



# AMICA International

## Automatic Musical Instrument Collectors' Association

### Honor Roll

From the AMICA, V 13, No. 5, June 1976

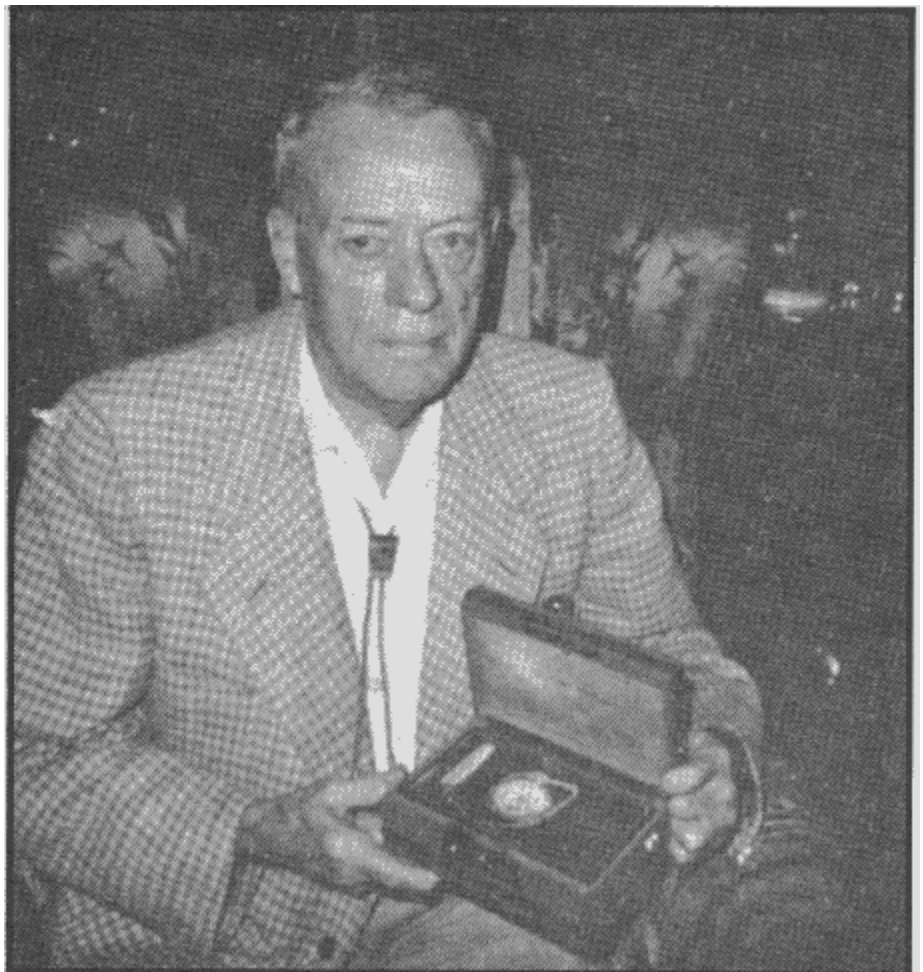
**CLARENCE N. HICKMAN**

By Alf E. Werolin

Recently the AMICA Board of Directors elected Dr. Clarence N. Hickman an honorary member of our society. Dr. Hickman made many contributions to the design of the Model 'B' Ampico and worked for the American Piano Company along with Charles Fuller Stoddard, the inventor of the Ampico reproducing piano, for a period of five years. The following brief biographical sketch has been excerpted from a "Genealogy of the Hickman Families" and from Larry Givens' book, Re-Enacting The Artist.

Dr. Hickman was born on a farm in Indiana and was one of nine children. His early childhood interests were archery, magic photography, and playing the guitar and clarinet, each of which were to play an important role in his later life. Educated in Indiana, he received an AB degree from Winona College. He began his active career as a teacher of physics and mathematics.

