

## The Reproducing Piano - Welte-Mignon



*The Original Welte-Mignon - Freiburg, Germany, 1905 onwards.*

### Introduction

During the second half of the nineteenth century, the firm of Michael Welte und Söhne in Freiburg-im-Breisgau, southern Germany, achieved world renown as a manufacturer of [orchestrions](#). Over several decades it built up a skilled workforce, both for the construction of the instruments and for the arrangement of the music rolls which caused them to play. So, at the turn of the 20th century, it was ideally placed to develop an experimental piano playing device, with the aim of reproducing the recorded performances of the finest pianists of the day. Edwin Welte, son of the main director of the firm, Berthold Welte, and Edwin's former schoolfriend, Karl Bockisch, together experimented and produced the first reproducing piano in the world. What we now know as the *Welte-Mignon* was originally called, quite simply, the *Mignon*, an essentially French word meaning both small and pleasing, to distinguish it from the firm's other instruments, which were all considerably larger.



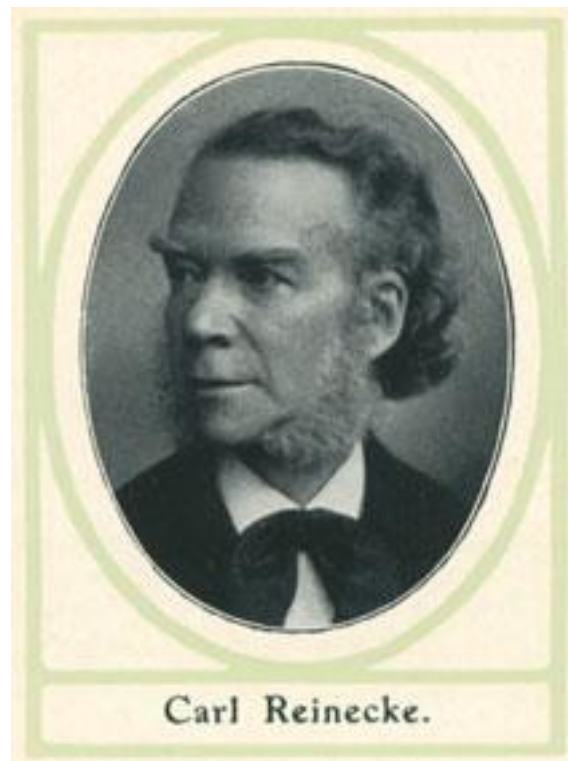
*The Welte Factory in Freiburg-im-Breisgau, Germany.*

On the [Pianola History](#) pages of this website you will find many descriptions of both piano players and player pianos. The one is a device fitting in front of a normal piano, and the other a piano with the player works built

inside its case. In a sense, the original Welte-Mignon was neither of these, or at the very least it was a most unusual player piano, since it had no keyboard, and looked for all the world like an ornate sideboard, often decorated in ways to complement the owner's own furnishings. Nevertheless, it was rightly regarded as the first true reproducing piano, in that it automatically replayed the tempo, phrasing, dynamics and pedalling of a particular performance, and not just the notes of the music, as was the case with other player pianos of the time. Its main introduction to the public took place in Leipzig, Germany in early March 1905, at the showrooms of Hugo Popper, a manufacturer of roll-operated orchestrions. However, it had been demonstrated, with a limited number of recordings, at the Autumn Trade Fair in that city in September 1904. It was launched in the USA in 1906, and in due course the Mignon mechanism was installed into normal pianos, especially the Steinway and the Feurich.

### **Musical Example**

The earliest born pianist ever to record on music roll was Carl Reinecke, who came into the world on 23 June 1824, three years before the death of Beethoven. Reinecke was a friend of Schumann, was helped in his career by Mendelssohn, knew Brahms as a young man, and probably heard Chopin play in Paris. His first concert tour, of Scandinavia, took place in 1843. He taught, amongst others, Albeniz, Grieg, Karg-Elert, Sinding, Sullivan, Thalberg and Cosima Wagner. That we in the 21st century should be able to hear his playing at all is a wonder in itself, but the real miracle is the quality of recording developed so early on by Welte in Germany. The Company regarded its Mignon recordings as something akin to photographs; wrong notes were as often as not left uncorrected, and it is likely that the dynamics were automatically recorded and remained similarly unedited. Reinecke's rolls were recorded in January 1905, when he was already 80 years old; to be sure, one hears the uneven playing of an elderly man, but it is a man with a style of performance formed and perfected in the early nineteenth century.



*Carl Reinecke (1824-1910)*



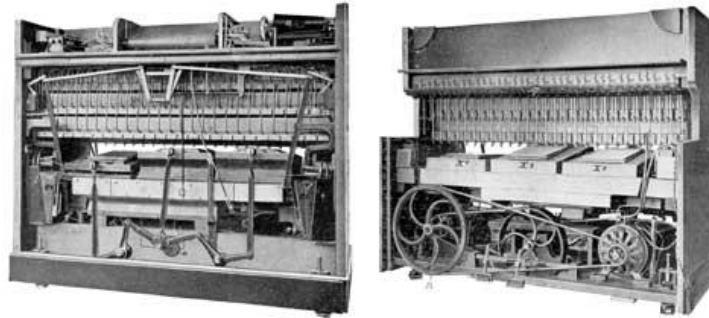
**BEETHOVEN: Ecosaise in E flat, [2.3 Mb]**  
Recorded by Carl Reinecke - 21 January 1905, Leipzig.

*This roll was played back on a Steinway Welte grand piano in London, in January 2006.  
The audio recording is the copyright of the Pianola Institute, 2006.*

▲ Back to top

## Mechanical Operation

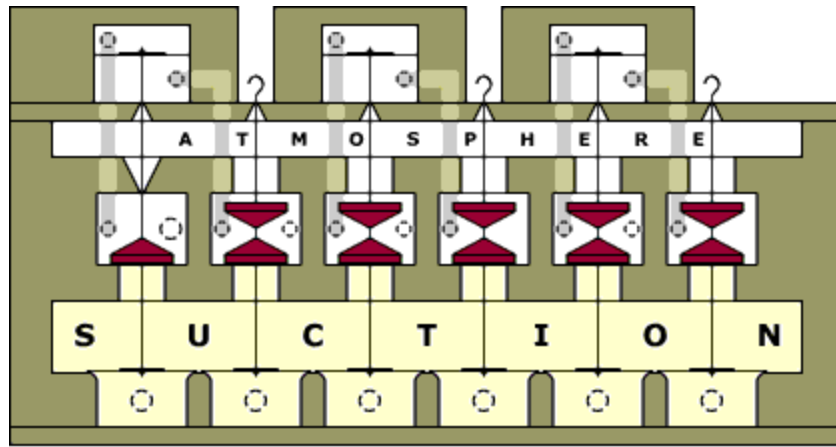
In February 1909, the *Illustrirte Zeitung* of Leipzig published an article on roll-operated instruments, which included clear illustrations of the workings of a Welte cabinet player. This was a later variety of Mignon which fitted in front of a normal piano, and played it by means of felt-covered wooden fingers, as shown below, the roll side first. It is readily apparent that the instrument was both complicated and substantial, not something to be moved about without the aid of household staff.



*The Welte Cabinet Player, Illustrirte Zeitung, Leipzig, 11 February 1909.*

As with nearly all player and reproducing pianos, the Welte-Mignon is powered by suction, and that simple fact may be enough for you. It uses pneumatic valves and motors, just like any other player piano, although its valves are a little different from most. But the more complex mechanisms found within it are those which control the dynamics of the music, according to coded perforations located towards the edges of the rolls. The Mignon splits its pneumatic mechanism into two sections, with the division occurring between F# and G above middle C. The historical reasons for this break point are not immediately clear, especially since most player pianos are divided between the E and F just below this, which is the actual halfway point of the normal keyboard.

