

THE MUSEUM OF MUSIC: A HISTORY OF MECHANICAL INSTRUMENTS

BY CHARLES B. FOWLER

■ At what may have been the first educational media conference ever held in the field of music, Percy A. Scholes, in 1925, expounded the virtues of the player-piano and the reproducing piano for music education. In a demonstration of the many educational possibilities of these "extraordinary mechanical contrivances," he concurred with Alexander MacKenzie, chairman of the Committee on the Educational Use of Piano-Player Rolls, that "All musical educationists of standing are today agreed as to the high value of the ordinary 'Pianola' Roll, and 'Duo-Art' Roll, and the Gramophone Record."¹

Few music educators will recall that forty years ago the Pianola held as much educational promise as the phonograph recording. Mechanical aids for storing and reproducing musical sounds have come and gone during the last thousand years. As a means of bringing music to a broader audience, mechanical instruments have a history that is inseparable from developments in music education. Perhaps the most effective and far-reaching "music educator" at the present time is the

¹Percy A. Scholes, *The Appreciation of Music by Means of the "Pianola" and "Duo-Art"* (London: Oxford University Press, 1925), Foreword.

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phonograph itself. This mechanical reproducer has origins that reach back to the time of Bach.

A substantial part of the history of mechanical instruments can be seen and heard in the Museum of Music, temporarily housed at 34 Greenacres Avenue, Scarsdale, New York. Assembled there are more than five hundred mechanical musical instruments and models that convey the continuity of effort and the ingenuity that have gone into man's desire to reproduce music for the non-performing masses—from the water clock automata of al-Jazari, with its drums, trumpets, and clashing cymbals, to the three-piece life-sized robot band that performs more than fifty facial and body actions during each musical selection.

Between these extremes lies a fascinating variety of mechanical contrivances that play music recorded on paper, wood, and metal rolls, on perforated metal discs, and through other devices. Besides the human hand, five means have been employed to activate these machines—water, sand, weights, springs, and electricity. Each of these is illustrated by the exhibits in the museum.

Powered at first by water, the earliest known mechanical musical instrument dates from about 875 A.D. This hydraulic or "water organ," called the "Banu Musa," played interchangeable cylinders

automatically. This cylinder with raised pins on the surface remained the basic device to produce and reproduce music mechanically until the second half of the nineteenth century. "Mechanical carillons" are mentioned in the Low Countries as early as the beginning of the thirteenth century. The same pinned-cylinder mechanism activated these bells.

To the musician, an interest in mechanical musical instruments is not entirely musical. While aesthetic quality was often a primary concern of the inventors, it is true that many of these mechanical instruments are clever gadgets and novelties—jewel boxes and the like—intended for looks as much as for sound. Musical watches, clocks, mechanical singing birds, dancing dolls, and other musical automata played a limited selection of tunes of questionable merit. However, the fact that music was produced mechanically does not mean that it was inferior or substandard. The Royal Music Library in London has a number of works for both chimes and carillon composed by Handel. Of thirty-two pieces composed by Haydn for a flute-playing clock, five have been preserved on the cylinders of that instrument, made in 1792. Mozart also wrote for the pinned-cylinder instruments of the period.

The problem of making mechanical performances musical was a

vast one. In the case of completely mechanical performance by automatic instruments, only one performance is possible. Whether the mechanization is complete or partial, artistic interpretation is limited. For the most part, the difficulty in achieving artistic sensitivity was due to the lack of dynamic variation, a characteristic typical of these instruments. The discerning listener failed to find the necessary expressiveness.

"Automatophonic" is the term applied to mechanisms that replace the human performer, but not the instrument itself. Organs, pianos, violins, and even harps and xylo-

phones, are "played" by a cylinder "brain," programed with pins or pegs that "trip" the correct notes as the cylinder revolves.

So difficult were the processes of transferring a piece of music to pins on a cylinder, that Buchner claims the secret rivaled the mystery that shrouded the making of stringed instruments.² The problem was compounded as cylinders were pinned with more than one tune, in alternating rows of melody and harmony parts.