In 1917 Dr. Hickman went to Clark University in Worcester, Massachusetts, to study for his Master's degree and while there undertook work in the development of rockets. Following graduation, he continued his research and development work on rockets at the Mount Wilson Observatory shops



in Pasadena, California. These rockets were intended for use in World War I. It was here that a rocket charge explosion caused the loss of several fingers on Dr. Hickman's left hand and parts of those on his right hand.

Next came a short stint at the Aberdeen Proving Grounds to demonstrate the rockets he had developed, following which he joined the Bureau of Standards in Washington. During 1922 he received his doctor's degree from Clark University, using as his thesis the work he had done at the Bureau of Standards. For a short period thereafter he worked at the Washington Navy Yard developing submarine mines, and it was from here that he joined the American Piano Company. His assignment: "to develop a better Ampico reproducing piano!" What a change! From rockets, submarine mines and other explosive devices, to developing that most explosive of all automatic musical instruments - the Ampico Re-Enacting Piano!

In 1924 the American Piano Company decided to establish a fully equipped research laboratory in the new Chickering Hall in New York under the direction of Charles Fuller Stoddard, the inventor of the Ampico. Mr. Stoddard realized the need for a physicist and mathematician in undertaking more advanced research in the operation of reproducing instruments. Thus Dr. Hickman was employed to work on the improvement of the Ampico as well as on other aspects of automatic piano manufacture and operation.

Dr. Hickman's work brought a high degree of sophistication to player piano technology and resulted in two monumental accomplishments: the development of the Ampico dynamic recording machine; and the improved Model 'B' Ampico. These developments, and other improvements to both the piano and reproducing mechanisms are well described and illustrated in Larry Givens' book on the Ampico. It is apparent from reading this historical account that Dr. Hickman made an outstanding contribution to the development of this reproducing piano.

Here is a quote from Larry Givens' book: "Dr. Hickman's employment with American Piano Company, from 1924 through the end of 1929, may accurately be said to represent the only period in the history of the player piano industry in which real scientific methodology was applied to the development of the player piano. Most development work in the industry had theretofore consisted of scratch-paper sketches and empirical constructing of models with hopes that they would function!" Dr. Hickman was responsible for changing this "hit-and-miss" approach.

After the disastrous stock market crash of 1929, the depression pushed the piano business to such a low ebb that the American Piano Company was forced into receivership and later merged with the Aeolian Company, which continues today in the manufacture of fine pianos. The research department was closed and Dr. Hickman left to join Bell Telephone Acoustical Laboratories.

An interesting sidelight of Dr. Hickman's work in the Ampico research lab relates to his early hobby of archery. While in the lab he became interested in the physics of bows and arrows. He made many measurements in the laboratory and wrote several papers which were published in scientific archery magazines. Later he invented a method of making silk backing for bows, and produced these materials in his home during the thirties. According to his calculations he produced enough of these materials to back 42,357 bows!

At the Bell Telephone Laboratories Dr. Hickman developed the method of magnetic recording on metal tape, and worked on many devices for measuring and showing speech patterns. He also worked on new ways of doing machine switching in central telephone offices.

It was not long, however, before he was back at work on rockets, armor piercing bombs, recoilless guns, bazookas, and flame throwers at the Rocket Research Laboratory in the old Naval Proving Station in Maryland. It was here that his early interest in photography was put to good use in developing a ribbon frame camera for photographing rockets in flight.

*Upon retiring from the telephone company in 1950, Dr. Hickman joined the Sandia Corporation in Albuquerque, New Mexico, where he was concerned with guided missile developments. Since 1953 he has been living in New York and has been serving as a consultant to some of the leading industrial companies in the country.*