A number of reproducing pianos make use of what are known as **lock and cancel** valves, allowing perforations on the roll to be only momentary, but to have a lasting effect. This avoids the need for extended perforations, which can lead to weakness of the paper and the consequent risk of malfunction. The firm of Michael Welte and Sons was already using such devices for its organs and orchestrions, and so their application to the Welte-Mignon was quite a natural progression. There are three pairs of lock and cancel valves on each side of the Welte-Mignon dynamic control mechanism, and one such device is illustrated below, in the animated diagram, which is based on the original Mignon patent, no. DE162708 of 1904, obtainable in full from the European patent database: [www.espacenet.com](http://www.espacenet.com).



**Stage 1:** All valves at rest. Suction applied to all tracker bar ports via the six small holes below the main suction chamber.

### *The Welte-Mignon Dynamic Valve Box.*

This animation shows only one pair of valves working, for the sake of simplicity, and to help establish an understanding of the way in which lock and cancel valves operate. The view is a cross-section through a wooden valve box, with the input signals coming via tubing from the tracker-bar, and entering the box through the six holes at the bottom. Above the inputs are six thin leather diaphragms, known as **pouches**, and above them the main suction supply chamber. At the side of each pouch, though too small to be sensibly illustrated, is a tiny **bleed** hole, whose purpose is to channel a small amount of suction to its respective tracker bar opening. The air allowed through the tracker bar by a perforation in the roll is far greater than the suction provided through the bleed hole, so it does not stop the valve from lifting as appropriate, but when the roll perforation closes, the bleed suction provides just enough to evacuate the passage to the tracker bar, thus equalizing the pressures and allowing the valve to fall again.

Valves 1, 2, 3 and 5 have two functions, one of which, not illustrated in this first diagram, plays a part in governing the Welte-Mignon dynamic control mechanism. All the valves contribute towards locking or cancelling the operation of the first valve of each pair, by means of the diaphragm at the top. Short lengths of tubing channel the output of each valve to small chambers, either above or below the locking diaphragms, as can be seen in the illustration above. For the sake of clarity, the presence of suction is shown in yellow, and atmosphere in white.

The second illustration, which is still in preparation, shows the overall dynamic governor, in combination with this valve box.

[▲ Back to top](#)

### **The Welte-Mignon Recording Process**

The Welte Company in Germany kept its recording processes a closely guarded secret, and for many years the accepted explanation of its technique was based on the ideas of Richard Simonton, an American who had visited Edwin Welte and Karl Bockisch in the late 1940s and 1950s. In particular, Ben M. Hall, the sleeve note writer for an American series of LP recordings inspired by Simonton, entitled **The Welte Legacy of Piano Treasures**, created a detailed description of the recording process, complete with explanatory photographs and drawings.

But although Richard Simonton was a real enthusiast in the promotion of Welte's "lost" musical archive, his energy and personal charm were not matched by a similar expertise on the history or technical operation of player pianos, and in the light of new documentary evidence, the theories that have been accepted for so many

years have become unconvincing. This webpage describes the probable system that Welte used, using the latest evidence from all relevant sources, much of which was not available, or at least not recognised, until the past few years.

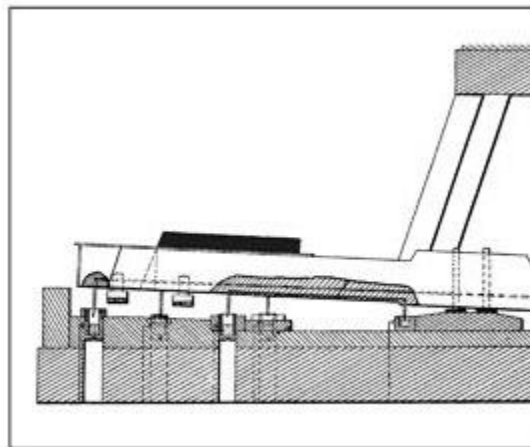


*Ignace Jan Paderewski recording for the Welte-Mignon - 27 February 1906, Leipzig.*

[▲ Back to top](#)

### **Recording the Pitches and Durations of the Notes**

As the pianist played a particular note, a thin rod of metal or carbon, attached to the underside of each key, was dipped into a small cup of mercury, located in a trough under the keybed of the piano, which spanned the whole width of roughly seven octaves. In this way, an electrical contact was made, without greatly affecting the touch of the recording piano, which had to remain sensitive enough for the most fastidious pianist. The system used must have been very similar to Charles Fuller Stoddard's 1910 design for the Ampico recording piano, illustrated in US Patent 1,367,634.



*Detail of early Ampico Recording Piano - US Patent 1,367,634, filed 12 November 1910.*

One can certainly see a wooden compartment of some sort under the keyboard in many of the Welte recording photographs, and it is particularly clear in the case of Ferruccio Busoni's 1907 recording session in Freiburg.

Also in the photograph below are a number of relevant people: on the left of Busoni is Edwin Welte, followed by Karl Bockisch, whose arm is resting on the roll recording machine. Although these two are generally recognised as the inventors of the Welte-Mignon, modern researchers have suggested that other earlier engineers might well also have played a part. The bearded gentleman on the right, in morning dress, is Berthold Welte, who was the director of Michael Welte und Söhne in Germany. Towards the far wall is a display stand, containing the various medals the firm had been awarded, and against the wall an original Welte-Mignon keyless piano.



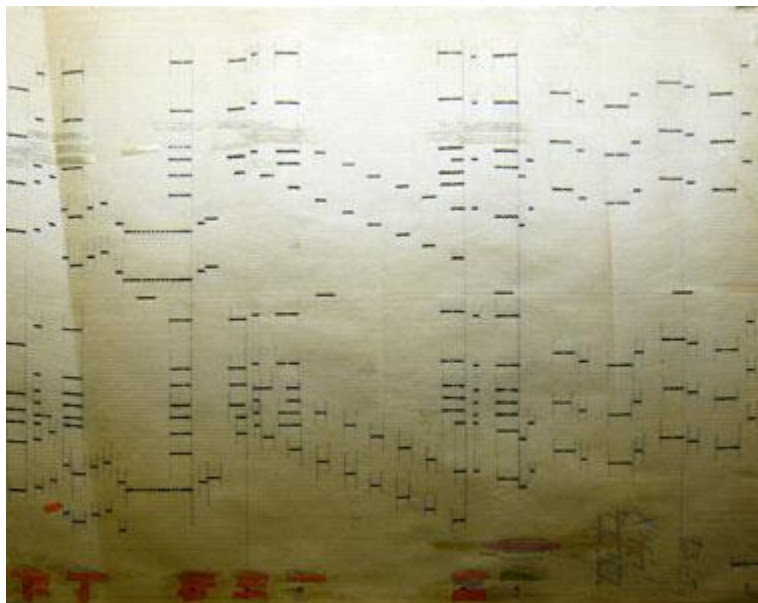
*Ferruccio Busoni recording for the Welte-Mignon - 16 March 1907, Freiburg.*

Despite the element of secrecy and the implied uniqueness of Welte's recording process, it is worth noting that a very similar trough can be seen in the recording photographs for the Philipps' **Duca** reproducing piano, so Welte were certainly not alone in this feature of their design. Arthur Friedheim, shown below, was a pupil of Franz Liszt, and at one time his assistant and secretary.



