris audiences. Lhévinne recorded the Nocturne for Left Hand, Op. 9, No. 2 for Welte-Mignon in 1906 in the Freiburg studio. Constantine Igumnoff incorporated the works of Scriabin in his playing from 1896 as well.

Welte pianists who recorded works of Scriabin in Moscow in 1910 were Constantine Igumnoff, Alexander Goldenweiser, Isabella Vengerova, Theodor Koenemann, and Gabriel Romanowsky. Were these pianists friends of...
Scriabin? Did their playing of ‘certain pieces only’ meet with his approval? That question remains unanswered. The fact remains that they were playing Scriabin’s works concurrently with the composer himself. In this light, the playing of these pianists should be considered to be at least influenced by the composer. At best, they were his friends and performed ‘certain pieces’ to the composer’s liking. Given the absence of other recordings from Scriabin’s peers at that time, they may be as close to the composer’s wishes as may be heard.

What is unfortunate is that most of the Welte-Mignon rolls recorded in Russia are difficult to locate today. Original copies of Scriabin composed rolls are especially difficult to find. For most enthusiasts of the Welte-Mignon, locating and auditioning these obscure titles could take many years to accomplish. The Igumnoff recording session for Welte included the Sonata Fantasie, Op. 19, No. 2, first movement.\(^1\) Alexander Goldenweiser recorded the Mazurka Op. 40, No. 2. Both of these recordings are found on the Caswell CD. The Caswell CD does make some of these rare titles available in a medium which is more accessible to modern listeners. Those owning a finely restored Welte-Mignon instrument, who have access to any of these titles, are fortunate to be able to experience the magic for themselves.

In conclusion, Bowers’ writing suggests that Scriabin’s shifting performances were the norm for his live playing. It seems to be a mistake to interpret the composer’s performances as definitive in the case of Scriabin’s own Welte-Mignon recordings. What the Welte-Mignon recordings do give us, are examples of the tidal movement of Scriabin’s playing. We are able to briefly glimpse the mood of the composer on the day he sat at the Welte-Mignon recording piano. This is especially valuable when contrasted with the playing of his peers.

Notes
\(^1\) Alexander Scriabin: The Composer as Pianist, Pierian 0018, The Caswell Collection, Volume 5, Pierian Recording Society, Post Office Box 90476, Austin, TX 78709 USA.

\(^2\) Leff Poushonoff (sometimes listed as Pyschnoff) recorded in Petrograd in January 1910 but did not include any works of Scriabin. The Poushonnoff recordings of works by Scriabin were recorded in New York, circa 1926, for the Deluxe Reproducing Roll Corporation, makers of Welte-Mignon Licensee rolls.

\(^3\) Welte Mignon roll number 2081

\(^4\) Welte Mignon roll number 2072

Ibid. p. 198

Ibid. p. 196

Ibid. p. 195

Welte-Mignon roll number 1300

Ibid. p. 195

Vengerova, Koenemann (sometimes listed today as Fyodor Keneman), and Romanowsky are not represented on the Caswell CD.

Welte-Mignon roll number 2063
Nancarrow’s *Concerto for Pianola*
Paul Usher

‘...This Concerto that I am now only vaguely thinking of is going to be fairly long, complex and difficult. When it is finished I am going to want quite a bit of money. If no one wants to pay it I will put it on the shelf as I have done many times in the past.’

(Letter from Nancarrow to Dr Wolfgang Becker of WDR, 19 October 1986)

**The sketches**

In November 2003 I went to Basel to spend two weeks at the Paul Sacher Foundation where I hoped to find traces of the Concerto for Pianola and orchestra Conlon Nancarrow had agreed to write for Rex Lawson back in 1986. I had been told that there were several pages of a pianola part written out in the middle of 24-stave blank manuscript paper - and not a lot else. What is definitely known about this piece is that it has some connection with the three movements of Study 49, although whether these were made out of abandoned material for the concerto, or the concerto was to have used this music in some way is not known. I spent my first days in Basel transcribing Study 49a-c from the punching scores, including several variants of the second half of Study 49b.