Dr. Hickman's interest in music continues to this day but in a most unusual way. Here is what he writes: "After having the accident in Pasadena where I lost several fingers, I sold my clarinets thinking that I would no longer be able to play them. However, I began to have dreams that I could still play the clarinet. These dreams persisted for over ten years. Finally when I was in the research laboratory of the American Piano Company I went to the Wurlitzer Co. to see if they could modify a clarinet so that I could play it. When they saw my hands that laughed at me, saying that it was impossible. The dreams persisted and then I went to see a young man whom I had met in our laboratory. He was a clerk in a music house on 14th street. I put the problem to him and he said they could not do the job but suggested that I do the modification. He said: "You are a good mechanic and you have excellent tools in your laboratory." I had never thought of doing this but it sounded reasonable to me so I bought a 'C' Clarinet and he gave me a box of old keys. On a weekend I did the job. When the job was completed, I was amazed to find that after a period of ten years I could still play and found to my utter amazement that I could still read music."

"I am still interested in music but not in collecting. I have been going to our local hospital (Jackson Heights) to play the clarinet for the patients. I have also been trying to help handicapped patients by showing them what I was able to do in resuming playing the clarinet after losing five fingers in that rocket charge explosion."

Dr. Hickman has certainly had a brilliant career. Who else has obtained patents for inventions covering such a wide field? Submarine mines, rockets,

archery, telephone applications, pianos and reproducing pianos! AMICA is honored to have this distinguished gentleman to join us.

-----  
**"Dr. Clarence Hickman"**

**Article by acquaintance of Dr. Clarence Hickman: Boris F. Kim Johns Hopkins**

Clarence N. Hickman was the man who was quite influential in the development of the Ampico Model "B" Reproducing piano.

Dr. Hickman, who died about 1987, was an amazing person who had many varied interests and contributed with his knowledge and inventiveness to many diverse fields. He was primarily a rocket scientist and worked at the Bell Telephone Laboratories for most of his professional career.

During the second world war, he was the head of a wartime project that developed rockets; he in particular was the inventor of the bazooka rocket launcher. As part of his rocket research, he developed a high speed camera (called a spark gap camera) that was capable of extremely high frame rates for photographing rockets in flight.

Hickman was very interested in the sport of archery and is considered by many the father of the science of archery, having made many seminal studies both theoretical and experimental into the mechanics and dynamics of the bow and arrow. He used his high speed camera to photograph the flight of an arrow as it leaves the bow and showed that the arrow bends and vibrates in flight. This phenomenon, which he discovered, is called The Archer's Paradox.

Dr. Hickman was a consultant to the American Piano Company during their development of the reproducing piano. The specific problem that he addressed was how to measure the velocity of a hammer striking the string so that loudness could be accounted for in player pianos. Here he made use of his spark gap camera to measure the speed of the hammers.

I wasn't much interested in pianos when I knew Dr. Hickman, so unfortunately I am not familiar with specific details of his work at Ampico Research Laboratory. I understand, however, that he designed an action that was subsequently used in the reproducing pianos.

In July, 1979, Dr. Hickman (then in his 90's) was invited by AMICA to give a talk on his work at Ampico. The talk was given at the Ben Franklin Hotel in Phila, Pa. I was not present but I understand that the talk was very well received; many in attendance sought his autograph on books about player pianos.

Boris F. Kim Johns Hopkins University/APL [bkim@aplcomm.jhuapl.edu](mailto:bkim@aplcomm.jhuapl.edu)

-----  
C. Hickman's own Account:

I was born August 16, 1889, on a farm about one mile north of Lizton, Indiana. With the exception of William, all my brothers and my sister were born on this same farm. (This does not include the two children that died in infancy). We lived in a four room frame house that belonged to my grandfather Leak. As children, we played with bows, crossbows and arrows made by my father or older brothers. We all used the PINCH DRAW. The arrows had heavy heads so that we did not need feathers to guide the arrow. We all went to the Leak country school. My teachers were Ora Leak, Obe Higgins and Ethel Jacks.

