

20TH CENTURY BUILDING MATERIALS

Timeline

- Post-Civil War to World War I (1870-1914)
  - Traditional building materials (stone, brick, wood, metals), combined and used in new ways
  - Faith in science and technology to solve problems
- Creation of technical societies for standards and testing of building materials
  - 1894: Underwriters Electrical Bureau, now Underwriters Laboratory (UL)
  - 1896: National Fire Protection Association (NFPA)
  - 1898: American Society for Testing Materials (ASTM), now American Society for Testing and Materials International (ASTMI)

Underwriters Laboratories Inc.

- 1893: Columbia Exposition's Palace of Electricity contained a mass of criss-crossing wires in a highly-combustible structure built of wood and staff
- Insurers for the Exposition refused to cover it, threatening to delay the start of the Exposition
- William Henry Merrill, a respected Boston electrician, inspected the electrical installations and pronounced them safe (they were), so fire insurance extended to the Exposition



- Merrill was besieged by companies across the country to inspect their buildings for fire safety
- 1894: Merrill founded the Underwriters Electrical Bureau. First product tested on March 24, 1894: noncombustible insulation material for Frank R. Shields of MIT, who was testing rubber compounds that could be used to insulate electrical wiring
- 1901: changed name to Underwriters Laboratories, Inc.



- 1903: Published first Standard for Safety: tin-clad fire doors
- 1905: UL certified multi-colored Christmas lights and a fire extinguisher
- 1913: first fire test of building wall construction: 2”x4” wood studs with gypsum paneling



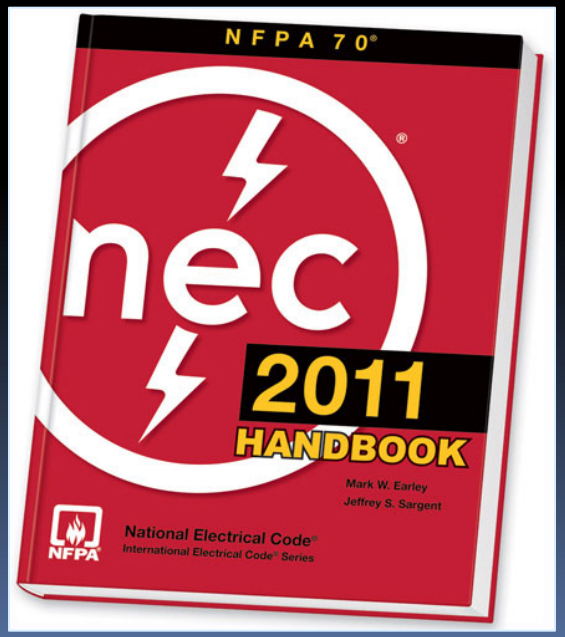






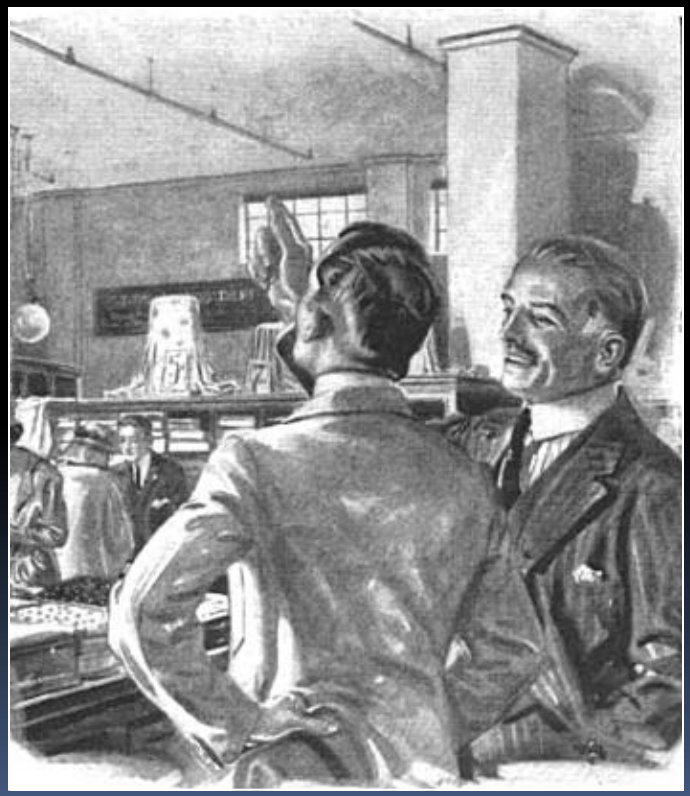
- 1870s-1900: Exploration of ways to control fire loss
- 1872: First sprinkler system patented--spraying water on a fire through a pipe with holes to control fires in large textile mills
- Invention of electricity and lack of electrical safety standards led to even more fires
- 1895: Five different approved rules for electrical installations in the U.S. → confusion and controversy