As early as 1670, large organs,

²Alexander Buchner, *Mechanical Musical Instruments* (trans. by Iris Urwin) (London: Batchworth Press, 1961), p. 24.

with the tunes set up in pins on a wooden barrel, were used in English churches. The choir director played the barrel-organ by cranking a handle. Several hymn barrels were supplemented by an Easter and a Christmas barrel. Around 1700, a smaller barrel organ appeared, designed for home use. Three sets of metal pipes and one of wood played eight to ten jigs, marches, and love songs, with a soft, mellow sound.³

In 1810, Burney remarked on the "general use" of the barrel organ and on the fact that, "recent improvements of some English Artists have rendered the barrel capable of an effect equal to the fingers of the first-rate performers." At a time when few people were able to play a keyboard instrument, the barrel organ provided musical entertainment and enrichment in the home.

Improvements in the barrel organ were continuous. The orchestrion, the most elaborate of the automatic organs, was manufactured in various sizes, the largest of which contained all the instruments of the orchestra and encompassed its full range, from the lowest note of the contrabass to the highest pitch on the piccolo. Sometimes called "orchestrophones," these instruments

³For more on the barrel organ, see John E. T. Clark, *Musical Boxes: A History and An Appreciation* (London: The Fountain Press, 1952), pp. 138ff.

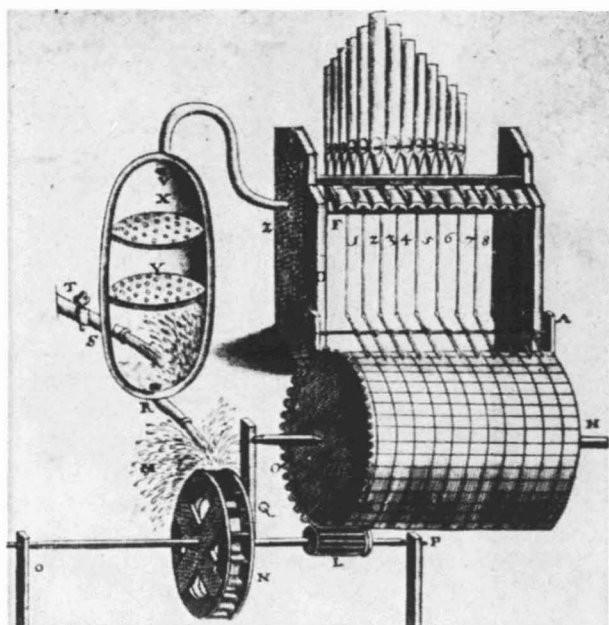


Figure 1, left: The earliest known mechanical instruments were powered by water. This drawing of the water organ at the Villa D'este, Rome, shows the ingenuity of these early inventions. The pinned cylinder remained the basic device to produce and reproduce music mechanically until the second half of the nineteenth century.