On March 1st, 1898, we moved from the Leak farm to the Job Hadley farm farther north. We all attended another country school, walking about one and one-half miles to the school. We boys shot fish with bows, using umbrella staves as arrows. I well remember that I could not understand why we had to aim under the fish to hit it. It was not until I attended high school, where I learned about refraction of light, that I understood this phenomenon. At this early age I showed ability to tinker with watches. Our house had four rooms downstairs and one large room upstairs. In addition, there was an adjoining log house that we used as a summer kitchen and dining room during the summer months.

On March 1st, 1900, we moved from the Hadles farm to the Mappen farm which was about one mile west of Jamestown, Indiana. The Big Four Railroad ran right through this farm. The house had only three rooms and the seven of us lived there for three years. We attended a country school that was about on-half mile from out house.

While living on this farm I became interested in photography and became well acquainted with Stanley Hendricks, who owned and operated a photo-graphic studio in Jamestown. Stanley Hendricks was to have a profound influence on my life at a later date. I also became interested in music, playing guitar and cornet.

On March 1st, 1903, we moved from the Mappen farm to a 240 acre farm about four and one-half miles north of Martinsville, Indiana. The farm house had three rooms downstairs and two upstairs. We attended a country school not farm from our farm. My father had bought this farm; here-to-fore we had been renters. My brother, Hanson, attended high school at Martinsville, walking several miles to the interurban.

I continued my interest in music, especially the guitar, and began to take pictures for a small fee. I attended the firs and cleaned the school house for a small fee.

In June, 1904, I graduated from the eight grade but, not being able to attend High School, I took the 8th grade over again. We cut wood -- hickory poles for the Old Hickory Chair Factory at Martinsville -- and we had to do lots of ditching. At that early age I surveyed an open ditch for my father, using a square and level. He did not have much confidence in the ditch, claiming that the water was going to run backwards. When we had our first big rain, he went out in the rain to see how the ditch was working and was surprised but happy to see that the water was running the right direction.

Disturbed over the fact that we children were not going to be able to get a high school education, my father and mother sold this farm and in September, 1905, we moved to a farm west of Jamestown. The farm house had five rooms all on the same floor.

I attended high school at Jamestown and on the side studied German (from books only). My interest in photography continued and I did lots of professional work. I continued playing guitar and renewed my interest in magic, which had begun when I was about five years old. I gave a magical performance at Jamestown and then later at Brownsburg. I was the official photographer for the Standard Oil Company that was erecting a pumping station at Jamestown.

I renewed my friendship with Stanley Hendricks and he hired me to clerk in his clothing store on Saturdays and later during the summer. He had given up the photographic business and had bought the clothing store in Jamestown.

In September, 1906, we moved from this farm to a farm of eight acres, about one and one-half miles south of Jamestown. My father and mother had bought this farm. This house had five rooms downstairs and three rooms upstairs. This was the largest house we had ever lived in. Furthermore, there were fewer in the family. My oldest brother, William, had married and my brother Hanson was Supt. of Schools in the Philippine Islands.

I continued my studies in the Jamestown High School and also continued my home studies of German.

Stanley Hendricks had sold his clothing store in Jamestown and had established one at Waynetown, Indiana. He had tried to get me to quit high school and go with him to Waynetown to clerk in his store. However, I told him I wanted to get a high school education. In the fall of 1908, I received a letter from him offering to let me finish my high school at Waynetown, by clerking in his store, mornings, noons and evenings and all day Saturdays. I accepted his offer and went to Waynetown. I slept in the store for some time.

Stan, as we all called him, was like a brother and father to me. I owe a great deal to him. He always called me "Hick".

In June, 1909, I graduated from the Waynetown High School and continued clerking full time in Mr. Hendrick's clothing store. In the late fall of 1909, I took a leave from the store to attend a teacher's Normal Course at Winona Collect, Winona Lake, Indiana. Dr. Johnathan Rigdon, who had been president of Central Normal Collect at Danville, Indiana, had established a new college at Winona Lake, Indiana.