Each of Nancarrow’s studies is based on a particular set of tempo ratios, and crucially, almost every study is unique - once he had used a particular set of ratios he would not use it again, making this aspect of the music almost like a fingerprint. Study 49 is based on the tempo ratios 4:5:6 - the frequency ratios of a major chord. In a letter regarding his plans for the piece he also said that it would involve up to eight different tempi. This narrowed down what I would look for in the sketches - music that incorporated the ratios 4:5:6 and possibly others. I then began to trawl through a trolley load of folders containing all the sketches that had not as yet been identified as belonging to a particular work. Towards the end of the first week I came across a folder that particularly caught my attention. It contained about seven sketches of various lengths and in several places there were indications of instrumentation - groups of horns, trombones, and an elaborate canon for timpani, congas, temple blocks and wood blocks - music for a large orchestra in fact. The manuscript paper was marked out with the following ratios: 3.33:4:5:6:7:9:11:13 - a 13th chord built on C with A below, or A-C-E-G-Bb-D-F-Ab (Nancarrow marked the ratios with the appropriate letter names: C, E, Bb etc). These tempi could have been derived from Study 49c where this 13th chord is often sustained from the up-rushing chromatic scales. What all these sketches also had in common was the use of a repeated rhythmic pattern 3-3-4-2-4. Two of the sketches were marked ‘Con. A3’ and ‘Con. A4’ (there was also a scrap of paper with the first bar of Study 49b marked ‘Con. D’). They appeared to be sketches for the opening of
two movements. One of them ended with a fragment of Study 49a played on trombone, horn and oboe. Another ended with the opening flourish of Study 49c. This seemed to be fairly conclusive proof that I was looking at Nancarrow’s sketches for the Concerto, and that he had got further with it than previously thought, although of course there is no proof that these had not been abandoned or rejected, rather than simply unfinished. I transcribed these sketches and a few other bits and pieces that were possibly connected, because they were written on the same type of manuscript paper, or they used the appropriate tempo ratios or rhythmic pattern, and took these copies back to London.

The Nancarrow Concerto and some comments on writing for the Pianola

Movement 1

The piece begins with the percussion canon, edited and elaborated. A prepared piano is also used as an additional percussive instrument. I felt that the entry of the Study 49a theme did not work here - all the energy of the canon was dissipated. Instead I have taken a fragment of the end of Study 49a and telescoped the whole movement out of it, generating about thirty different versions which gradually accelerate over the course of the movement - the original being heard as a blur on the pianola at the end of the movement. Over this I wrote a complex pianola canon using the 3-3-4-2-4 rhythmic motif as a basis. Approximately half way through the movement there is a pause and there begins a canon on the strings based on one of Nancarrow’s sketches - (while this canon gets under way the pianist must change the roll and then re-coordinate with the ensemble - the noise of the roll winding back is also part of the piece - an extra bit of percussion!) - I continued Nancarrow’s canon and ‘dove-tailed’ it with the ‘telescope’ process leading to the super-human chaos of the movements close.

Movement 2

One of the sketches based on the 13th chord tempi was an ostinato based on a repeating series of 3-3-4-2-4 along with a little minor 3rd motive. I noticed that this sketch had almost exactly the same number of bars as Study 49b and that the key scheme closely matched the Study, following a cycle of fifths. The second half was not such a close match, which may be explained by the fact that the second half of the Study exists in at least three different versions - the final score as written by Nancarrow does not match the punching score (and therefore the Wergo recording). I edited the second half and completed the ending (about three bars). This movement is perhaps the closest to what Nancarrow may have written - in fact I have only edited it and composed about 3 additional bars.
Movement 3
This movement is completely original although inspired by a procedure found in Nancarrow’s Study 33 where canonic voices of different tempi begin simultaneously but are swapped over at a specific point in order that they can converge. If the 1st movement sees the pianola as a super-human note making machine and the second is a more or less neo-classical interpretation, then the 3rd is where I feel the true potential of the pianola as a unique ensemble instrument begins to be felt. This is because the player can follow the conductor in one tempo but what comes out of the piano is in another - enabling very complex tempo relationships to be precisely played. It has to be said that this requires great concentration from the pianolist and also goes against his instinctive way of playing. If I had the opportunity to write more in the future I would perhaps modify my approach here and make at least some of the pianola’s music related to the conducted tempo! It seems to me that the possibilities for the use of the pianola in ensemble contexts, (not just as a soloist), is of great interest and seems to have been very little exploited.