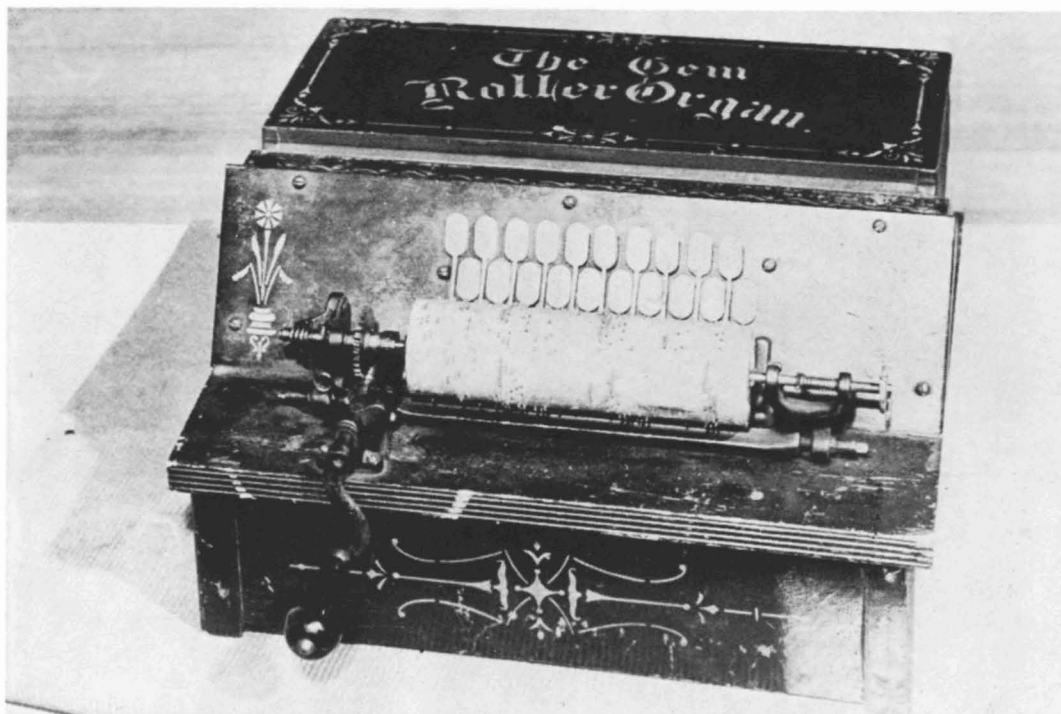


Figure 2, right: The Gem Roller Organ, about 1850, showing the wooden cylinder, pins, and hand crank. All the instruments in the Museum of Music have been restored to perfect operating condition.

originated in the latter half of the eighteenth century. In one orchestration, manufactured in the nineteenth century by Imhof and Mühle of London, the stringed instruments were represented by six hundred pipes, the woodwinds and brass instruments by one hundred and seventy reed pipes, and in addition there were drums, triangle, cymbals, and castanets.

One of the drawbacks of the orchestrions was the difficulty in changing the barrels. The largest orchestrions were twenty feet in height and required barrels that were five feet long. One advancement was a multiple-barrel instrument which permitted the barrels to be rotated to bring any barrel into playing position. Such instruments played Beethoven symphonies, overtures, operatic selections, dance tunes, and marches.

Johann Maelzel, the Elder, (1772-1838) invented an orchestration called a "panharmonicon" that combined winds and strings. At Maelzel's suggestion, Beethoven composed his *Wellington's Victory* for an improved version of this instrument. Maelzel's fame was so celebrated that he toured America with his mechanical instruments, winning great popular acclaim everywhere.

Another mechanical instrument, the metronome, bears some mention. In 1815, when Maelzel was

demonstrating his panharmonicon in Amsterdam, the Dutch genius Dietrich Nicholas Winkel shared with him his idea for the metronome. Maelzel, upon his return, made the instrument, and ever since has falsely been credited as its inventor.⁴

In 1821 Winkel created an even more remarkable mechanism, a machine that could compose. The "componium," as it was called, was exhibited in Paris, tested by members of the Academy, and was viewed with great interest and admiration. Winkel's instrument is in the collection of the Brussels

⁴Buchner, p. 79.

Museum of Musical Instruments.⁵

A major development in the history of mechanical instruments was the invention of the pneumatic mechanism. This invention replaced the barrels with a perforated card that had square or oblong holes, according to the length of the notes played (Figures 3 and 4). The self-changing disc machine was invented by Gustave Brachhausen in 1897. The twenty-seven-inch disc Regina, with self-changing attachment, was popular in

⁵For a picture of this instrument, see Lucius R. Wyatt, "The Brussels Museum of Musical Instruments," *Music Educators Journal*, Vol. 53, No. 6 (February 1967), p. 49.

Figure 3, right:
The Autophone,
made in
Ithaca, New York,
in about 1882,
showing the perforated
card. The length
of the
slits in the perforated
roll determined
the length of the
tones. The
invention of the
pneumatic mechanism
replaced the
more complex and
cumbersome barrels.
Reduced costs
in manufacture
permitted wider
public use.

