

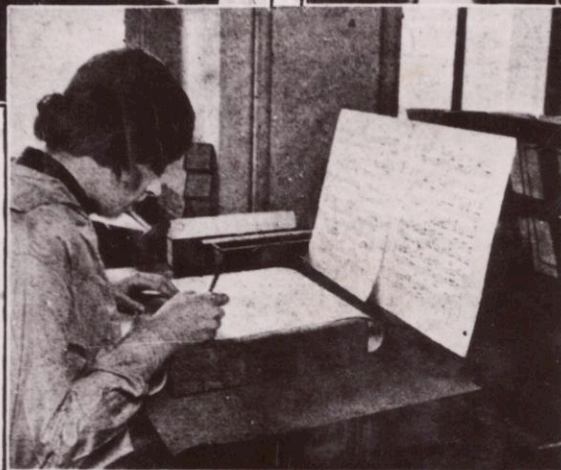
THE RECORDING INSTRUMENT ▲

The record of the notes and tone coloring are taken down on the right-hand sheet in the form of pencil marks. The dynamic record, on the left, comes off the instrument without anything showing on the sheet. After it is put through a development process, marks indicating the measurement appear. These marks are then identified into pairs which are measured by a scale divided into one hundred and twenty parts; each part represents one-tenth of the difference in loudness discernible by the average ear. After this is done the measurements are transferred to the note sheet giving a figure at the beginning of each note which tells to an unbelievable accuracy just how loud that note was struck by the recording artist. The recording instrument is connected by means of electrical circuits to the recording piano located in another room where the artist plays the original music



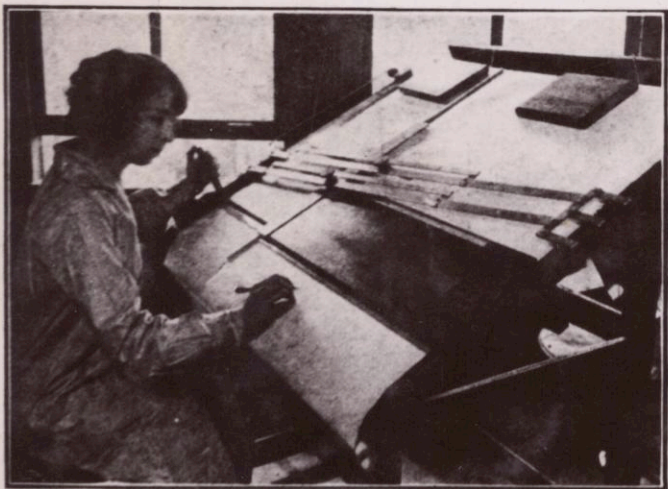
▲ EVERY DETAIL IS MEASURED

Here the myriad dots and lines of the recording are examined and measured in the process of translating them into music-roll perforations which control the reproducing mechanism in the piano, and give a performance which clearly possesses even the emotional qualities of the original playing. Operators examine and measure every detail set down in the recording of a person's playing. One of the most interesting operations is the analysis of the tone quality which is made possible by indications showing the speed with which the dampers move up and down in the operation of the damper pedal. The reproduction of "half pedaling" and other subtle tone effects is made possible by a system of extending certain note perforations, which cause their tones to ring through from one harmony to the next, thereby giving effects identical with those which the original artist contrived to put into his playing



WRONG NOTES ARE ELIMINATED

A painstaking checking with the sheet music eliminates wrong notes which were accidentally struck by the pianist



TRANSFERRING MEASUREMENTS

Unraveling the maze of figures in a dynamic record and transferring them to the roll is made extremely simple by an ingenious device



HAND PERFORATING PILOT HOLES

Hand-perforated holes at each end of the line indicating the position and duration of the notes guide the automatic stencil-making machine