*Arthur Friedheim recording for the Philipps Duca - 24 October 1911, Frankfurt.*

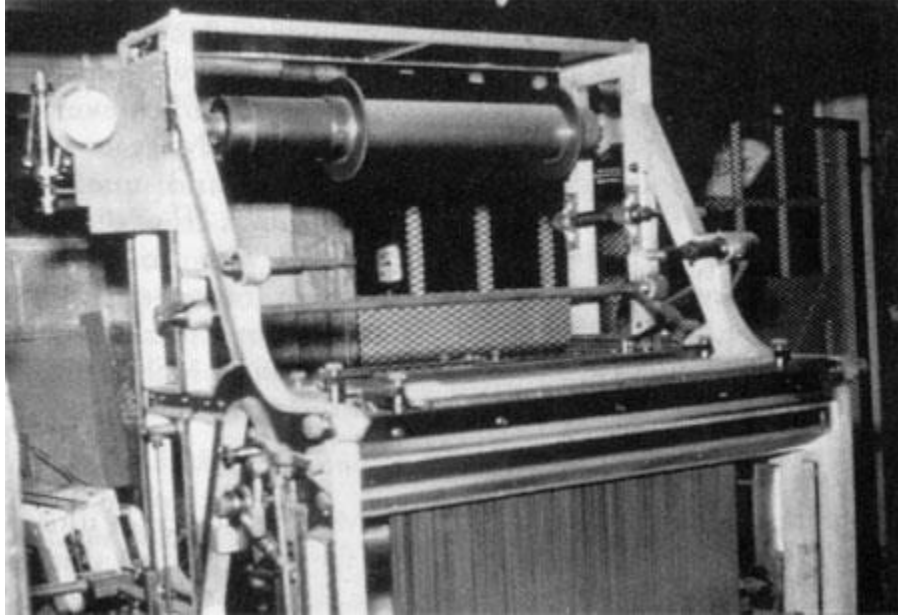
Unlike Duo-Art, Welte did not perforate music rolls in real time, but instead made ink or carbon traces on an original roll as the notes were played, and these were subsequently punched out by hand. It is likely that the paper for these originals was white, and that it was pre-printed with 100 continuous lines, in the positions where each pitch was located. A number of similar master rolls recorded for the Welte Philharmonic Organ have survived, and one can still see the pencil and recorded ink traces, which provided a roll editor with a clear indication of where to punch out each note.



*Fragment of a Welte Philharmonic Organ Master Roll - Freiburg, c.1910.*

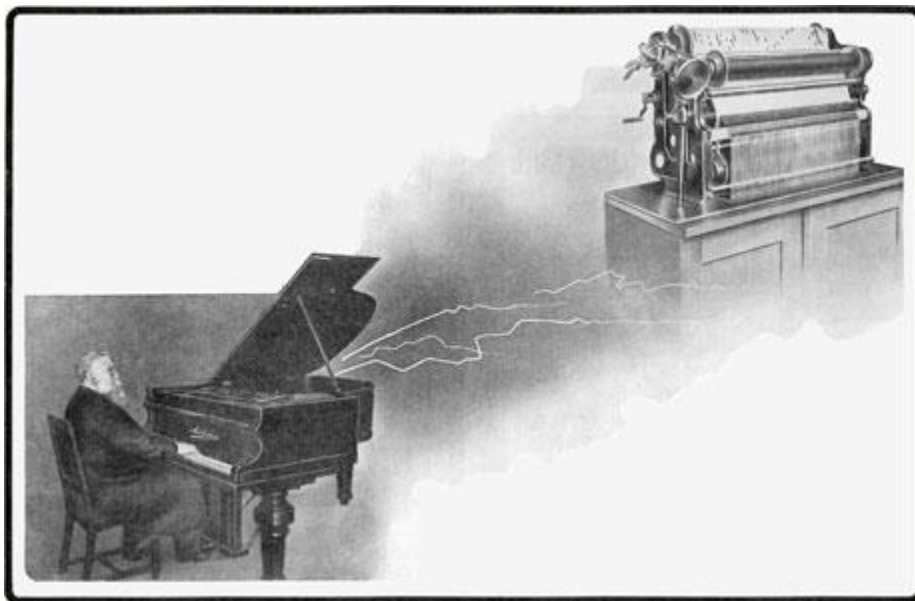
The machine reputedly used for marking out these Welte organ rolls has survived, and today forms part of the collection at the [Museum of Music Automats](#), at Seewen in Switzerland. It used small metal wheels which rotated as they marked the note durations, thereby avoiding any drag on the moving roll. The following photograph was taken while the machine was still in a workshop in New Jersey, and reproduced in a CD

booklet which accompanied a recording of Gustav Mahler's Welte-Mignon rolls, published in the USA in the mid-1990s. As can partly be seen, the take-up spool had adjustable edge guides, making it suitable for a variety of different sizes of roll, so there is no technical reason why it should have been restricted to recordings for the organ, as opposed to the piano. At the top left is a speed governor, similar to those found in gramophone equipment of the time, and at the front are the individual note trackers, operated by solenoids in a lower part of the machine, which rocked the note wheel levers and so brought the inked marking wheels into contact with the paper.



*Welte Organ Roll Recording Machine - New York, c.1910.*

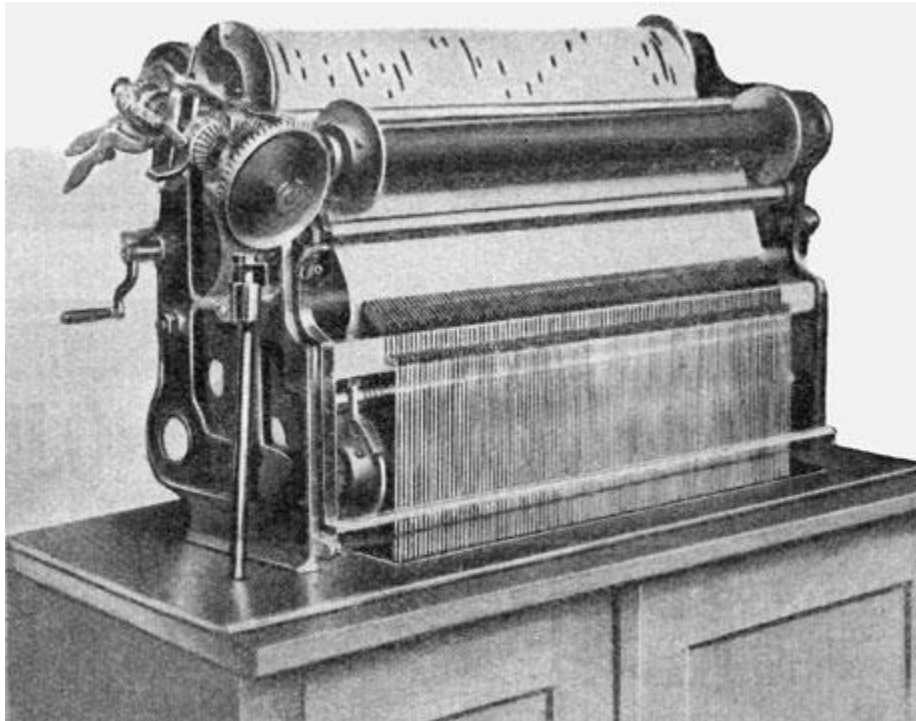
Such machines were not as uncommon as we might perhaps think. A German engineer from Berlin, Paul Boehm, had already patented a very similar mechanism in 1886, significantly at the very time Welte had begun producing paper rolls for its orchestrons, and an almost identical device was still in use in that city in the years preceding the First World War. The recording process for the Virtuola expression piano, manufactured by the Römhildt-Heilbrunn Company, of Berlin and Weimar, and exported to France under the name of "Mélodia," was depicted, in a somewhat romantic combination of artist's drawing and retouched photograph, in an advertisement in "l'Illustration", published in Paris in late 1913.





