

Thonet furniture, 1830-1953 : an exhibition at the Museum of Modern Art, New York

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Thonet Industries

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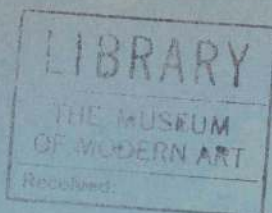
THE MUSEUM
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THONET

1830-1953

an exhibition at the Museum of Modern Art, New York



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T H O N E T

furniture

1830-1953

an exhibition at the Museum of Modern Art, New York

This filmstrip is presented by Thonet Industries, Inc.

on the occasion of their 100th anniversary in America

1853-1953

T E N O S T

T E N O S T

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an exhibition at the Museum of Modern Art, New York
an exhibition at the Museum of Modern Art, New York

This film is presented by Thomas Industries, Inc.
This film is presented by Thomas Industries, Inc.
on the occasion of their 10th anniversary in America
on the occasion of their 10th anniversary in America

1953-1954

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THONET FURNITURE

An Exhibition at the Museum of Modern Art, New York

This filmstrip consists of 41 frames, of which 8 are from printed sources and 33 are actual views of the exhibition and of furniture featured in the exhibition.

The filmstrip is divided into four main sections: VIEWS OF THE EXHIBITION, BENTWOOD FURNITURE, TUBULAR STEEL FURNITURE, and MOLDED PLYWOOD FURNITURE.

Below is a detailed list with appropriate data for each frame. Fuller commentary will be found in the accompanying manual.

VIEWS OF THE EXHIBITION

Five views of the exhibition as installed at the Museum of Modern Art
(Frames 4-8)

BENTWOOD

Title	(Frame 9)
Bentwood spiral made from a tree trunk dramatically demonstrates the possibilities of the bentwood process	(Frame 10)
First Bent Veneer Chair, 1836-1840. Owned by Mrs. F. Thonet, Vienna	(Frame 11)
Bentwood Parquet Floor, Liechtenstein Palace, Vienna, 1843-49	(Frame 12)
Bentwood Chair, Liechtenstein Palace, Vienna, 1843-49	(Frame 13)
Café Daum Bent Veneer Chair, 1850. Owned by Mrs. F. Thonet, Vienna	(Frame 14)
Bentwood Furniture Production	(Frame 15)
U.L. Beech trunks are cut into boards	
U.R. Wooden poles are steamed before bending	
L.L. Steamed poles are strapped into iron molds	
L.R. Weaving of cane seats and backs	
"Vienna" Bentwood Side Chair, 1876 model - 1953 model. Collection, The Museum of Modern Art	(Frame 16)
Bentwood Rocking Chair, 1860. Owned by Miss Robbie M. Griggs, Birmingham, Alabama	(Frame 17)
Pictures illustrating the popularity and wide-spread acceptance of the bentwood chair	(Frame 18)
Bentwood Arm Chair, c. 1890. Owned by Thonet Industries, Inc.	(Frame 19)
Thonet Bentwood Furniture exhibited at the Crystal Palace Exhibition, London, 1851	(Frame 20)

THE HISTORY OF THE BRITISH PAINTING

An exhibition of the history of the British painting, from the earliest times to the present day, is now being held at the National Gallery, London. The exhibition is divided into four main sections: (1) The Pre-Raphaelite Movement, (2) The Victorian Era, (3) The Twentieth Century, and (4) The Modern Movement. The exhibition is a most interesting and instructive one, and is well worth a visit to all those who are interested in the history of art.

THE HISTORY OF THE BRITISH PAINTING

- (Page 1) The Pre-Raphaelite Movement
- (Page 2) The Victorian Era
- (Page 3) The Twentieth Century
- (Page 4) The Modern Movement
- (Page 5) The Pre-Raphaelite Movement
- (Page 6) The Victorian Era
- (Page 7) The Twentieth Century
- (Page 8) The Modern Movement
- (Page 9) The Pre-Raphaelite Movement
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- (Page 11) The Twentieth Century
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- (Page 13) The Pre-Raphaelite Movement
- (Page 14) The Victorian Era
- (Page 15) The Twentieth Century
- (Page 16) The Modern Movement
- (Page 17) The Pre-Raphaelite Movement
- (Page 18) The Victorian Era
- (Page 19) The Twentieth Century
- (Page 20) The Modern Movement

Single Piece Bentwood Chair, c. 1873 (Frame 21)

3 Production Phases of Experimental Oak Chair: left to right (Frame 22)

- a. Flat board, band sawed
- b. First bending operation forming the back
- c. Second bending operation forming the seat
- d. Finished chair

Art Nouveau Bentwood Interior, Exposition For Decorative Arts, Turin, 1902 (Frame 23)

Bentwood Arm Chair, 1870. Collection, The Museum of Modern Art (Frame 24)

TUBULAR STEEL

Title (Frame 25)

Section of Marcel Breuer's Tubular Steel Chair illustrating a new application of an industrial material (Frame 26)

Marcel Breuer; Dining Room, Piscator Apartment, Berlin, 1927 (Frame 27)

Ludwig Mies van der Rohe: Living-Dining Area, Tugendhat House, Brno, Czechoslovakia, 1930 (Frame 28)

Le Corbusier and Pierre Jeanneret: Living Room, Church House, Ville d'Avray, 1928-29 (Frame 29)