- 1896: NFPA formed
- 1897: NFPA published first National Electrical Code
  - Now published every three years
  - The current code is 2011
- Early standard for installation of fire sprinkler systems
- While Underwriters Laboratories focused on testing, NFPA focused on codes and standards



Grinnell Sprinkler System installed in 1939 in Rebekah Scott Hall, Agnes Scott College, Decatur, GA









- 1878: Dr. Charles Dudley of the Pennsylvania Railroad reported on best steel formulation for rails; requested steel companies meet this standard; they were outraged and refused to comply
- Dudley sought constructive dialogue between the suppliers and the customers
- 1898: American Society for Testing Materials (ASTM)
- 1901: 1st standard (for steel rails) issued; standards for structural steel for bridges also approved
- 1910: 1st book of standards published; committees on cement and petroleum were formed

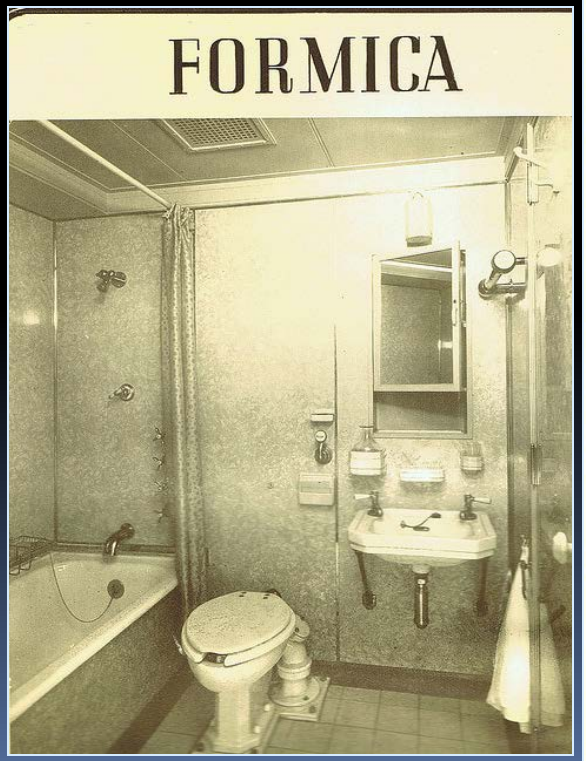
Timeline continued

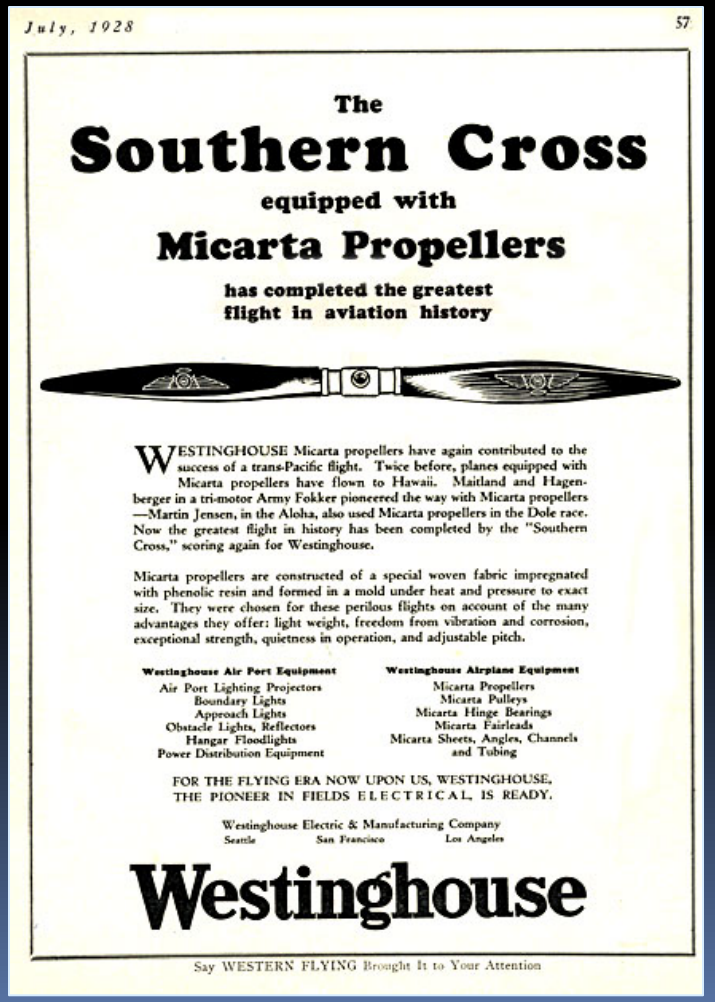
- World War I
  - Brought standardization to the building trades
  - 1916: American Engineering Standards Committee formed. It became American National Standards Institute (ANSI) in 1969.
    - In its first ten years, AESC approved national standards in the fields of mining, electrical and mechanical engineering, construction, and highway traffic