*Raoul Pugno recording for the Virtuola/Mélodia expression piano - Paris, c.1913.*

Looking at the Mélodia recording mechanism in detail, the same style of trackers is immediately apparent, with what appears to be a set of thin wheels on the opposite side of a rigid metal comb, and the finished roll ends up on a take-up spool in exactly the same position as that on the Welte machine. The note traces have been touched up by an artist, since in practice they would have been much smaller and lighter, but in general terms this is a note-recording machine that must have been very similar to that used by Welte in Freiburg and elsewhere. Tantalisingly, the Mélodia advertisement informs the Parisian public that the recording machine will be demonstrated on request, every afternoon, at the Company's studios at 39, rue la Boétie - how frustrating that neither the machine nor indeed the building should still be there!



*Mélodia Roll Recording Machine - Paris, c.1914.*

[▲ Back to top](#)

### **Recording the Dynamic Information**

In the absence of modern audio methods, the only means available of capturing music roll dynamic information in the early 1900s was to record either the length of time taken to play each individual note, or the force exerted in playing it. Generally speaking, the louder a note is to sound, the faster the key has to be struck, and the greater the energy that must be expended by the pianist in order to accelerate the fingers and arms accordingly. These fleeting variations of time or exerted force need to be measured, recorded, and converted to the two constantly varying tracks of dynamic coding that are all a reproducing piano can respond to. Many reproducing piano companies had no automatic means of doing this, relying instead on information noted down by a human recording producer, either as undulating pencil lines on a musical score, or, in the case of the Duo-Art, as perforated coding triggered by the use of two manually operated control mechanisms.



*Recording for the Duo-Art - Herbert Fryer at the Piano, Reginald Reynolds at the Duo-Art Dynamic Console - London, c.1923.*

All the surviving evidence for the Welte-Mignon suggests that Welte's recording methods were relatively straightforward, using materials and mechanical designs that were already in use and readily available at its factory in Freiburg. However, since the company kept its dynamic recording processes secret, there is no authoritative description that was written by the original inventors or operators. It is abundantly clear, however, to any musician studying the performances on original Welte-Mignon music rolls, that the company had to have developed some means of recording and converting the dynamic information quite automatically. With most other reproducing piano systems, there is often the feeling that the dynamics have been carefully crafted by a roll editor; there is a tendency to use the complete gamut, from *pianissimo* to *fortissimo*, for every roll, just to prove that the particular system can do it. In the case of the Welte-Mignon, however, there can be astounding realism at some of the most insignificant moments, and on occasions a certain lack of detail when the musical texture becomes too complex - both signs of an automated process.

Welte dynamic coding is also difficult to edit effectively, since it is based on crescendos and diminuendos, which have an effect on all subsequent notes, until one of the various dynamic limits is reached. Ampico was not dissimilar, but it had an extensive and well-documented editing department, with dozens of musicians and technicians, whose traces remained in existence well into the 1990s, whereas Welte simply did not. And Welte, uniquely amongst the main four roll recording companies, did not encourage its pianists to participate in the editing process. Indeed, there was virtually no editing process: pianists could listen to their rolls once perforated, and if they were unsatisfied with them, they could choose to record them again, but there was no suggestion of the original recordings being alterable in any way. The Welte recording contract of the British pianist, Fanny Davies, which has survived at the Royal College of Music in London, spells these conditions out very clearly.

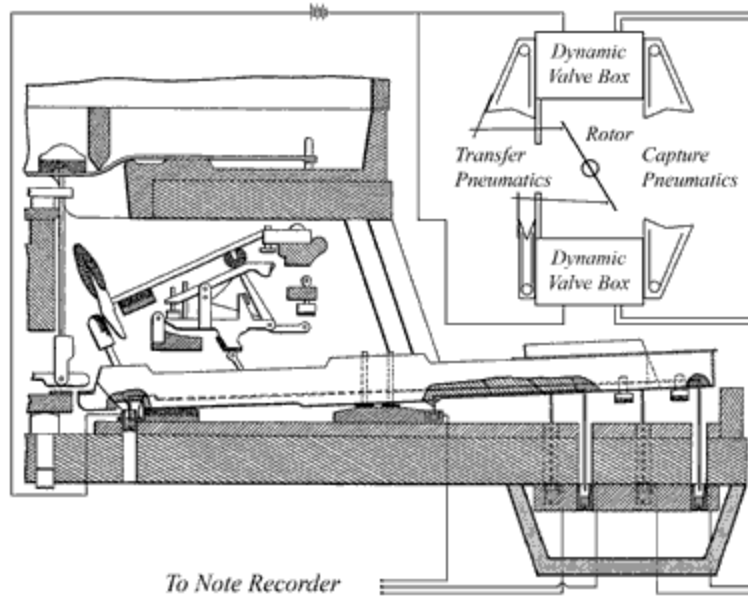


*Fanny Davies, from "Autogramme Berühmter Meister der Tonkunst", Freiburg, c. 1914.*

The clearest original report that we now have is an account published in 1986 by a former audio engineer and historian of recorded sound who lived in Freiburg from the early 1950s onwards, and who had dealt personally with Karl Bockisch in the 1930s, in connection with a whole series of broadcasts of Welte-Mignon rolls on the German Radio. The engineer, Horst Wahl, informs us that in the early days of the reproducing piano, a trained musician was sometimes employed to mark up a score with the pianist's dynamics, since the earliest automatic systems were not able to provide sufficiently musical results. This is roughly what happened at Ampico, for example. However, Herr Wahl then goes on to say that Welte and Bockisch did their best to avoid such a process (in our translation):

*"Welte and Bockisch worked tirelessly over several years in order to eliminate this unsatisfactory method, and they finally developed a (pneumatic action) rail with a whole series of finely graded holes, which regulated the passage of air, responded in proportion to the various loudnesses and thereby provided a different way of recording the dynamic shadings."* (Horst Wahl: Die Chronik der Sprechmaschine, Vol. 1, Düsseldorf, 1986).

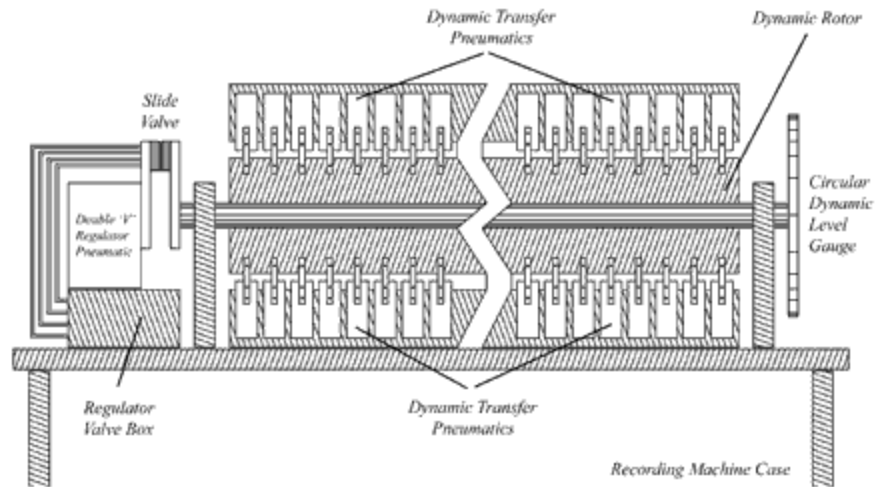
This elusive note, hidden away in a multi-volume work on the history of the gramophone, and spotted in 2014 by Gerhard Dangel of the Augustiner Museum in Freiburg, neatly confirms the description that has featured on this webpage since 2009.