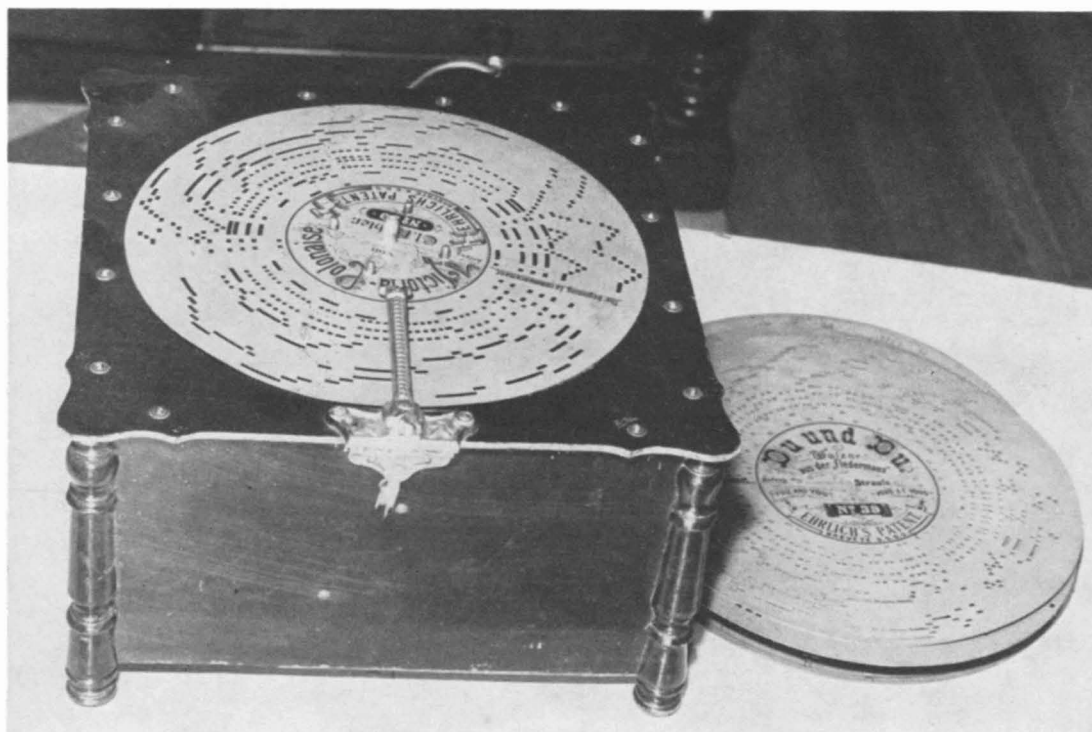
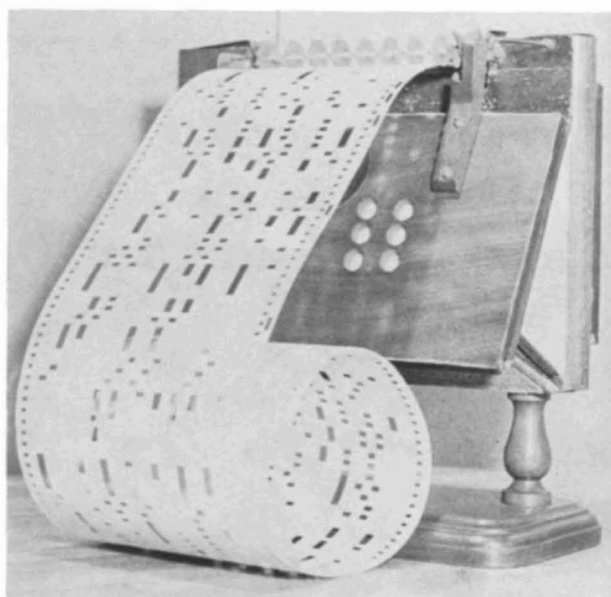


Figure 4, left:
Ehrlich's Organ,
hand operated,
employed flat paper
records.
Selections included
light classics,
marches, hymns, and
love songs. Most of
the musical selections
were of
European origin.

America among the wealthy (Figure 5). These self-changing Reginas and Polyphons held a magazine of twelve discs, and any tune could be selected at will.