First Tubular Metal Chair. Marcel Breuer, 1925. Collection, The Museum of Modern Art (Frame 30)

Resilient Tubular Steel Cantilever Chair. Ludwig Mies van der Rohe, 1926. Collection, The Museum of Modern Art (Frame 31)

Tubular Steel Cantilever Chair. Marcel Breuer, 1928. Collection, The Museum of Modern Art (Frame 32)

Adjustable Recliner. Le Corbusier, Pierre Jeanneret and Charlotte Perriand, 1927. Collection, The Museum of Modern Art (Frame 33)

Adjustable Recliner (View showing recliner in another position)(Frame 34)

Revolving Leather Chair. Le Corbusier, Pierre Jeanneret and Charlotte Perriand, 1927. Owned by Thonet Industries, Inc. (Frame 35)

MOULDED PLYWOOD

Title (Frame 36)

Molded Plywood shapes demonstrate the inherent flexibility of a traditionally rigid material (Frame 37)

Adjustable Lounge Chair. Ilmari Tapiovaara, 1929. Owned by Thonet Industries, Inc. (Frame 38)

Molded Plywood Arm Chair. Joe Adkinson, 1952. Owned by Thonet Industries, Inc. (Frame 39)

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THONET FURNITURE

Frames 1-8: Introduction and Installation Views of the Exhibition

The story of Thonet furniture (presented here on the occasion of the firm's 100th anniversary in the United States) reads like a chapter in the history of industrialization. In the early part of the 19th century, Michael Thonet, a small cabinet-maker and joiner, well trained in his craft, experimented in his Rhenish workshop with new methods to produce a chair which would be lighter, more durable and at the same time cheaper to make than the handmade products of his trade. In 1830, at the age of 23, he began making chair parts and soon complete chairs of bundles of thick veneer strips, which were saturated with glue and exposed to heat in wooden molds. This original method, which was later replaced by an improved process of bending solid wood, preceded Alvar Aalto's bent plywood furniture of the 1930s by one hundred years.

In 1842 Thonet moved to Austria. Keenly aware of the originality and possibilities of his invention, he pursued his idea, in partnership with his five sons, through a lifetime of unceasing labor and planning. When he died in 1871 at the age of 75, the one-time small cabinet-maker left behind an industrial empire of factories and saw mills, vast holdings of forests and a network of company showrooms in 25 capital cities. His invention led to an entire new industry. After the expiration of his original patents in 1869, other companies began producing the same furniture. Together, in the first decade of the 20th century, the industry employed more than 35,000 people.

In many respects the Thonet story reads like the Ford story in the automobile industry. Part of its success lies in industrialization through division of labor, the professional craftsman being replaced by untrained hands working in an assembly line (see Frame no. 15), through control of raw materials essential to industry-factories were placed near beechwood forests, for which exploitation rights had been secured-and through a world-wide sales organization.

Thomas Thomson's Introduction and Installation of the Light

1850-1860 I. Thomson and his associates

The story of Thomas Thomson (presented here on the occasion of the firm's 100th anniversary in the United States) reads like a chapter in the history of industrialization. In the early part of the 19th century, Thomas Thomson, a small cabinet-maker and joiner, well trained in his craft, experimented in his workshop with new methods to produce a chair which would be light, strong, durable and at the same time cheaper to make than the heaviest products of his trade. In 1850, at the age of 27, he began making chair parts and soon complete chairs of birch veneer, which were regarded with great interest to begin in wooden chairs. This original method, which was later recognized by an improved process of bending with wood, proceeded along Thomson's bent pipe wood furniture of the 1850s by one hundred years.

In 1852 Thomson moved to Australia. He only knew of the originality and possibilities of his invention, he pursued his idea, in partnership with his five sons, through a lifetime of necessary labor and planning. When he died in 1871 at the age of 75, the one-time small cabinet-maker left behind an industrial empire of factories and saw mills, vast holdings of forests and a network of company showrooms in 27 capital cities. His invention led to an entire new industry. After the expiration of his original patents in 1869, other companies began producing the same furniture. Together, in the first decade of the 20th century, the industry employed more than 25,000 people.

In many respects the Thomson story reads like the Ford story in the automotive industry. Part of its success lies in industrialization through division of labor, the professional craftsmen being replaced by untrained hands working in an assembly line (see frame no. 12), through control of raw materials essential to industry-factories were placed near bestwood forests, for which exploitation rights had been secured and through a world-wide sales organization.

The products--an elaborate line of furniture, particularly chairs--were shipped around the globe in millions of pieces and installed in every place where people sat down for pleasure or work. Dismantled for easy shipping and equipped with screws for quick assembly, this furniture led straight to the serial production of the 20th century. It not only accepted but turned to positive advantage the limitations of machine production, which for good results asks for anonymous, simple shapes devoid of the craftsman's rich and intricate detail. There is elegance and refinement in many of the pieces and an inventiveness in the use of material and production methods which have not been surpassed.

The great French architect Le Corbusier furnished his Pavillon de l'Esprit Nouveau at the 1925 Exposition des Arts Decoratifs in Paris with standardized Thonet chairs which were designed around 1870 (Frame no. 24). Le Corbusier explained his choice when he said "We have introduced the humble Thonet chair of steamed wood, certainly the most common as well as the least costly of chairs. And we believe that this chair, whose millions of representatives are used on the Continent and in the two Americas, possesses nobility." Siegfried Giedion in his book "Mechanization Takes Command" terms them "form purified by serial production."