Recording the Soul of Piano Playing

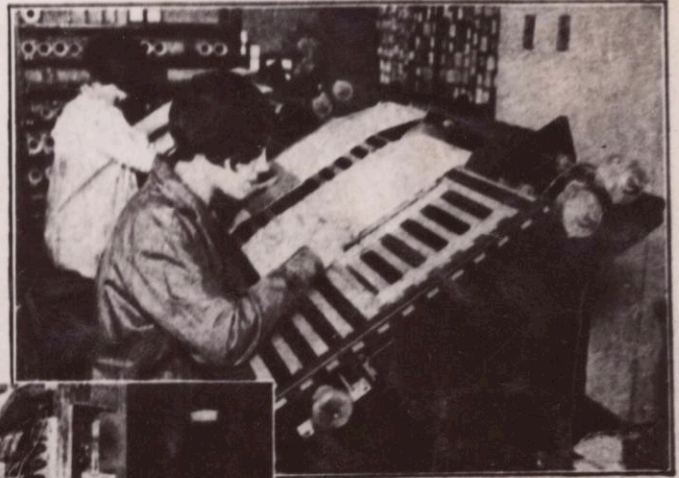
A RECORDING instrument, lately perfected by the Ampico Research Laboratory, accurately reveals the physical basis of those finer emotional qualities which mark the inspired performances of the great masters. A record taken on this instrument of the playing of an everyday pianist clearly shows the mediocrity of his performance as compared with that of one of the foremost great artists. That lovely liquid singing quality of tone—which is so rarely heard even in the great recital halls; that bel canto which subdues an audience to the point of making them regard the dropping of a pin as a misdemeanor; and a cough as a states prison offence; and

other effects, heretofore regarded almost as manifestations of the soul of the artist, are being analyzed for mechanical reproduction through the record music roll. This delicate recording instrument measures accurately the length of time it takes the hammer to travel the last eighth of an inch before it strikes the string, and from this measurement the exact loudness of the tone produced can be easily calculated, 416 hundred-thousandths of a second being required to produce the softest note and 51 hundred-thousandths for the loudest. About 60 times more energy therefore is expended in striking the loudest note than when producing a whispered pianissimo. Some



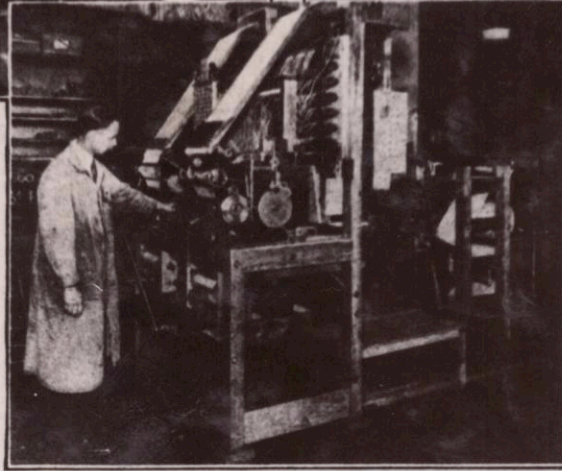
FIRST HEARING OF RECORD ▲

The first time a record is heard is when it comes from the automatic stencil-making machine. With only pilot perforations at the beginning and end of each note as guides, this machine has simultaneously cut a trial and a finished stencil. The stencil is three times the length of the trial record. An operator who is a finished musician takes the record at this stage and carefully examines every detail of the performance, checking up the result of the various stages in the long process of its completion. After the corrections indicated during this rigid inspection have been made, the record is an exact duplicate of the artist's playing, even in the smallest detail of light and shade, and is now ready for the artist to hear. Upon hearing the record, the artist becomes his own critic and if any further change is to be made, it is in deference to his wish to alter his performance