*Welte-Mignon, Freiburg-im-Breisgau, Germany - Probable Dynamic Capture Mechanism.*

The Welte dynamic recording process most likely occurred in the following way. For each key, there were not one, but two sets of electrical contacts, operating at different times and positions during the playing of the particular note. One contact set, the metal rod and mercury described above, operated immediately the key was struck, and the other, a fine wire contact at the back of the piano action, was not made until the hammer had more or less reached the piano string. The first contact triggered a pair of small electro-pneumatic valves, of a sort commonly found in Welte organs of the time, and these did two things: the first valve operated a pneumatic mechanism which marked a note line on the master roll, and the second caused suction to pass between a pair of small pneumatic motors, of roughly the same size as the note pneumatics on the early Welte-Mignon playback mechanism.

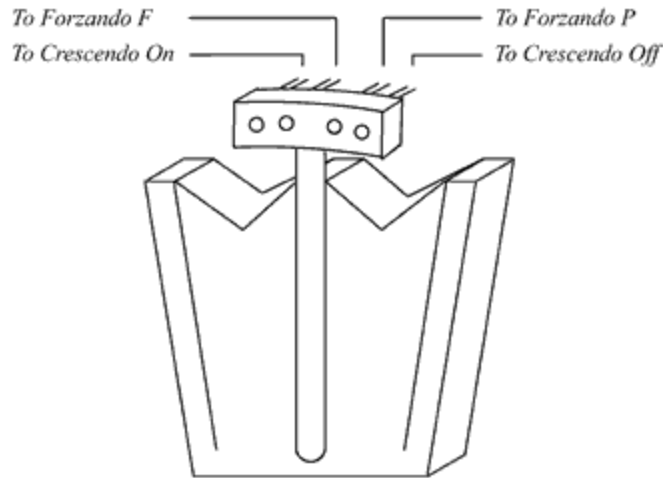
At rest, when the recording machine was not in operation, both pneumatics of each pair were held open by springs, but in use, when no note was playing, one pneumatic was fully open, and the other fully closed by suction, a position equivalent to the loudest *fortissimo* that could be measured. As soon as the first electrical contact was made, the two pneumatics began to reverse their state, through one or more carefully adjusted small orifices, similar to, but a little larger than the 'bleed holes' found in normal player pianos, with the open pneumatic being gradually evacuated, and the closed pneumatic gradually opening. Over the time interval necessary to move the key slowly enough to produce the quietest possible *pianissimo*, the state of the two pneumatics would completely reverse, with other dynamic levels being reflected by smoothly varying intermediate positions.



*Welte-Mignon, Freiburg-im-Breisgau, Germany - Probable Dynamic Transfer Mechanism.*

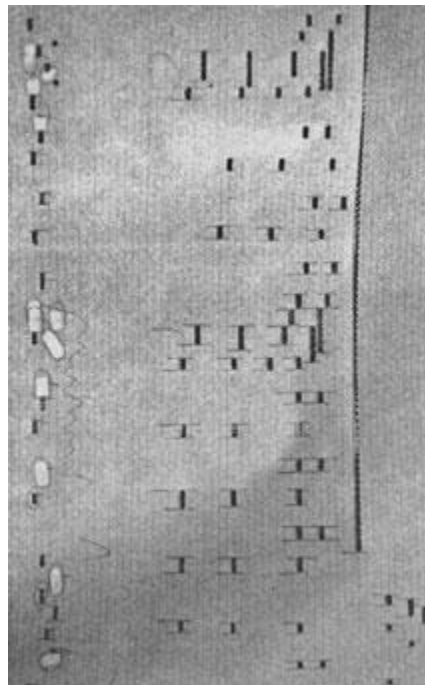
When the second contact, at the back of the piano action, came into operation as the note began to sound, another set of electro-pneumatic valves was triggered, which also had two functions. Firstly, it inhibited any further change in the position of the dynamic capture pneumatics, which therefore mirrored the dynamic force with which the particular note had been played. But this individual note dynamic then had to be amalgamated with the dynamics from any other notes being played, and this was done by allowing both pneumatics of the pair to briefly pass whatever suction remained in them to a secondary pneumatic pair, of the same capacity, though not necessarily the same dimensions, as the first. Both pneumatics of this secondary pair were normally fully opened by springs, but on their being closed by suction, small arms fixed to their moving surfaces potentially came into contact with the two blades of a light and rigid cylindrical rotor, which thereby rotated to a position reflecting the average dynamic of all notes playing in either the bass or treble section of the recording piano. As soon as the transfer of suction had taken place, and the rotor had been moved accordingly, the secondary pneumatic pair opened again, and the primary pair was reset to its potential *fortissimo* state.

Located at the end of each dynamic rotor was a double registering pneumatic with a movable centre board, something like one of the component pneumatics on the roll motors of late Aeolian push-up Pianolas, and the two mechanisms were connected by means of a slide valve, attached to the centre board of the pneumatic. If the rotor slowly moved one surface of the slide valve in either direction, it uncovered a single port, which caused a fixed length of either the *crescendo* or *decrescendo* dynamic coding to be marked on the master roll. At the same time, it caused one side of the double pneumatic to be gradually evacuated, thereby rotating the other surface of the slide valve until the port closed again. At this point, however, and assuming the rotor had not moved its position further, the double pneumatic continued to operate slowly, until the corresponding port at the other extremity of the slide valve was opened. The opposing dynamic coding would then be marked on the roll, and the double pneumatic would reverse its direction. In this way, the dynamic coding on the master roll could be made to hover, albeit rather slowly, at any dynamic level.



*Welte-Mignon, Freiburg-im-Breisgau, Germany - Probable Registering Pneumatic.*

However, the Welte dynamic control system also allowed for accents of considerable subtlety. On the slide valve there were two further ports, only uncovered if the dynamic rotor changed its position substantially. The uncovering of either of these inner ports would cause the marking of a *forzando* or *forzando piano* trace on the master roll, but only for as long as the port remained open. At the same time, it would cause the appropriate side of the double pneumatic to be evacuated quickly, thereby closing off the open port. A further feature of the double regulators was a connection to marking pens at the sides of the master roll, allowing two oscillating traces to be printed in synchronism with the variations in dynamic levels. Such a trace can clearly be seen on the rather grainy photograph of the original master for Welte-Mignon roll 4119, "Moment Exotique", by Vladimir Horowitz, which is taken from a book entitled *Reproducing Pianos Past and Present*, by Kent Holliday, published in 1989 by the Edward Mellen Press. This master roll is the only original Welte-Mignon master known to have survived beyond the Second World War. Unfortunately, although it was in Austin, Texas, in the 1980s when this photograph was taken, since the credits in the book confirm this location, all trace of it has now disappeared. Kent Holliday has kindly provided a copy of the original photograph, seen below.



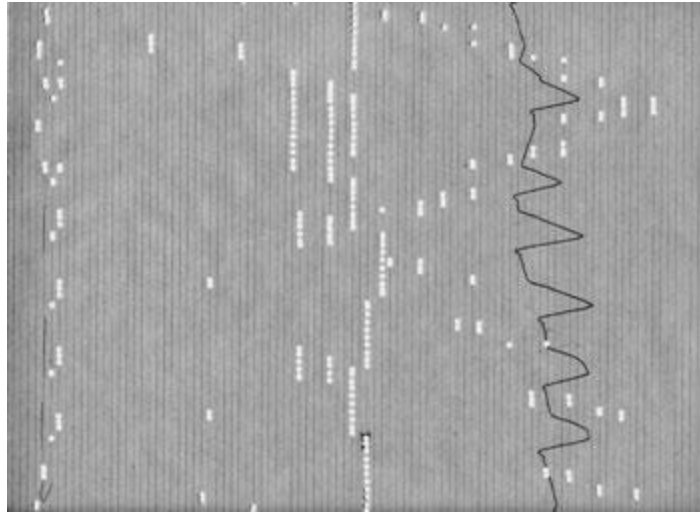
*Section of a Welte **original** roll, with bass dynamic line at the left side - Freiburg, 1926.*

One final feature of the Welte-Mignon's creation of dynamics was its use of what is known in English as a *mezzoforte* hook, allowing the mechanism to be restricted if desired, either above or below a fixed *mezzoforte* level. One of two perforations in the roll causes either the bass or treble hook to be brought into operation, and the dynamic regulator is then held within a particular section of its overall range. The main usage of this device occurs when the music is generally loud, since it allows for substantial accents to be achieved more speedily than might otherwise be the case. However, it would be foolhardy to insert the necessary coding into the master roll after the recording had been made, since every other subsequent dynamic command would then have to be edited as well. It is much more likely that an operator switched on the equivalent hooks in the recording cabinet, which would not only have marked up the master roll, but also have affected the double regulators and thereby altered the subsequent coding on the roll quite automatically.