In the spring of 1910 I resumed my duties clerking in the clothing store. In the fall of 1910 I accepted a position teaching 7th and 8th grade in the Waynetown public schools. During the winter I organized a band in the school and by spring they were playing well enough to perform in public. It was at this time that I took up the clarinet as I was never able to develop a lip for the cornet good enough to play as much as was needed as a band instructor.

I had continued my interest in magic and had given a few performances in Waynetown and Hillsboro. I made a short tour of churches and opera houses in Indiana, billed as The Hoosier Magician. I had one assistant that traveled with me, Lacy Shuller. In the spring of 1911, I made another tour under the same billing. After this tour, I went back to the farm at Jamestown for the summer.

I had expected to teach 7th & 8th grade again in Waynetown but was offered a position at about double the salary to teach in the Jamestown High School. I taught mathematics, physics, botany and German in this school. I took the state teacher's examination in German and got a license without ever having had an hour of study in any school. I had been elected president of a German club in Waynetown because they thought I knew more German than others who had studied German in college for four years.

-----

## **The Hickman Answers - By Richard J. Howe**

### **From the AMICA, Nov/Dec 1987**

From the early 1960's through the late 1970's, Larry Givens of Wexford, PA, had an extensive exchange of correspondence with Dr. Clarence N. Hickman, inventor of the Ampico B. In 1965 Larry posed a series of sixteen questions to Dr. Hickman. What follows are the questions and Hickman's answers. Although some of this material is covered in the Hickman Interviews and Hickman Diaries (*See The Ampico Reproducing Piano*, edited by Richard J. Howe and published by The Musical Box Society International in 1987), additional information is contained in this material. A subsequent article entitled "The Hickman Letters" will contain a substantial amount of new information.

LG: When Mr. Stoddard conceived of the Ampico originally, was it modeled after any existing idea, or was it his own fresh concept of what a player piano should be? The Welte-Mignon reproducing action had already been invented by the time the Ampico came along, and it might be possible that Mr. Stoddard had become familiar with it and decided to improve upon it - and the Ampico was the result. He may never have told you anything about this, but if he had, I would be very interested in knowing it.

CH: Mr. Stoddard knew nothing of the Welte-Mignon when he started his invention. He did see one after he was well along with his work and was scared to death for fear that his work would have been in vain. However, he felt that his system was so much better that he went ahead with his own work. He felt the same way about the Duo-Art player. So did I. Of course, I did not see them as soon as Mr. Stoddard.

LG: Did Mr. Stoddard come to American Piano Company with the Ampico action developed and working, or was it only an idea which he had to "sell" to American Piano and then develop it afterward? Do you know whether he received a royalty or a salary?

CH: Mr. Stoddard's action was well along when he joined the American Piano Company. However, the player did not come on the market until after he had conducted further research. He received both royalty and salary. He also received royalties on all rolls after they were being produced under American Piano Company control.

LG: Apparently during the early years of the Ampico, American Piano Company marketed the Ampico action under the names of Stoddard-Ampico and Ampico Artigraphic. Do you know whether these actions *were* different from the later Ampico action which was sold during the 1920's as the regular Model A action?

CH: I was not familiar with the Stoddard-Ampico or the Ampico Artigraphic but I am pretty sure that in principle they *were the* same as was being manufactured when I came with the company in the Spring of 1924.

LG: How was the Amphion Company connected with Ampico? Someone told me that all Ampico Model A actions were made by Amphion in Syracuse, New York - can you confirm or deny this?

CH: The American Piano Company had many factories. The Chickering, Knabe, Mason & Hamlin, and many makes were made at East Rochester. They also owned the Amphion Company and all player mechanisms were

manufactured in that plant. The rolls, however *were* manufactured at East Rochester. Both Model A and Model B actions were manufactured at the Amphion Company. I visited that plant many times in connection with the production of the new Model (B).

LG: Early Ampico rolls (from about 1915 to 1917) are marked to the effect "Made by the Rythmodik Music Roll Company, Belleville, New Jersey. "Can you explain the connection between Rythmodik and Ampico?