It was also in 1925 that a new idea revolutionized furniture design: The invention of the tubular steel chair, for which Thonet Brothers soon obtained major production rights. The story goes that Marcel Breuer, then a master at the Bauhaus in Dessau, envisioned the use of chromium-plated tubular steel for metal furniture while he was riding a bicycle. It occurred to him that the same bent steel which formed his handle bars could be fashioned into continuous loops to form the supporting frames of chairs and tables. In 1925 he designed and built the first chair entirely of chrome-plated tubular steel (Frame no.30).

Another revolutionary step in the development of modern furniture was the tubular steel cantilever chair. One of the first models, a Breuer design of 1928,

eventually became the prototype for thousands of modifications throughout the world. (Frame no. 32). Between 1925 and 1929, the greatest architects of the modern movement, Mies van der Rohe, Le Corbusier, Marcel Breuer and others, developed tubular steel furniture which we consider today, together with their architecture, as the classic examples of new spatial relationships for a new industrial and scientific society. Thonet Brothers, who were by then an international organization with factories in Germany and France as well as the former Austrian territories, produced all of these designs and became the commercial exponents of a new concept of beauty.

Recent additions to the furniture produced by the American Thonet Industries reflect the firm's pioneer spirit. Knock-down plywood and leather chairs by Ilmari Tapiovaara and molded plywood chairs by Joe Adkinson (Frames no. 38 and 39) indicate the endless possibilities open to the inventive mind in designs which are as different from the rigid precision of the metal pieces of the 1920s as they are from the sinuous interlacings of the earlier bentwood chairs.

FIRST BENT VENEER CHAIR, 1836-1840.

Frames 9-11

Michael Thonet, born in 1796 in the small town of Boppard on the Rhine, learned the carpenter's trade and in 1819, at the age of 23, opened his own business as joiner and cabinet maker. It was the period of German adaptation of French Empire, called Biedermeier in Germany, and Thonet's furniture in the Biedermeier style was sold along the Rhine and in the nearby Mosel valley.

Experiments to make this furniture lighter, yet stronger and more portable, began in 1830. Between 1830 and 1840 Thonet succeeded in making chair parts and soon entire chairs by bending and heating thick bundles of veneers, saturated with glue, in prepared wooden molds. His first experiments were the curved top and center bars of chair backs, traditionally carved from solid wood and covered with

a thin sheet of fine veneer. The new discovery made these same shapes much lighter, more durable and relatively cheap, since the core consisted of strips of ordinary lumber. Costly veneers were used on the outside only.

Realizing the importance of his invention, Thonet thought to protect it by taking out patent rights in various countries. Investors were found and with their help patents acquired in France, England and Belgium. Thonet planned to finance large scale production at home through the sale of foreign patents, but was unable to do so.

At the time this chair was produced (Frame no. 11) Thonet was largely absorbed in working out his technique, which he also applied to the curved head and foot boards of beds and sofas. There are some unconventional curls back of the top support, but nothing else in the appearance of the chair's upper part distinguishes it from other chairs of the same period. The extraordinary technical innovation however, caused a strange transformation of its lower part. The chair now sits on four legs which do not end at the floor but spring up to join each other. As the bending methods were further developed, an entirely new shape gradually emerged, having no relationship to forms and decorative schemes of earlier periods, but suggesting new concepts of beauty genuinely of our own time.

CAFE DAUM BENT VENEER CHAIR, 1850

Frames 12-14

In 1841 Thonet met Prince Metternich, then Europe's mightiest statesman. The prince, visiting his Rhenish estates, saw some of the new furniture at a local fair, recognized its potentialities and argued that Thonet would never fully realize his invention within the narrow confines of his home town. Vienna was the place for a man of his caliber. He offered his sponsorship at the Imperial Court, even a free ride to Vienna in the coach of the diplomatic courier. Thonet accepted and in 1842 went to Austria, where patent rights had already been granted

to him. He was well received and soon a "privilege" gave him the right to "bend by chemo-mechanical means any, even the most brittle, types of wood into any form and curve desired."

The German creditors who had financed his foreign patents meanwhile dispossessed him in an effort to recover their losses. Thonet moved his family to Vienna and started afresh. For four years he and four of his sons were under contract to a Viennese cabinet maker, commissioned to design and manufacture parquet floors and furniture used in remodeling the huge Liechtenstein Palais (for pictures of Thonet's bentwood parquets and chairs in the Liechtenstein Palais, executed in the style of the second Rococo, see Frames no. 12 and 13).

This chair (Frame no. 14) was one of the first designs produced after Thonet and his sons opened their own workshop in 1849. It drew much public attention when it was exhibited in 1850 together with some of the intricate parquet designs.

Viennese newspapers reported on the new invention; sponsors in high places praised its qualities; but the greatest commercial success was the first large order which came from Madame Daum, owner of a famous café. Café Daum was the first public place to be furnished with bentwood chairs (made especially from the finest mahogany and in use until 1876, when they were replaced by new Thonet designs).