So here the pianola plays a series of three ‘switch-over’ canons in metres designed to closely approximate irrational tempo relations (Φ/2 - √3/2 - √5/2). At each convergence point a little ritornello is played by the brass. Across these canons the ensemble plays the music of the first canon at different tempi - the ensemble piano ghosts the pianola at first, then after the first convergence point a percussion version is played and finally starting with the third canon the woodwind play their version, converging at the end, - the movement finishes with the brass ritornello alone.

Movement 4
Nancarrow’s introduction survives almost intact up to the entry of the pianola (Study 49e), though re-orchestrated for the smaller ensemble. As in the 1st movement, I felt that what seemed to be Nancarrow’s obvious intention of using the material of Study 49 after the orchestral introduction, did not work. It is perhaps significant that Nancarrow did not continue these sketches from the point where the Study 49 material is indicated. One reason for this is that what works very well on Nancarrow’s modified pianos with their hard percussive sound does not necessarily work well on a modern concert grand, and this is of course what we would use for our piece. So, what follows is a completely original three voice canon on the pianola written in conjunction with an elaboration of all remaining sketches played by the ensemble, (similar to the third movement in using approximations to irrational tempo relationships (√13 - √3 - √7)) and precisely co-ordinated. Of the ensemble part only the climax of the movement is newly written. The piece ends with a brief coda - almost an anti-cadenza, in contrast to the end of the 1st movement, where the pianola plays simply and quietly.
When I began to write this piece in January of 2004 I was faced with a multiple task: to think about how to write for a new instrument, to think how to write for this instrument in an ensemble context, and to fit this all in while utilising the music of another composer (and writing what I hoped would be an enjoyable piece of music). I think that the way I thought about the instrument grew during the course of writing the piece and will continue to grow in the future.

The pianola is not so much a different instrument as a different ‘interface’ to a familiar one, altering the way one thinks about its possibilities. It is comparable in some ways to, for instance, the way the performance of Bach’s violin music must be reconsidered according to whether one is using a baroque ‘arched bow’ or a modern bow. Or in the case of H. F. Biber’s many pieces involving scordatura (non-standard tuning) which, if attempted on a modern instrument (not strung with gut), would destroy it. The pianola already has a repertoire that could be called ‘pianolistic’ (as opposed to ‘pianistic’), and I am sure it holds many possibilities for expanding any definition of that term.

The performance
The first full rehearsal of the Nancarrow Concerto took place in Frankfurt on 11 November 2004. The players of Ensemble Modern had been very well prepared by Kasper de Roo and it went extraordinarily well, everyone very interested to see the pianola in action and quite amazed at the first run through of the 1st Movement as the soloist swamps the ensemble. It was a great pleasure to be present at this rehearsal as there was a very relaxed atmosphere, and not the feeling of barely suppressed hostility from players that is sometimes to be felt at rehearsals of new pieces!

Rex Lawson was in many ways in a difficult position, having only shortly before received the five rolls and was now plunged in at the deep end with unfamiliar players and conductor. Although a preliminary rehearsal alone with Kasper had helped to clear the way, this was still unfamiliar territory for everyone; the players not sure what to expect from rehearsing with such a machine or having any idea what the solo part would sound like, and the soloist having not had very much time to familiarize himself with the music and at the same time adjusting to a slightly different way of playing, due to the relationship of the solo part to the ensemble. It is a tribute to the gifts of all involved that so little went wrong!