CH: I am sorry but I do not know the connection between Rythmodik Music Roll Company and The American Piano Company. All rolls were being made at East Rochester when I came with the company. I expect some of Mr. Foster's nephews could give you some answers to this question.

LG: Were the Ampico recording studios always located in New York City? Where in New York were the studios located before they moved into Chickering Hall on 57th Street? Which floor were the studios and labs on? What was the rest of the Chickering Hall building used for?

CH: I really do not know where the recording was done before they moved to Chickering Hall. Our research lab was on 38th Street when I first came with the company. I think we moved to Chickering Hall that summer. Then recording was all done on the tenth floor and the research lab was on the 11th floor. The rest of the building was devoted to sales of Chickering pianos and players. They also sold some of the East Rochester makes but not the Knabe, and I do not believe they sold the Mason & Hamlin either but I am not sure about that.

LG: In the introduction to the 1929 Model B service Manual, "Ampico Tower" is mentioned. Is this Ampico Tower the tower on top of Chickering Hall? (The Chickering Hall tower originally bore the Chickering Cross of the Legion of Honor.)

CH: I think the Ampico Tower was the tower on top of Chickering Hall.

LG: Were the Ampico laboratories in Chickering Hall devoted to research only on the Ampico player, or on pianos in general?

CH: No, I did a great deal of research on the piano itself. I developed the piano action which you have a description of there. Mr. Stoddard did not do much on the piano.

LG: Why was the Model B developed? (In other words, in response to what **need** was the Model B produced?) What was the major superiority of the B over the A, in your opinion? Did you have any large-scale troubles in adapting the Model B to play Model A rolls even though the B had only one crescendo? Why was only one crescendo included in the B? Were the Model B actions made in Syracuse or in Rochester? Were you hired by Mr. Stoddard for the direct purpose of redesigning the A into the B?

CH: The Model B was developed because the governing mechanism of the Model A was too slow to be able to accent a note and then drop the pressure for soft notes or vice versa. Our first governing device developed after I came with the company reduced the weight of the moving part to 1/10 of the Model A governor. This still was not enough to do what we wanted. I was responsible for the development of the pouch bleed system used in the Model B. It reduced the weight of the moving part to one-one thousandth of the Model A. The other objective was to use an electric motor to drive the rolls as the pump type motors used too much air and when the pressure was highest and the drag on the tracker bar was greatest, that was when the air motors took the most air and always dropped the playing pressure when it was most needed.

It took lots of thinking to get the new rolls to play on both models but I think we did a good job on that score. Almost always the crescendo was applied to both sides at the same time and since I had developed the pump

pressure spill valve, it was so very simple to put a spring that was stretched to increase the pump pressure or the high side of the governing mechanism. We did not think it was worth while to have two crescendos.

The Model B action was made in Syracuse at least until well after the depression started. Chickering Hall was still active for some time and I visited the Recording Lab several times after I had gone with the Bell Laboratories (1930). I do not know just when they moved the Recording lab away or when they started making the Ampico at Rochester, but am sure they did do this. Mr. Stoddard hired me expressly to work on the improved Ampico. He went to the Bureau of Standards and asked them to recommend someone. At that time I had left the Bureau and was working at the Mine Building Washington Navy Yard on submarine mines.

LG: Did Mr. Stoddard leave American Piano Company at the same time you did, or did he remain with the company for a longer time? Did he go directly into the restaurant business after leaving American Piano?

CH: Mr. Stoddard left the company at about the same time I did and very soon after bought the restaurant which he operated for many years and did his research on methods of cooking in connection with this restaurant. It was much later that he went with Stouffers.

LG: Did American Piano Company go into receivership after the market crash? If so, who handled the company while it was in receivership? What became of the labs and studios and the equipment in them?