This chair was manufactured by bending four layers of wood for the back support and five layers for the seat frame. These wood strips were first softened in boiling water, then bent in prepared molds and dried. The individual bent veneer shapes were then glued together. In its appearance, the chair differs radically from the early German as well as the eclectic but remarkably handsome and fluid Liechtenstein designs (see Frames no. 11 and 13). Its shape, rather than conforming to the design principles of a past period, seems to be born out of the material. It rises lightly from the ground and follows naturally the bending lines of the wood grain. The tops of the front legs still show traces of conventional

to him. He was well received and soon a "privilege" was his the right to "read
of design-constructive means say, even the most brilliant types of wood into any form
and curve desired."

The inventor, however, was not content with the "privilege" but he wanted to know
if he was not to be paid for his invention. He was told that he was to be paid
for his invention and that he was to be paid for his invention.

For four years he and four of his sons were under contract
to a Vienna cabinet maker, commissioned to design and manufacture
The Vienna cabinet maker who had the right was a very famous cabinet maker
and he was very successful in his business. He was very successful in his business.

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carving, eliminated in later designs. The chair as a whole is already refined to the essential elements: a seat held by four legs, the two in the rear being joined to make a continuous curved back support. The two curlicues which face each other within the chair back, while bracing the curved rail, supply a decorative element in a simple and unaffected manner.

"VIENNA" BENTWOOD SIDE CHAIR, 1876 MODEL--1953 MODEL.

Frames 15-16

The first Thonet showroom was opened in Vienna in 1852. Workshops were moved to larger quarters to house 42 workmen and a steam engine to drive the machines which until then had been operated by hand. In 1853 Michael Thonet transferred his business to his five sons, retaining leadership in Thonet Brothers.

The first large scale factory was opened in 1857 in Koritschan, a small country town in Moravia, abundant in beechwood forests and with a local farm population to provide cheap labor. It was here that full industrialization was introduced. Professional cabinet makers were no longer employed. Labor was divided between men to do heavy work and youthful helpers, mostly girls, for sanding, polishing, weaving and packing. The weaving of cane seats and backs was later transformed into a separate home industry (see Frame no. 15).

More machines were installed (all invented and built by the Thonets themselves), and production continuously improved: furniture parts were no longer glued, but screwed together, so that they could be shipped demounted at great space savings. An important step in the conquest of world markets was an invention enabling even the most complex curves to be bent from solid wood. From then on countries in tropical zones became potential customers, since the sections no longer made of layers of bent veneers glued together, could not separate under the influence of heat and moisture.

curving, eliminated in later designs. The chair as a whole is already reflected
to the essential elements: a seat held by four legs, the two in the rear being
joined to make a continuous curved back support. The two outer ones which face
each other within the chair back, while protecting the curved walls, supply a decorative
five element in a simple and unostentatious manner.

"VIENNA" BERNHARD GIBR GIBR, 1895 MODEL--1933 MODEL

Process 15-16

The first Vienna show was opened in Vienna in 1895. Workshops were moved to
larger quarters to house 45 workers and a steam engine to drive the machines
which until then had been operated by hand. In 1905 Michael Thonet transferred
his business to his five sons, retaining leadership in Thonet Brothers.

The first large scale factory was opened in 1907 in Kitzbühel, a small country
town in Austria, abundant in hardwood forests and with a local fair population
to provide cheap labor. It was here that full industrialization was introduced.
Professional cabinet makers were no longer employed. Labor was divided between
men to do heavy work and youthful helpers, mostly girls, for sanding, polishing,
weaving and packing. The weaving of cane seats and backs was later transferred
into a separate home industry (see flow no. 15).

More machines were installed (all invented and built by the Thonet brothers)
and production continuously improved: furniture parts were no longer glued, but
screwed together, so that they could be shipped dismantled at great space savings.
An important step in the conquest of world markets was an invention enabling even
the most complex curves to be bent from solid wood. From then on countries in
tropical zones became potential customers, since the sections no longer made of
layers of bent veneers glued together, could not separate under the influence of
heat and moisture.

A small side chair was added to the firm's line in 1859 in an effort to introduce a particularly simple, inexpensive chair. The two pieces shown here (Frame no. 16) are the 1876 version of this chair (eventually to become the best known of all Thonet products) and the same chair as it is still produced today by Thonet Industries. The important innovation of the original 1859 design was the circular bent seat frame, supported by a ring brace. By 1900 this round seat was used in connection with about one hundred different back designs. Customers were also offered the choice of four different leg braces, of which two are presented here. However this chair is more than a rational assembly of standardized parts. The new process of bending wood was originally meant to reduce the weight of solid carved parts of a traditional design. But in its step by step development, a chair design emerged for which no prototype existed—a design that is predominantly open and linear. Known as the Vienna chair, eventually it became the firm's main product. By 1900 the bentwood industry had produced an estimated 40 million Vienna chairs, a figure which by this time has grown to well over 100 million.

BENTWOOD ROCKING CHAIR, 1860. (Frame no. 17)

Frames 17-18

Rocking chairs are said to have originated in Lancashire around 1750. At about the same time, Benjamin Franklin produced a rocking chair for which he used iron rockers. During the late 18th century the Windsor rocker became a fixture of the American home. It may be possible that its popularity here reflected habits of greater informality developed by the colonists in contrast to the more formalized patterns of European living.