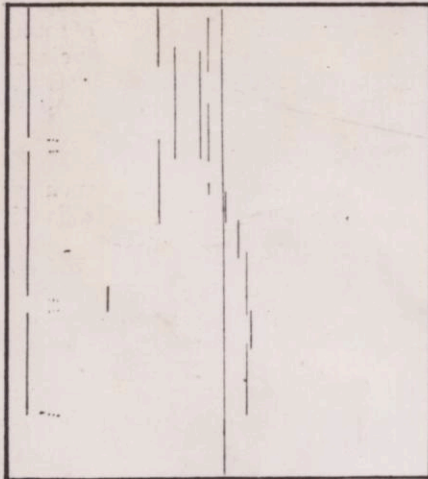
▲ STENCIL CHANGES

A special table over which the record and the stencil pass at the right proportionate speeds facilitates the making of any changes in the stencil which the artist has indicated in the record after hearing its performance. Usually the changes suggested by an artist have to do with dynamic where he accented a note too much or too little or where one phase had too much or too little contrast with another. He seldom touches the rhythm or the tone coloring. In a dance record, the rhythm is automatically checked and corrected in the stencil machine. After alterations are made the machine makes duplicates from this stencil and these in turn are used in the manufacture of the finished music rolls used in the reproducing piano. The actual music-cutting machines are duplex, cutting 30 rolls at a time in two groups of 15 each at the rate of three and one-half feet of finished record per minute of operation



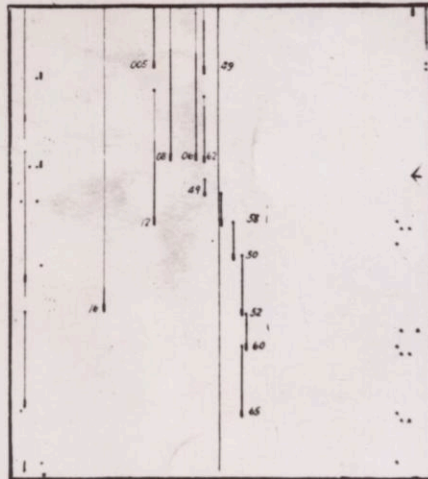
AUTOMATIC STENCIL MACHINE

This remarkable piece of automatic mechanism, which all but thinks, took more than five years to design and construct



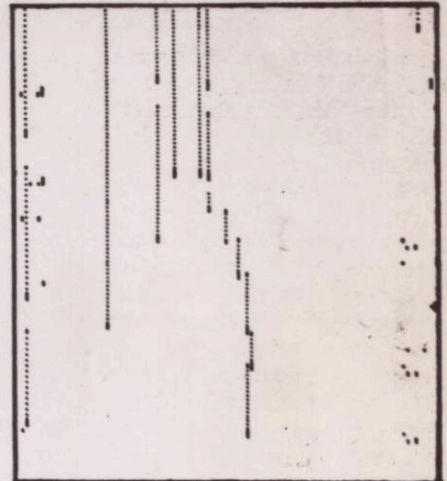
ORIGINAL RECORDING

Here are shown the pencilled lines of the notes, pedaling, and speed of the dampers



COMPLETED MASTER

It has the dynamic figures, tone coloring extensions and expression perforations



FINISHED PRODUCT

The record as it comes from automatic stencil machine, ready for first hearing

Revealing Idiosyncrasies of Artists

interesting side-lights are shown in the playing of great pianists by this super-accurate method of recording. One artist who produced an exceptionally beautiful quality of singing tone was found to co-ordinate his hands and pedaling to the almost incredible accuracy of one fiftieth of a second. We sometimes hear a performance which sounds perfect. Apparently there is not a flaw existing in the playing. Records of such performances when analyzed sometimes reveal unbelievable faults. One example, which to the ear showed the most remarkable control of dynamics, beautifully graduated melody, and an accompaniment played with almost inaudible softness and

smoothness, revealed when submitted to the tests of an uncompromising measuring machine, a grossly faulty rhythm in the accompaniment. This shortcoming was not discernible in listening to the playing because the accompaniment was too soft to define the positions of the various notes. The records measure technical ability with uncanny accuracy. The marks of the pencil points of this soul-searching machine show exactly the control the pianist has over his fingers; whether his dynamics are nicely balanced or ragged; if his tone is good or bad; and even whether his playing has feeling or is cold. The performance is figuratively put under a microscope.