CH: Before the crash, the American Piano Company officials sold their stock to the Bankers Trust Company. They operated the company until the stock market crash. However, Mr. Stoddard and I sold our stock as soon as the Bankers took over. We had no confidence in them. After the crash, the original officers of the American Piano Company bought the company back and organized the American Piano Corporation. I got in on the ground floor of that organization through Mr. Foster and I bought the bonds that permitted me to have quite a bit of stock. The bonds were paid off and I made a nice deal out of the stock. They paid dividends and only in recent years sold out all stock to some other organization. My stock was called at that time.

LG: Where were Ampico recordings made after the breakup of the Chickering Hall studios? (Or, did the studios remain intact until the mid-1930's?) I know from Adam Carroll that there was recordings equipment functioning until 1936, as he made recordings until that year - but he does not remember where he made then after 1930.

CH: The question has been answered to the best of my ability in the last part of the answer about the Model B.

LG: The last time we met, you described to me a machine which was built by Mr. Stoddard and which had a floating tracker bar to automatically "time" the dance rolls (to put them into perfect meter). In fact, you gave me a photo of the machine as it was being operated by Mr. Isaacson in the Ampico labs. Due to the fact that we had so much else to discuss the last time, we didn't talk much about this particular machine. However, it interests me very much, and I would like to pursue this as far as possible during our discussion on the 15th. Therefore, I hope you can remember enough about it so that I can form some idea of how the machine functioned, what it did, etc., etc. Was this the machine which produced the finished master roll which was then sent to Rochester for production?

CH: After this machine was put in operation (it was on our floor), all rolls that were recorded were made from masters that this machine produced. It made a test roll at the same time it made a few masters. Even though the machine was made to even tempo for dance rolls, it was also used when the floating tracker bar was not used. I guess you had better quiz me on this machine for it would take pages to tell you my improvement on the valve unit used with this machine. As designed by Mr. Stoddard, there were seven valves used in the unit. I reduced this to four. It got rid of lots of trouble.

LG: Could you give me, as far as you are able, a complete step-by-step description of the processes through which a recording went before it reached the final production master stage? I am particularly interested in



knowing more about the **editing** of the rolls and how this was done. This was probably the province of musicians themselves rather than your department, but you may remember enough about it that you can furnish valuable information.

CH: Originally, (before I came with the company) they recorded the notes and pedals on the carbon machine you mentioned. This was used in the new system too. It was a hand punch proposition before the special machine discussed above was built. After it was built, you had to only hand punch the first and end of a note from the carbon machine. The machine automatically put in all the rest of the perforations including the solid slot at the beginning and the broken punches to the end of the note. However, before the punching was done, the note sheet and the dynamic sheet were run through by the girls and they used the pantograph machine shown in some of the photos. They wrote the dynamic intensity on the note sheet and this expression was hand punched before going on the cutting (punching) machine. Four masters and a trial note sheet was punched and tried on the piano. A musical editor did this work. If there was something bad, it was corrected by using gum paper and the hand punch.

Formerly, the editor did all the dynamics as he remembered they were played by the artist. This was almost impossible. You always got what the editor thought it should be rather than the artist. The artist would listen to the record and make changes through the editor until he got tired. He would often approve the record to get away from the drudgery of making changes. Of course the editors did know how to make the selection sound well.

LG: Prior to the invention of your dynamic recording machine, was there any method used for recording dynamics as the musicians played - or *were the* dynamics later inserted on a sort of guess work basis? As far as I have been able to determine, prior to 1927 when your dynamic recorder came along, no dynamics. were actually recorded at all.

CH: The answer to this question is no. The dynamics were placed in by the editor as he thought they were played by the artist. As I said before, it was usually a record more like the editor would play it than the way the artist played it. No dynamics were ever recorded until I invented the dynamic system.

LG: What means of recording **notes** did they use prior to 1927? Was the method the same as the later one in your machine, i.e., using styli on a carbon paper roller?

CH: They used the same machine for recording the notes that we used. This machine was originally invented by Mr. Stoddard. I do not know what system was used by Welte-Mignon or Duo Art. However, neither of them recorded dynamics.