The first bentwood rocking chair was produced in 1860. In Austria up to that time only heavy, upholstery-padded iron rocking chairs were known. Their unwieldiness and high prices did not encourage wide distribution. Even the new, lighter bentwood rocking chair was slow in finding a market. Overseas export

A small side chair was added to the firm's line in 1899 in an effort to cater
to a particularly single, inexpensive chair. The two pieces shown here (from
no. 181 are the 1899 version of this chair) eventually to become the best known
of all Thonet products) and the same chair as it is still produced today by
Thonet Industries. The important innovation of the original 1899 design was the
cleverly bent seat frame, supported by a ring bracket. By 1900 this round seat was
used in connection with about one hundred different back designs. Customers were
also offered the choice of four different leg models, of which two are presented
here. However this chair is more than a random assembly of standardized parts.
The new process of bending wood was originally meant to reduce the weight of soft-
wood parts of a traditional design. But as the year by step development,
a chair design emerged for which no prototype existed—a design that is prodig-
iously open and light. Known as the Vienna chair, eventually it became the
firm's main product. By 1900 the bentwood industry had produced an estimated 50
million Vienna chairs a figure which by this time has grown to well over 100
million.

ROCKING CHAIR, 1890. (From no. 17)
Figure 17-18

Rocking chairs are said to have originated in Lancashire around 1750. At about
the same time, Benjamin Franklin produced a rocking chair for which he held two
patents. During the late 18th century the Windsor rocker became a fixture of the
American home. It may be possible that the popularity here reflected habits of
greater informality developed by the colonists in contrast to the more formalized
patterns of European living.

The first bentwood rocking chair was produced in 1860. In Austria up to that
time only heavy, upholstered-backed iron rocking chairs were known. Their un-
wieldiness and high prices did not encourage wide distribution. Even the new,
lighter bentwood rocking chair was slow to find a market. Overseas export

eventually pushed production-it was the ideal seat for hot countries. In the first decade of the 20th century, the entire industry's output grew eventually to about 100,000 pieces annually (see Frame no. 18 for popularity of bentwood rocking chair).

But it was more than its weight which distinguished the new bentwood rocking chair from its forerunners. These earlier pieces were ordinary chairs whose four legs were planted on two curved pieces of wood (cradles worked on the same principle centuries before anybody thought of transferring the idea to chairs). The design of the bentwood rocking chair was developed from the bending process-a double frame, shooting forward in two vigorous arcs and bending backward like the runners of a sleigh, an element which fifty years later appears in the resilient cantilever chair of Mies van der Rohe (see Frame no. 31).

The chair's semi-horizontal shape, which requires longer rails, produces a racy, sleek appearance. No other bentwood chair type allows as much freedom and inventiveness in the play of bent rails-in fact, none shows as clearly as the many rocker variations, including the design of a rocking sofa with adjustable back, the emergence of a new type of decoration which, similar to Art Nouveau design, was not applied as an afterthought, but became a linear animation of the object itself. The curves and spiral flourishes which fill the spaces between the seat and the long sliding rocker base-excellent technical solutions of bracing and frame support-the curled up end pieces of the back frame, the pulling apart of two parallel lines into seat frame and arm rest, all indicate a highly sophisticated, imaginative interpenetration of practical and decorative elements.

BENTWOOD ARM CHAIR, c. 1890

Frame no. 19-23

1862 saw the opening of the second factory in Bistritz in Moravia, after Koritschan had proven too small and its surrounding forests unable to yield

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to about 100,000 pieces annually (see page no. 15 for popularity of ...)

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sufficient quantities of Carpathian beech. The new factory was almost entirely devoted to manufacturing "Vienna" chairs.

At the same time the Thonets began producing a great variety of goods other than furniture. Their catalogs soon included hat stands, wall brackets, picture frames and easels, walking sticks, wash stands, hoops, baby chairs and cribs. It was also here that a new line of "Phantasie" furniture was developed, of which this chair is a good example (Frame no. 19). Its proportions are of a generosity similar to that of the arm chair of 1870 (see Frame no. 24); its design, however, is purposely intricate and rich. (For additional examples see Frames no. 20, 21, 22).

Art Nouveau design elements, like the long, sensitive curves, and the flowing, endless interplay of lines, were intrinsic parts of bentwood design. Certain furniture pieces and entire interiors (see Frame no. 23) tried to adapt bentwood to Art Nouveau as the style of the period. However, Art Nouveau as a style seemed to have by-passed the use of bentwood for its purposes, and, possibly for the sake of greater power of expression and infinite refinement, preferred the traditional methods of carving from solid wood its undulating stalks and whip-lash curves.

BENTWOOD ARM CHAIR, 1870.

Frame 24

Thonet's acute production problem was the supply of wood for their spreading factories. Only by moving on to Hungary and Galizia and later to Poland and Russia could sufficient supplies be obtained. Saw mills were erected on the estates of the princely owners of large forest lands, now so far removed from the factories that material had to be shipped by rail.

A tremendous variety of designs poured forth from the Thonets as well as their

devoted to manufacturing...
The new factory was...
At the same time the...
Furniture...
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no. 20, 21, 22,

Art Nouveau design elements, like the long, sensitive curves, and the flowing, business-like lines, were...
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wood in Art Nouveau...
style seemed to have...
possibly for the sake...
explored the traditional...
curves and whiplash curves.