Paper rolls came into use around 1878. They gradually replaced the barrels and discs and permitted the development of the Pianola. This was not simply a player piano, but a foot-actuated instrument in which the interpretation of the music was under the control of the operator. E. S. Votey, an American engineer, invented the Pianola in 1897. The "Duo-Art" piano, in addition to being a Pianola, also reproduced the actual recorded interpretations of the performer. Its capacity to reproduce shades of performance and be true to the individuality of the artist brought the instrument to the attention of many great composers and performers of the early nineteenth hundreds. Debussy, Ravel,

Mahler, Richard Strauss, Rachmaninoff, Josef Lhevinne, Moriz Rosenthal, and others flocked to recording studios to record their performances on the Welte Mignon, the Aeolian Duo-Art, and the American Piano Company's Ampico. There they made permanent accounts of their interpretations, recording on rolls the subtlest nuances in dynamics and tempo, touch and pedaling.⁶

The Museum of Music contains examples of all these instruments and many others. Among them is the only known Tonophone, an electric piano manufactured by the Wurlitzer Company in 1894, an automatic xylophone, banjo (Figure 6), and harp, the Hupfeld automatic triple violin, the Link Orchestrion played by an endless paper music roll (Figure 7), an Edison one-cent juke (Figure 8),

⁶Many of these rolls have been flawlessly reproduced on Argo Recordings, DA 41, 42, and 43.

and the Automatic Cremona Theatre Orchestra, a twenty-piece band that was used principally in motion picture theaters from 1914 to 1924. All the instruments in the collection have been restored to perfect working condition. They are arranged in chronological order as a sort of sonic cavalcade of the history of mechanical music. The museum has been in existence for almost fifteen years and is opened from May to December. A large representation of the instruments has been installed in seven especially-designed vans, which allow the exhibit to be transported to any location. The collection has been shown at the Smithsonian Institution, Washington, D.C.; at Yale University, New Haven, Connecticut; and in Albany, New York.⁷

The museum presents a clear

⁷Lewis Graham, Curator-director of the Museum of Music is seeking permanent quarters for the collection.

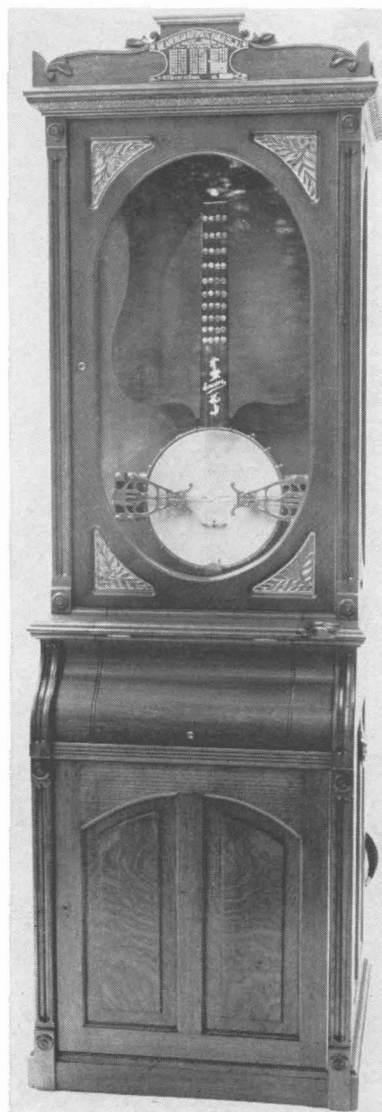
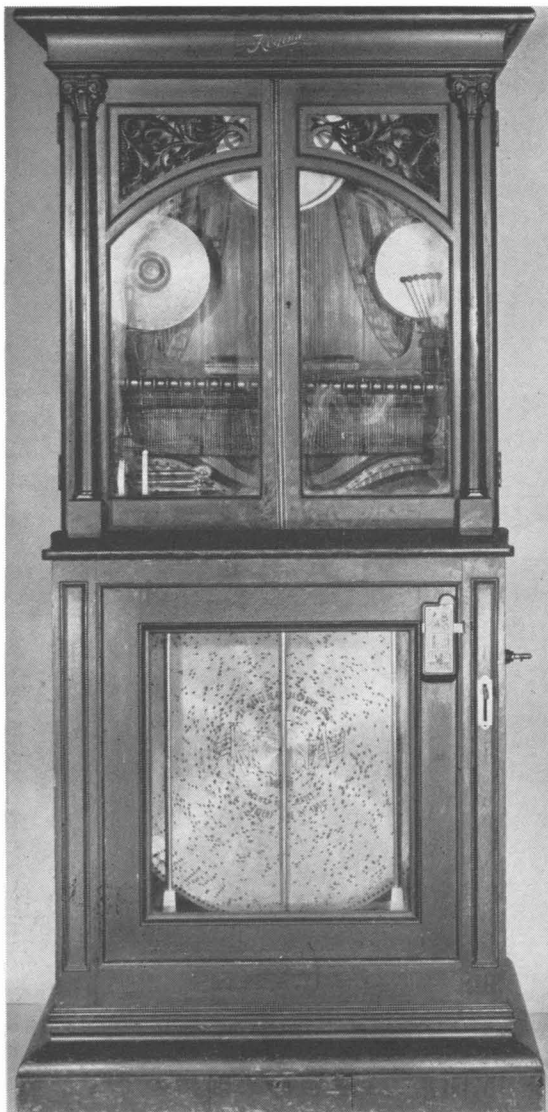