The first performance of the Nancarrow Concerto took place in Köln on 13 November in a late night concert in the Klaus von Bismarck Saal of the WDR. Only seven minutes were allowed for the push-up to be attached to the piano due to the fact that the performance was being broadcast live and had to be kept within its broadcast slot. This lack of time for preparation caused the only
technical hitch of the evening in that a low C was left hanging a couple of times, though very few people would have been aware of this.

Otherwise the performance was of an exceptionally high quality, played with great flair and energy. It would perhaps be inappropriate for me to comment on the musical qualities of the piece, but I can say that the performance exceeded my expectations and was very warmly received by everyone.
Appendix - CD

With this issue of the Journal, we are pleased to enclose a CD of a representative selection of the early Welte-Mignon rolls played on a medium size Steinway-Welte grand, one of the standard pianos into which Welte installed their reproducing mechanism. The particular instrument used was made in 1922 and is the property of Denis Hall. Recorded at Hayes, Kent during March 2005. Digital editing by Richard Black.

1. **Raoul Pugno (1852-1914)**
   Prelude and Fugue in F minor (Book 2)  
   Bach  
   544  
   26/09/1905

2. **Ignace Jan Paderewski (1860-1941)**
   Polonaise Op 53  
   Chopin  
   1256  
   27/02/1906

3. **Theodor Leschetizky (1829-1915)**
   Nocturne Op 27/2  
   Chopin  
   1194  
   18/02/1906

4. **Ferruccio Busoni (1866-1924)**
   Valse-Caprice on Motives from *Lucia di Lammermoor*  
   Donizetti/Liszt  
   442  
   11/11/1905

5. **Teresa Carreño (1853-1917)**
   Petrarch Sonnet No 47  
   Liszt  
   368  
   2/04/1905

6. **Edvard Grieg (1843-1907)**
   Norwegian Bridal March Op 19/2  
   Grieg  
   1276  
   17/04/1906

7. **Vassily Sapellnikoff (1867-1941)**
   Nachtfalter (The Moth)  
   Strauss/Tausig  
   939  
   1/12/1905

8. **Alexander Scriabin (1872-1915)**
   Preludes Op 11/13 & 14  
   Scriabin  
   2069  
   -/02/1910

9. **Professor Paul de Conne (1874-1959)**
   Romance Op 38/2  
   Schütz  
   922  
   29/11/1905

10. **Xaver Scharwenka (1860-1924)**
    Polish Dance Op 47/1  
    Scharwenka  
    233  
    7/03/1905

11. **Camille Saint-Saëns (1835-1921)**
    Rhapsodie d’Auvergne Op 73  
    Saint-Saëns  
    800  
    13/12/1905

12. **Yolanda Merô (1887-1963)**
    Staccato Caprice  
    Vogrich  
    763  
    30/10/1905

13. **Josef Lhévinne (1874-1944)**
    Arabesque on The Beautiful *Blue Danube*  
    Strauss/Schulz-Evler  
    1305  
    6/10/1906

14. **Ignace Jan Paderewski (1860-1941)**
    Minuet Op 14/1  
    Paderewski  
    1263  
    27/02/1906
Contributors

Denis Hall has for many years been an enthusiast of historic performance recordings both on piano roll and disc and of making them accessible to present-day music lovers. He has involved himself in the restoration and preparation of reproducing pianos for concerts and recordings and in the transfer of 78 rpm recordings to master tape for LP and CD reissue.

Mark Reinhart has been involved with the Welte-Mignon for nearly thirty years, drawn by the music and interpretational styles of the distant past. By profession he is an electrical engineer working for the United States Patent Office, but his articles on musical and instrumental topics have been published in several specialist journals. Mark lives in rural West Virginia with his partner, a number of Welte pianos, and six cats.

Paul Usher was born in London and studied music at the Royal Academy of Music, Kings College (University of London) and the University of York. His music has been performed at events such as the Bath International Music Festival, the Huddersfield Contemporary Music Festival, Wien Modern and the Donaueschinger Musiktage. Performers include the Arditti Quarter, the Südwestfunk Symphony Orchestra, and Ensemble Modern.
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