ART NOUVEAU AND CHAIR DESIGN
Page 24

Thonet's acute production...
factories. Only by...
Results could...
estates of the...
factories that...
A tremendous variety of...
factories that...
factories that...
factories that...

competitors. Many of these designs possess great beauty and ingenuity, but none of them measures up to this chair of c. 1870, which combines lightness of construction with elegance of form, -nor do they achieve this degree of reduction to essentials. It is difficult to realize that this handsome, straightforward design could be the result of industrialization misused at that time (the height of Victorian prosperity) to swamp Europe with an avalanche of simulated handicrafts, of imitation material and imitation forms, produced by machine.

This arm chair (Frame no. 24) is unusually well proportioned: There is a generous seat on sturdy but well tapered legs, and a sweeping curve which runs over the back from one edge of the seat to the other, forms the arms. Its simplicity and directness foreshadow the open-cage shapes of the later tubular steel furniture; its refinement is heightened through the tapering lines possible in wood.

It was this standardized chair, then in continuous production for over 50 years, which Le Corbusier and Pierre Jeanneret selected for their famous Pavillon de L'Esprit Nouveau at the 1925 Exposition des Arts Decoratifs in Paris.

FIRST TUBULAR METAL CHAIR. MARCEL BREUER, 1925

Frames 25-30

Thonet Brothers in the early twenties merged with a group of their competitors and the new firm operated factories in Germany and France as well as in the countries of the former Austrian territory.

Michael Thonet was no longer the single authority who chose and created designs, the greatest merit of which was the anonymous simplicity and material economy of serial products. Outsiders entered the design field, particularly architects in search of furniture to fit their new houses. Curious about untraditional material, they brought to furniture design the same spatial concepts from which their new architecture derived. (See Frames no. 27, 28, 29).

competitors. Many of these designs possess great beauty and ingenuity, but none
of them measure up to this state-of-the-art, which combines lightness of con-
struction with elegance of form, nor do they achieve this degree of reduction in
weight. It is difficult to realize that this machine, streamlined
design could be the result of industrialization aimed at this time (the height
of Victorian prosperity) to sweep Europe with an avalanche of elevated hand-
carts, of industrial material and industrial forms, produced by machine.
This was their (Sears no. 24) is remarkably well proportioned: There is a generous
seat on sturdy but well tapered legs, and a sweeping curve which runs over the
back from one edge of the seat to the other, forming the arm. The simplicity and
directness of construction, the open edge design of the later tubular steel structure;
the refinement is maintained through the tapering lines possible in wood.
It was this streamlined seat, then in continuous production for over 20 years,
which in Corseter and Sears' catalogue selected for their famous Pavilion at
I. Paris Exposition of the 1889 Exposition des Arts Industriels in Paris.

FIRST TUBULAR STEEL SEAT, SEARS, 1889
No. 24

These models in the early period suggest a group of their competitors
and the new streamlined structure is better and better as well as in the
country of the 19th century American industry.
The first model was no longer the single structure, but open and elevated design,
the greatest part of which was the enormous weight and material economy
of serial production. Corseter entered the design field, particularly specialists
in search of furniture to fit their new process. Corseter about industrial
material, they brought to Corseter design the same capital concepts from which
their new streamlined structure, (Sears no. 24, 25, 26)

A revolutionary invention in furniture occurred in Germany. The architect Marcel Breuer, then a young master at the Bauhaus in Dessau, conceived the idea of bending tubular steel into continuous loops to form the frames for chairs and tables. The idea came to him while riding his bicycle, and in 1925 Breuer constructed the first tubular steel chair. (Frame no. 30).

It is a complicated maze of interlaced steelbars, suggesting the cage-like metal skeleton of a modern house. The frame is articulated by tautly stretched canvas panels which, like the walls of a frame building, no longer carry weight but are suspended in the steel frame.

For three years this design, which was conceived for mass production, had to be executed piece by piece in a small metal shop. In 1928, Thonet took over the design and was soon manufacturing Breuer's chair in Germany and in France.

RESILIENT TUBULAR STEEL CANTILEVER CHAIR. LUDWIG MIES VAN DER ROHE, 1926

Frame 31

Once the tensile strength of tubular steel for furniture was utilized, it was only one more step towards another, even more startling innovation—the cantilever chair. Until this time, chairs had usually touched the ground with four feet—sometimes with three; in the cantilever chair an engineering principle, new to furniture, is involved: that of a projecting beam or plane supported only at one end. Modern architecture's extensive use of this principle was made possible through steel and reinforced concrete. Applying the principle to chairs, a number of architects almost simultaneously evolved a logical form: a continuous loop frame extending its front legs backward along the ground like runners of a sleigh and thus dispensing with the need for back legs. The frame's sides were then connected by panels of fabric, leather or woven cane, so that in forming seat and back their natural flexibility was added to the resilience of the steel.

A revolutionary invention in furniture occurred in Germany. The architect Marcel Breuer, then a young master at the Bauhaus in Dessau, conceived the idea of bending tubular steel into continuous loops to form the frames for chairs and tables. The idea came to him while riding his bicycle, and in 1925 Breuer constructed the first tubular steel chair. (Patent no. 20)

It is a complicated case of intertwined steelbars, suggesting the cage-like metal structure of a modern house. The frame is articulated by tautly stretched canvas panels which, like the walls of a frame building, no longer carry weight but are suspended in the steel frame.

For three years this design, which was conceived for mass production, had to be executed piece by piece in a small metal shop. In 1928, Thonet took over the design and was soon manufacturing Breuer's chair in Germany and in France.