Figure 5, far left: The Regina Concert Orchestrion, c. 1898, plays on piano strings, chimes, cymbals, and drums by means of several, large steel discs. Operated by spring motor, the machine automatically changes the discs for each nickel, permitting the operator to select his musical preference in much the same manner as the modern juke box.

Figure 6, left: The Automatic Banjo dates from 1907. The museum collection also contains an automatic xylophone, accordion, harp, and violin. All of the instruments in the collection are tuned and adjusted frequently in order to permit the viewers to enjoy hearing them at their best.

record: the art of music has always courted mechanical aids. The development of instruments to supplement and extend the possibilities of the human body as a means of music-making has continued for centuries. The proliferation of music-instrument industries today documents the influence such mechanization has had on the effectiveness of music as a means of human expression. The extension of mechanization in recent years into sophisticated electronic and computerized machinery, to enhance both the reproduction and creation of music, is one more step in a long and important history. The inventiveness and the ingenuity of man is clearly evident in all these developments.

Perhaps the electronic composers of the present decade seek some of the same goals sought by their predecessors: to rid music of man's

individual mannerisms, to create a scientifically perfect music, and, as a composer, to control fully the interpretive aspect of the musical art. One can conjecture that Toscanini, who was never satisfied with his performances of Beethoven's *Missa Solemnis*, would have welcomed the master's own definitive realization. To control completely the notes, meter, rhythm, tempo, and volume of music through the dehumanization of performance has been the temptation of many composers. The objectivity of the perforated Pianola roll or the magnetic tape is as much a creative challenge on the one hand, as aleatoric or "chance" music is on the other.

Mechanization of music flourishes today. Electronic attachments to musical instruments are becoming increasingly evident, from amplifiers to vibrators and octave-

extenders. Tape recorders and transistorized stereophonic phonographs not only reproduce music with almost perfect fidelity, but they can also produce some effects unequaled by live performance in the concert hall. Even the wildest dreams of the inventors of the past have become a reality. At the present time, machines have expanded the vocabulary of musical communication in tone, color, range, directionality, and variety, and they even compose music. While the value of mechanical instruments is primarily historical, the tireless efforts of their makers—the real pioneers of technological progress in music—contributed immeasurably to the present place of music in American life. As forerunners of current developments, mechanical musical instruments are audible reminders of what has gone before, and of the vast possibilities that lie ahead. ☐

Figure 7, right:
The Link Orchestrion,
1915, employed electricity,
and was activated by an
endless paper music
roll containing
many different selections.

Figure 8, below:
The Edison one-cent juke
dates from 1887. The
directions read, "Turn
crank on side of
cabinet eight times and
let go, then
drop one cent in slot."