*Fanny Bloomfield-Zeisler recording for Welte - 6 August 1908, Freiburg.*

Clearly, it was very important that the operator should make the switch while the mechanism was already in the correct part of its range, or the hook would have the reverse effect of that desired. During the first sixteen months or so of non-experimental recording for the Welte-Mignon, most of which took place at the Popper showrooms in Leipzig, either Karl Bockisch or Edwin Welte can be seen sitting at the recording cabinet, in a position to observe the workings of the mechanism within. There is always, without exception, someone sitting at the controls of the cabinet in the photographs taken at this time. Soon after the return of recording operations to the factory in Freiburg, however, an alteration was made to the cabinet, to allow the two dynamic rotors to be sited where their positions could more easily be seen at a distance, so that an operator with a remote control could sit at a table, or look over the pianist's shoulder and follow the musical score, pressing the *mezzoforte* hook buttons in the secure knowledge that the mechanism was correctly positioned. The two holes for the indicators can clearly be seen in many recording photographs of the time, and in the photo above, of a recording by Fanny Bloomfield-Zeisler, it is also possible to see a remote cable attached to the side of the cabinet. In photos taken after the extension to the cabinet was introduced, the operator is generally standing, not sitting, and there is normally no sign of a chair, which would no longer have been essential at the cabinet itself. One may remark that the lady standing behind the recording cabinet in the photograph above is Edwin Welte's sister, Frieda, who was married to Karl Bockisch.



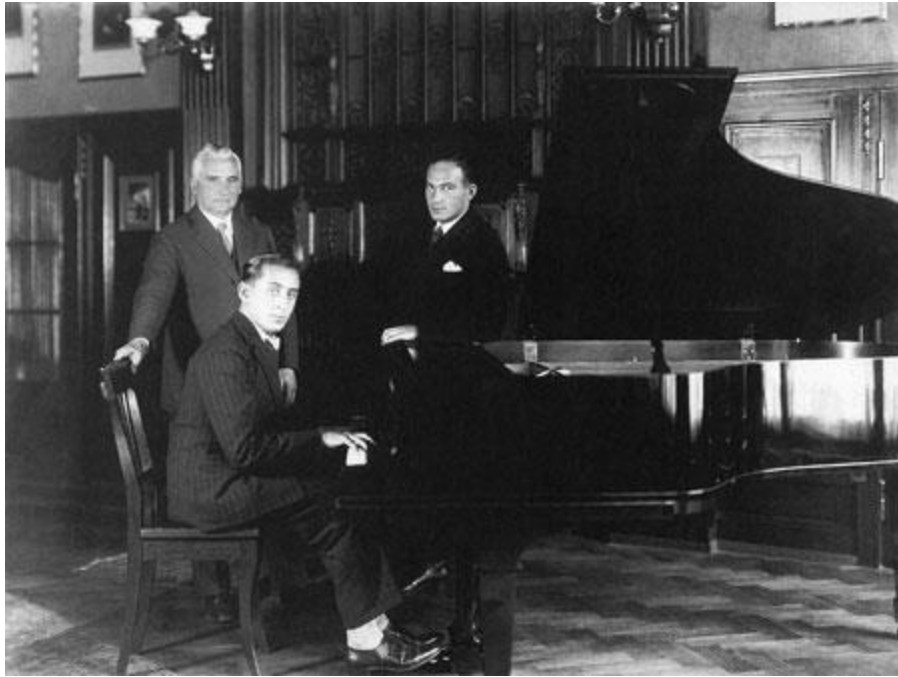
*Excerpt from a Welte **second master**, showing replay dynamic line - Freiburg, 1920s.*

This, then, is the probable way in which Welte-Mignon rolls were recorded. There may have been differences of detail, but the system as described above would have been perfectly capable of marking up both the note and dynamic traces on master rolls, with no human intervention after the time of recording, save the punching out of perforations as indicated by the ink traces. Careful use of measuring calipers would allow the marked dynamic information to be punched in advance of its respective notes, keeping the length of any such mark intact, but offsetting it so that the end of the resulting perforated slot terminated just a little in advance of the start of its corresponding inked marking. Once an **original** roll was complete, it was copied to a batch of **second master** rolls, which were subsequently used in perforating production copies. Some musical editing of Welte rolls may have taken place, of course, but not much, given the wrong notes which turn up with surprising frequency. By contrast, it is clear from Welte factory rolls which survive in Germany and California, that a good deal of simple editing was carried out on the second masters in the early 1920s, prior to the issuing of recordings for the later Mignon system that used green rolls, but this was done mainly for technical reasons connected with the differing ways in which the two systems responded to the pedalling signals. Where dynamic changes were occasionally made, a playback mechanism could be used to mark a dynamic line on a second master roll for checking purposes, as can be seen in the example above, from the collection at the University of Southern California.

### **Musical Editors**

The recording producers and editors employed by Welte are not quite as well-known as those of some of the other reproducing piano companies, and it seems clear from most of the early company photographs that Edwin Welte and Karl Bockisch operated the recording machine themselves for the first two years or more. However, at least some information has survived the passage of time, and the name of Franz Xaver Franz (1857-1920), an oboist in the Freiburg town orchestra, appears on master rolls for the Welte Philharmonic Organ. The Freiburg directories show that Franz first moved to the town around 1878, and the fact that he should have been there so early, and that he is known to have arranged organ rolls by hand, suggests that he might well have begun working for the firm from the late 1880s, at the time it began to use music rolls for its orchestras, in place of the earlier pinned barrels.





*Vladimir Horowitz recording for the Welte-Mignon - Freiburg, 1926.*

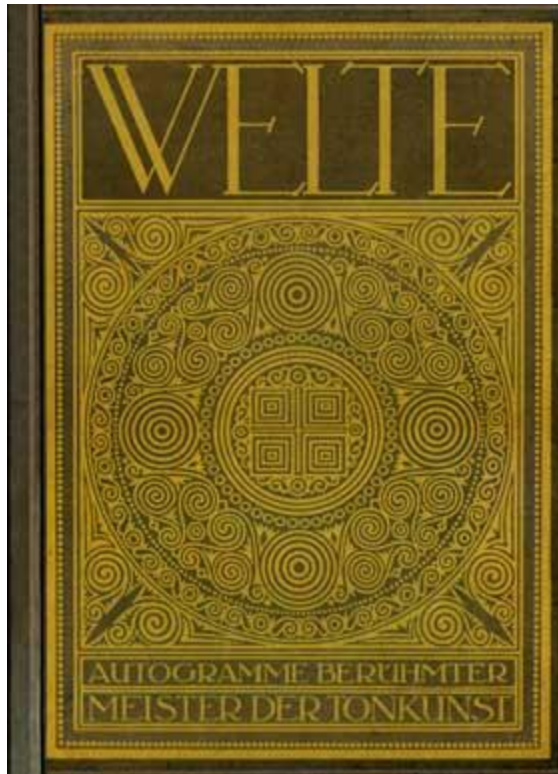
The Freiburg orchestra was clearly a good source of part-time musical talent, and another Welte musician from within its ranks, mentioned by the organist Alfred Hollins, was Friedrich Buchali, who moved to Freiburg a little before 1905, the year in which the Welte-Mignon was launched. It is tempting to surmise that Buchali might have been the trained musician who marked up dynamics in the earliest days of the Welte-Mignon, and he was certainly involved in notating changes of registration for the Philharmonic Organ as the organist played, since Alfred Hollins is very clear in saying so. From 1910 until 1932, Max Schreier, the orchestra's trumpeter, marked up the master rolls for perforation.