RESILIENT TUBULAR STEEL CANTILEVER CHAIR. IRVING MILES VAN DER ROHE, 1906

Figure 21
Plate 10

Once the tensile strength of tubular steel for furniture was utilized, it was only one more step towards modern, even more startling innovation—the cantilever chair. Until this time, chairs had normally touched the ground with four feet—sometimes with three—in the cantilever chair an engineering principle, new to furniture, is involved: that of a projecting beam or plane supported only at one end. Modern architecture's extensive use of this principle was made possible through steel and reinforced concrete. Applying the principle to chairs, a number of architects almost simultaneously evolved a logical form: a continuous loop frame extending the front legs backward along the ground like the trapeze of a tight-rope walker. The frame's sides were then connected by panels of fabric, leather or woven cane, so that in forming seat and back their natural flexibility was added to the resilience of the steel.

The Dutch architect Mart Stam in 1926 was the first to make a stiff, sharply bent chair frame which he connected with interlaced canvas strips. He did not exploit the inherent resilience of the steel frame. Gadgety American patent furniture of the eighties had touched upon the possibilities of resilience in cantilevered chairs. The principle was also known and used in the efficient seats of plows, reapers and other agricultural machines. In both instances there was no realization that, applied to furniture for the home, resilience could replace the cumbersome cushioning of upholstered pieces.

It was Mies van der Rohe, the first to discern the technical principle of the resilient cantilever, who in 1926 developed this chair whose springiness was achieved through the generous arc of its semi-circular support. The design, a continuous loop-visually one fluid, circling line-is the most direct and at the same time the most sophisticated solution for the creation of a chair. The new linear simplification, already indicated in the appearance of the "Vienna" chair (see Frame no. 16), is here carried to a logical conclusion by the elimination of every extraneous line and the limitation to two materials, steel and leather.

In certain respects this handsome design is related to the 1860 bentwood rocking chair (see Frame no. 17) by its similarly developed semi-circular supports.

TUBULAR STEEL CANTILEVER CHAIR. MARCEL BREUER, 1928.

Frame 32

Marcel Breuer gathered the elements of the cantilever chair into a design which eventually became its standard form and the best known of modern cantilever chairs (Frame no. 32)

The reason for its world wide acclaim may be the fact that in contrast to Mies' large low slung chairs, this design represented a more serviceable version. Its shape, compact and angular like that of Stam's but with greater resilience, is less space consuming than the Mies chair. Its sturdy frame terminates in two

The Dutch architect Hans van der Laan in 1925 was the first to make a chair, simply
 four chair legs which he connected with rounded cross pieces. He did not
 require the lateral resistance of the steel frame. (Early American patents
 furnished of the righter and looked upon the possibilities of resistance in
 reinforced chairs. The principle was also used in the efficient
 seats of planes, tractors and other agricultural machines. In both instances there
 was no resistance but, applied to furniture for the home, resistance could be
 given the maximum advantage of structural design.

It was Hans van der Laan, the first to describe the technical principle of the
 reinforced chair, who in 1925 developed the chair whose structure was
 achieved through the generous use of the semi-circular segment. The design, a
 continuous loop-visual one (Fig. 1), showing line-to-line the seat and at the
 same time the most sophisticated solution for the creation of a chair. The new
 linear simplification, already indicated in the appearance of the "Visium" chair
 (see page no. 10), is here carried to a logical conclusion by the elimination of
 every extraneous line and the limitation to two materials, steel and leather.
 In certain respects this handsome design is related to the 1925 reinforced
 chair (see page no. 11) by the similarly designed semi-circular segment.

EUROPEAN CHAIR DESIGNER HANS VAN DER LAAN, 1925

Page 32

Hans van der Laan gathered the elements of the reinforced chair into a design which
 eventually became the standard form and the best form of modern reinforced chair
 (page no. 32).

The reason for the van der Laan's design was the fact that in contrast to Hans
 van der Laan's chair, this design represented a more economic version. The
 shape, curved and angular like that of Hans's but with greater resistance, is
 less prone to bending than the Hans chair. The study frame terminates in two

blunt uprights for the sake of economical production. Bolted to it are a back support and shaped seat: two wooden frames covered with woven cane. This may seem like a more complicated solution than Mies' direct application of cane or leather to the chair frame, but again its practical possibilities are greater. The unassuming shape, like the earlier "Vienna" chair, proved ideal for mass production and achieved a similar popularity and wide distribution. Its ingeniously simple design eventually served as model for the thousands of coarsened variations on which we sit today in our kitchens, dinettes, offices, terraces, stores, waiting rooms and cafeterias.

ADJUSTABLE RECLINER. LE CORBUSIER, PIERRE JEANNERET AND CHARLOTTE PERRIAND. 1927.

Frames 33-34

France's contribution to modern furniture is largely one of mobility achieved without the assistance of mechanical means. The collaboration of Le Corbusier with Jeanneret and Charlotte Perriand resulted in a number of brilliant solutions of this problem of simple flexibility.

The adjustable reclining chair (Frames 33 and 34), unconventional in looks and performance compared to the traditional couch, consists of two separate parts—a straight base on whose rubber-covered cross beams rests a movable frame of tubular steel covered with canvas. This stretcher, somewhat in the shape of a reclining human figure, adheres by friction to the rubber surface of the base when pushed up or down. A furniture piece of great versatility to be used for resting, reading or conversation has been created with the help of this simple device. But beyond its usefulness, the shape, obviously the result of considerations of function, emerges as a piece of sculpture. Defined and emphasized by a long, round head pillow on one end and a sharp downward bend on the other end, the chair is a succession of tilted planes, held by the cradling arc of its curved base rail, itself balanced above a distinctly different base. Startlingly, the chair seems also to convey an abstract formulation of one of Le Corbusier's

architectural principles: The lifting of the main part of a building off the ground by columns of distinctly different character. This animated shape has become the basic type of today's reclining chairs.

REVOLVING LEATHER CHAIR. LE CORBUSIER, PIERRE JEANNERET AND CHARLOTTE PERRIAND,
1927

Frame 35

On the occasion of the Salon d'Automne in 1929, Le Corbusier, in an article discussing the furnishings of his exhibition interior, pointed out that airplane and automobile workshops had produced new techniques as well as new shapes which excited the imagination and could also be manufactured with considerable economy. He ascribed the use of metal furniture in homes as well as offices to new patterns of living leading to new informal attitudes. The abolishment of the old "salon" had suddenly reduced the number of furniture pieces in the home to built-in cases, chairs and tables. This Le Corbusier greeted as signs of a new age in furniture and illustrated it brilliantly in his interior at the Salon d'Automne. A great deal of his experimental work was executed by the Thonet workshops in Paris where, for example, an extension dining table was produced which unrolled tambour-fashion from the top of a small stationary cabinet.

This revolving leather chair (Frame no. 35) of the same period represents an attempt to modify for home use the revolving desk chair used in offices. Its appearance goes back to the beautiful bentwood arm chair of 1870 (see Frame no. 24) admired and extensively used by Le Corbusier in his houses, but its transformation is authentically of the 20th century. The crosswise arrangement of the spiderlike legs, also found at this time in many tubular metal bases for tables, and the surmounting chrome rail of the back support, form a glittering open structure on which solid shapes have been applied. The thick round leather pillow, the sausage-like semi-circle of the roll wrapped around the backrest, in their relationship to each other and to the spacious metal structure, form a rhythmical

architectural principles: The fitting of the seat part of a building off the ground by means of blocks of different heights. This method also has become the basic type of today's seating chairs.

REVOLVING LEATHER CHAIR, BY GERRIT THOMAS THORNTON AND CHARLOTTE PERHARD

1927

Page 12

In the course of the Salon d'Automne in 1925, in Copenhagen, in an article describing the furniture of his exhibition designer, pointed out that a chair and a stool, the workshop had produced new techniques as well as new shapes which excited the imagination and could also be manufactured with considerable economy. He mentioned the use of metal furniture in boxes as well as tables to new patterns of living leading to new interior activities. The excellence of the old chair had suddenly reduced the number of furniture pieces in the room to built-in cases, tables and chairs. This in Copenhagen greeted as signs of a new era in furniture and influenced it decisively in the interior of the Salon d'Automne. A great deal of his experimental work was awarded by the Thorntons workshop in Paris where for example an extremely strong table was produced which varied between fashion for example of a small stationary cabinet.

This revolving leather chair (Frame no. 27) of the same period represents an attempt to really for once use the revolving chair seat in office. Its appearance goes back to the beautiful painted arm chair of 1870 (see Frame no. 24) admired and extensively used by the Copenhagen in his houses, but the form-formation is substantially of the 20th century. The crossbar arrangement of the uprights, also found at this time in many tubular metal cases for tables, and the surrounding curved roll of the back support, form a gliding open structure on which solid shapes have been applied. The thick round leather gives the unique-like seat-circle at the roll wrapped around the bottom, in their relationship to each other and to the tubular metal structure, form a pictorial

pattern of thin and heavy curved forms.

ADJUSTABLE LOUNGE CHAIR. ILMARI TAPIOVAARA, 1949.

MOLDED PLYWOOD ARM CHAIR. JOE ADKINSON, 1952.

Frames 36-41

Recent explorations in the field of molded plywood-with which Michael Thonet experimented 120 years ago-indicate new design directions

The knock-down lounge chair (Frame no. 38) by Ilmari Tapiovaara can be completely dismantled for flat shipping. It consists of a supporting frame and a seat frame, the latter being spanned by two sheets of leather. The seat can be adjusted to three positions.

The visual separation of parts is carried even further in the arm chair (Frame no. 39) by Joe Adkinson. The molded planes of seat and back, the curved arms, a base made of two reversed V-shapes, and connecting cross-bars form a complex unit. These clearly defined parts are assembled so that their repetitive forms and restated angles create a pattern which binds them together, although each appears to be independent of its neighbor.

pattern of this and heavy curved forward

ADDITIONAL LIGHTS (REAR) (REAR) (REAR) (REAR)

WEIGHT THROUGH AIR CUSHION (REAR) (REAR) (REAR)

Figure 3-4

Recent experiments in the field of solid rocket motors which Michael Frost

experimented 150 years ago - the same directions

The rocket motor case (from an S-1) is linearly tapered and is completely

designed for the weight. It consists of a supporting frame and a case

frame, the latter being spaced by two rows of leather. The case can be

adjusted to other positions.

The visual separation of parts is made even further in the case of the

motor. The motor is tapered. The motor is tapered. The motor is tapered.

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