During the 1920s, when the new Welte 98 system was introduced on green paper rolls, it is known that the German pianist and composer, Hans Haass, was employed as a recording producer and house pianist, and there are some signs that the master rolls were more thoroughly edited during his employ. Certainly there must have been a great deal of work involved with the transfer of music from the Red to the Green system. Haass can be seen in the photograph above, standing behind the piano, with a rather older Karl Bockisch steadying himself on Vladimir Horowitz's chairback.

[▲ Back to top](#)

### **Pianists and Repertoire**

The three German reproducing piano systems for which rolls were recorded between 1904 and the outbreak of the First World War (Welte, Hupfeld, Philipps) had a very great advantage over their subsequent American and British competitors, in that the performances of a whole previous generation of pianists were captured, so that a remarkable glimpse of the piano traditions of the nineteenth century was preserved. When a new century succeeds the previous one, it quite naturally generates a nostalgia for times past, and one can sense that the styles of piano playing, particularly in Europe, at the start of the twentieth century were firmly rooted in an earlier tradition.



*The Welte-Mignon Presentation Book of Testimonials - Freiburg, c.1914.*

The novelty and incredible fidelity of Welte's piano roll recording, as compared to early cylinders and discs, persuaded a veritable galaxy of pianists to preserve their performances at the recording piano. Liszt's pupils were in the prime of their lives, and many agreed to record, one or two even attempting to play in the style of their late master. As we have seen, Carl Reinecke, born in 1824, was the earliest-born pianist to record for Welte, followed by Theodor Leschetizky (b. 1830) and Camille Saint-Saëns (b. 1835), all with styles of playing fashioned in the first half of the nineteenth century. Grieg, Fauré and de Pachmann follow from the 1840s, though with remarkably dissimilar ways of bringing the keyboard to life. Grieg in particular sounds less ancient than his contemporaries, and it is to be regretted that his wonderful fluidity of phrasing is absent from most present-day interpretations of his works. All too often, "authenticity" is a synonym for applying a modern, unromantic style of playing to every type of classical music.



Theodor Leschetizky für »Welte-Mignon« spielend.

*Leschetizky recording for the Mignon at the age of 75 - 18 February 1906, Leipzig.*

In all, some thirty pianists born before 1860 made their way on to Welte rolls, but the historical importance of the Welte-Mignon is not limited to such early exponents of the piano. Composers such as Debussy, Reger, Scriabin, Puccini, Glazounov and Mahler recorded their own compositions, the superstars Paderewski, Hofmann and Lhévinne became best-sellers, and young giants from Vladimir Horowitz to Rudolf Serkin visited the Welte studios in Freiburg at the very beginnings of their careers. The repertoire they all chose was not as carefully regulated as we might expect from today's ultra-organised concert artists, and in many cases seems almost to have been selected at the last moment. But taken overall, a library of over 3,000 important classical recordings emerged from the enigmatic Welte recording pianos over a period of some twenty-five years.



*Max Reger arriving at the Welte Studios - 26 July 1913, Freiburg.*

Towards the end of the reproducing piano era, in the late 1920s, the Festivals at Donaueschingen and Baden-Baden set the scene for a number of special compositions for Welte-Mignon, by Paul Hindemith, Ernst Toch and other young composers, with Hindemith also using the Welte Philharmonic Organ as an accompaniment to his *Triadisches Ballett*, choreographed by Oskar Schlemmer of the Bauhaus in Dessau. But such esoteric music was not typical of the Mignon, which in general covered the standard classical and romantic repertoire, with the singular advantage that its rolls were longer than those for the later systems, so that more extended compositions could be included, without the need for hastily edited cuts. In the 1930s and the Second War, the Welte-Mignon languished, and it was rediscovered for the world by Richard Simonton, an American who initially made recordings from Edwin Welte's own Steinway in Freiburg, and who later acquired some of the "second master" rolls, taking them back to Los Angeles, where they remain today, in the care of the library of the University of Southern California. The remainder of Edwin Welte's private collection was donated by his family to the Augustiner Museum, in his home town of Freiburg-im-Breisgau.

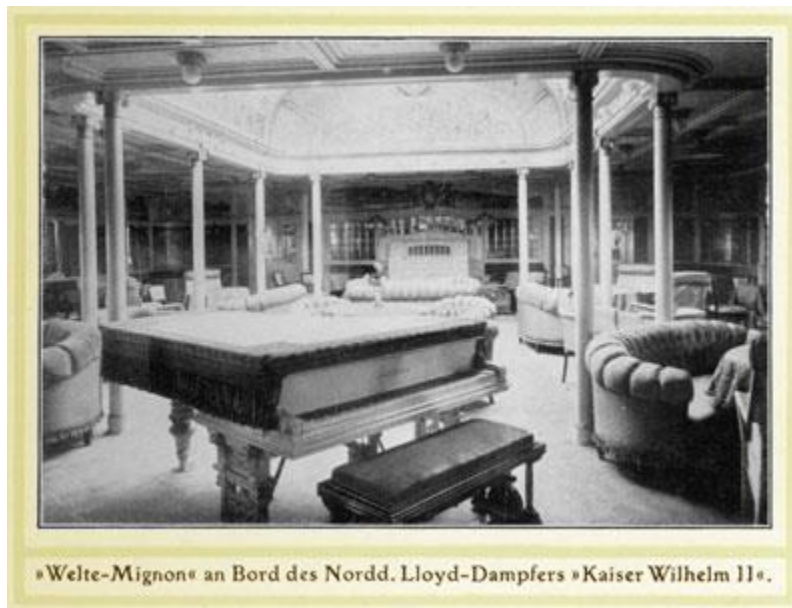
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**Welte-Mignon Instruments**



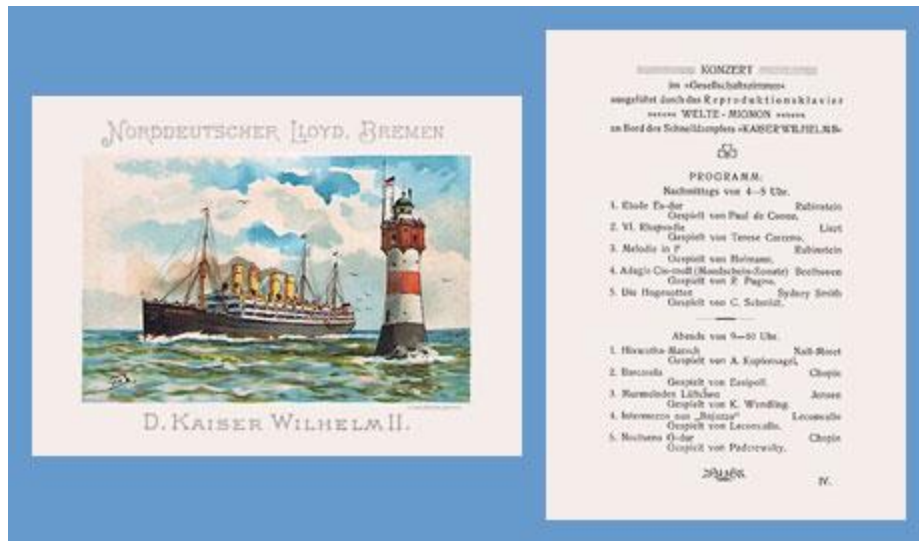
*Welte-Mignon and Potted Palms, Leipzig, 1905.*

As mentioned at the head of this webpage, the original Welte-Mignon was a keyboardless piano, built in to a rather solid-looking case, and designed for the homes of the wealthy, where space was not a consideration. It could be supplied in a variety of designs, or built to order to fit in with a client's existing furnishings. Quite early on, Welte entered into a contract to supply the original Mignon for use on the transatlantic steamships operated by the Norddeutscher Lloyd company, including the Kaiser Wilhelm II, Kronprinzessin Cecilie and George Washington. The grand "Gesellschaftszimmer" of the Kaiser Wilhelm II bears witness to a style of living that has long since disappeared, with an ornate Bechstein grand piano in the foreground, and a Welte-Mignon in pride of place at the far end of the saloon.



*Welte-Mignon on board the S.S. Kaiser Wilhelm II, c.1906.*

Daily recitals were given on board ship in the afternoons and evenings, as can be seen from this programme from the Kaiser Wilhelm II, which dates from around 1906, to judge by the recording dates of the rolls being played. One wonders whether, even in those august circles, audiences listened in respectful silence to the musical performances? It is all too easy to treat perforated rolls as mere background music, even when played by Paderewski!



*Welte-Mignon programme from the S.S. Kaiser Wilhelm II, c.1906.*

Welte und Soehne were not piano makers themselves, and the earliest Welte-Mignon instruments were based on pianos manufactured by Julius Feurich of Leipzig, who also made the piano used in the early recording sessions. Indeed, a rather proud Herr Feurich can often be seen in the Leipzig recording photographs, such as that of Paderewski further up this page, in which he is standing behind the piano. But by the end of 1907, Welte were also building what were then known as *cabinet players*, which we would today call push-ups, fitting in front of the client's existing piano.



*Welte Cabinet Player in the Music Room of Mr. F.H.E, c.1910.*

By the spring of 1908, and perhaps in response to the [Hupfeld Dea](#), an upright reproducing piano which had been introduced by Ludwig Hupfeld in November 1907, the Mignon mechanism was being installed into upright pianos with their own keyboards, both Feurich and Steinway. These were initially much taller than normal uprights, in order to accommodate the pump at the top of the instrument, with the expression mechanisms installed under the keyboard. The piano in the photo below is so ornate that the keyboard and roll mechanism are hidden behind heavily carved doors, and the whole instrument looks rather like an antique French *armoire*!



*Ornate Welte Piano in the Salon of Mr. V, c.1910.*

Such unusually tall upright pianos were not universally popular, however, so by Christmas 1911 the Mignon mechanism had been adapted to fit into smaller models, and this more compact style gradually took precedence. The upright in the photo below is shown in one of the display windows of the Steinway showrooms in Hamburg, Germany, around 1920. The covers of the piano have been removed in order to reveal the mechanism, and the large three-exhauster pump, which originated in Welte's orchestrions, can just be seen at the bottom of the instrument. On the right is a display of four contrasting Mignon recordings of Chopin's Nocturne in F#, Op. 15, No. 2, played by Xaver Scharwenka, Raoul Pugno, Ferruccio Busoni and Camille Saint-Saëns.



*Steinway Welte at Steinway's Hamburg Showrooms, c.1920.*

The Aeolian Company in America had introduced its Grand Pianola Piano in 1909, and Melville Clark had produced an Apollo Grand as early as 1906, so there must have been some pressure on Welte to develop a version of its Mignon that would fit into a Feurich or Steinway grand. The first Steinway grand Weltes to be manufactured were shipped at the end of 1913, and almost all of them were built into the medium-sized "O"

model. Edwin Welte himself had a Steinway Welte grand, keeping it to the very end of his life, when it was recorded for both Columbia in the USA and Telefunken in Germany.



*Steinway Welte Upright and Grand at Steinway's London Showrooms, 1924.*

[▲ Back to top](#)

### **The Welte-Mignon in Perspective**

Since the Second World War, the Welte-Mignon has served as the standard bearer for the cause of the reproducing piano, and it is true that it was the first such instrument to be fully developed, though only by a year or two, which is not so much when seen from the distance of a whole century. It also had the best commercial organisation in the United States of all the German player-piano manufacturers, and as a result became better known and sold more instruments than its Teutonic competitors, thereby becoming a more likely candidate for rediscovery after the Second World War. But in considering the Mignon's miraculous legacy, we should not ignore the equally stunning catalogues of the Hupfeld Dea and the Philipps Duca, which have been thoroughly ignored by musicians for many years. The University of Frankfurt, which had an almost complete set of Philipps Duca rolls, sold many of them off as late as the 1990s, apparently unaware of their potential musical significance. It would be reassuring to think that the renaissance of the Welte-Mignon might stimulate similar research and restoration of the other early reproducing piano systems.



*The Eighty-year-old Edwin Welte, Telefunken Recording Session, Freiburg, 1956.*

Technically, the Mignon presents more of a challenge than, for example, the Ampico or Duo-Art. The latter two were designed with mass production in mind, and so the adjustments and regulations necessary for faithful reproduction were more exactly documented at the time. Welte rolls are rarer than those for other systems, so the combination of good rolls with a good instrument has, until the recent developments of roll scanning and re-perforation, been largely a matter of chance. No reproducing grand piano responds well to being transported to a concert hall or recording studio, because its pneumatic valves, which work to tolerances of a few thousandths of an inch, are inevitably disturbed and take many months to settle properly. It is possible that the Ampico, with its unit valves, is hardier than most, but the Welte-Mignon in particular does not like to be moved. There are one or two push-up instruments, used in combination with normal grand pianos, and these are very occasionally used in public concerts in Europe, but in general the musical world must rely on audio recordings to explore the range and fidelity of the Welte-Mignon repertoire.

Unfortunately, the Welte has not been well served by the many recordings that have been made on inadequate instruments, right up to the 21st century. An enormous wealth of knowledge and experience was lost when Welte ended its days of recording around 1930, so the coarseness of playback caused by a renewed learning curve amongst musicians and technical experts in the 1950s and early 1960s can perhaps be forgiven. But if you have reached this page as a result of uncertainty aroused by some present-day CD, then listen to the following audio track, from a Welte roll recorded by Manuel de Falla in Paris in about 1912. It almost beggars belief that such subtlety of playing can have been captured nearly one hundred years ago. There are several currently available CDs of Welte-Mignon performances, ranging from the excellent to the decidedly poor. Listen first to De Falla, and then form your own judgment of any other recording you may have encountered.



**DE FALLA: Pièces Espagnoles - No. 4, Montanesa, [4.1 Mb]**

Recorded by Manuel de Falla - c. 1912, Paris.

*This roll was played back on a Steinway Welte grand piano in London, in January 2007.  
The audio recording is the copyright of the Pianola Institute, 2007.*



## **Welte-Mignon Technical Manuals**

For those with their own Mignon instruments, some of the original manuals are available here in **pdf** format:

[Welte-Mignon Reproduktionsklavier](#) - Technical manual in German for the green Welte-Mignon (98 holes on the tracker-bar), Welte & Sons, Freiburg, c. 1925, [**4.8 Mb**]

[Welte-Mignon - Test Roll 98](#) - Instructions in English for the green Welte-Mignon test roll (98 holes on the tracker-bar), Welte & Sons, Freiburg, c. 1925, [**2.5 Mb**]

[Welte-Mignon - Skala-Rolle 98](#) - Gebrauchsanweisungen auf deutsch für die grüne Skala-Rolle des Welte-Mignon-Klaviers (98 Löcher auf dem Gleitblock), Welte und Söhne, Freiburg, c. 1925, [**3.6 Mb**]