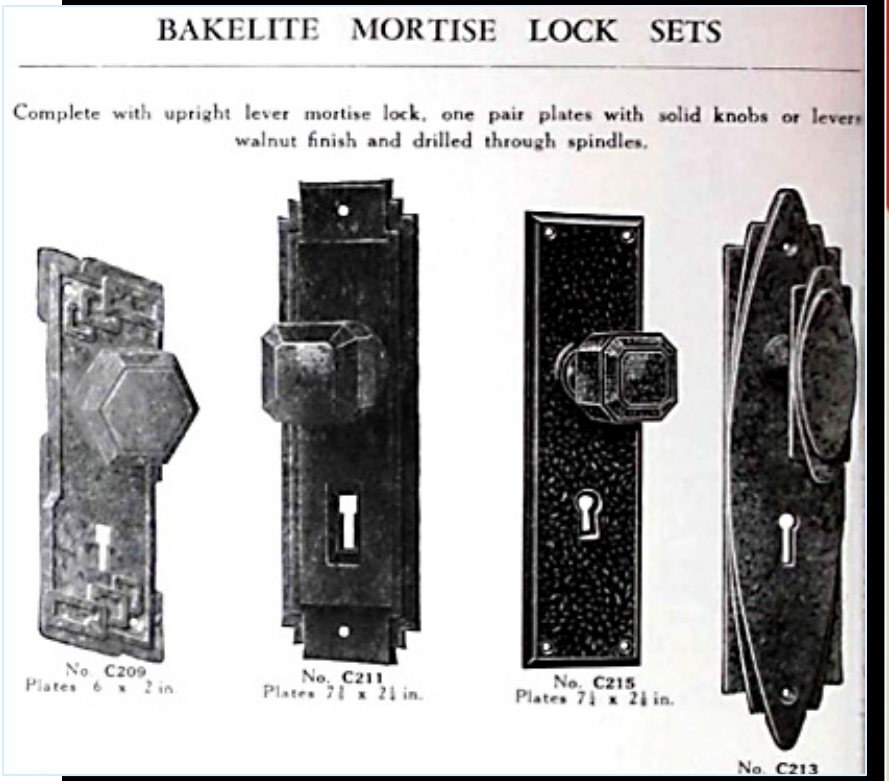
Timeline continued

- Post-World War I: Increased use of plywood, laminated glass, plastics (Bakelite), resin laminates (Micarta, Formica)









Other uses of Bakelite



Timeline continued

- 1920s: Economic expansion
  - In the 1920s, mass-production technologies fueled enormous growth in many product lines, including appliances, telephones, rubber tires, chemicals, and electrical equipment
  - Concerns about insulation → use of asbestos
  - Concerns about noise abatement → use of perforated tiles
  - Use of electricity widespread in urban areas
  - 1910-1920s period of formation of many national associations for building materials, and building trade companies

Timeline continued

- 1930s: The Great Depression
  - Consolidation of many small businesses
  - End of many materials in production since 1870
- World War II: Watershed for use of modern synthetic materials due to shortage of traditional building materials, especially lumber, needed for the war effort
- Post-World War II:
  - Huge demand for housing + shortage of cured lumber
  - Structural problems when build with green lumber

Timeline continued

- Post World War II continued:
  - New technologies and materials to build homes more quickly and inexpensively
  - Gypsum board and asbestos siding began to be used in large quantities

METALS

Metals

Early 20th century: development of two new metal technologies:

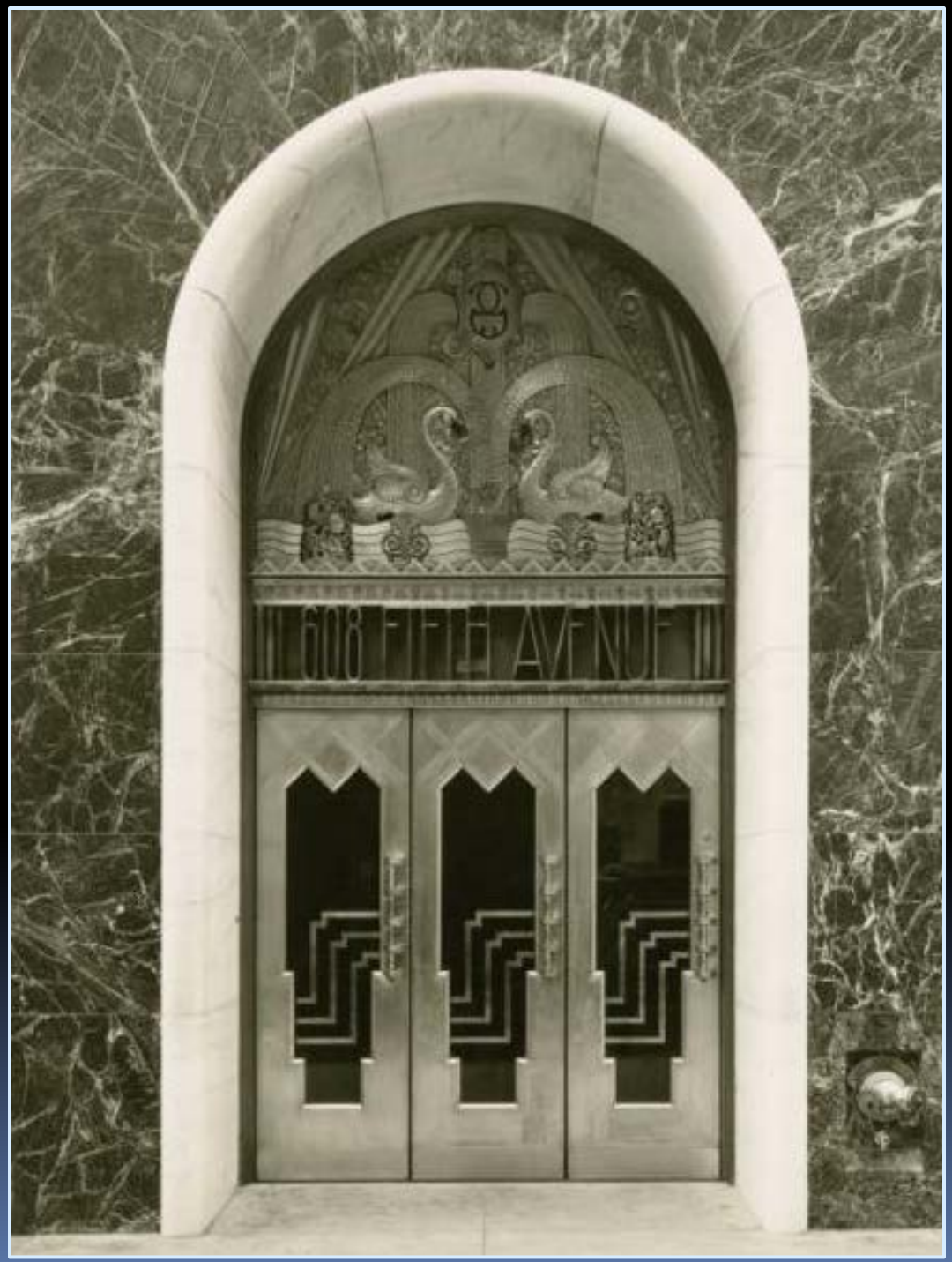
1. Extruded metals
   - Extrusion process for metal first developed in the 1700s
   - Hydraulic extrusion press developed by 1900
2. Manufacture of metal alloys
   - Many developed after the Civil War
   - Came into common use after 1900

Nickel Silver (contains no silver)

- Also called German silver, white metal, white brass
- Alloy of 75% copper, 20% nickel, and 5% zinc
- Silver-white color, easily worked, highly resistant to corrosion, takes a high-luster finish
- First produced by Chinese, imported to England in 1600s
- By early 1800s, produced in England, Germany
- Early uses
  - Decorative: fireplace screens, candleholders
  - Used by Native Americans in 1800s for jewelry, horse hardware
  - Base for silver/nickel plating of plumbing fixtures, hardware, keys

Nickel Silver continued

- In 1920s used structurally and decoratively; ideal for Art Deco, Streamline Moderne styles
- Ductile, hard, moderately strong
- Cast, forged, rolled, drawn, extruded, machined
- Other uses:
  - Ventilation grilles, monumental water foundations
  - To separate sections of terrazzo flooring
  - Extruded forms for storefronts
  - Rolled, pressed, cast doors and spandrels



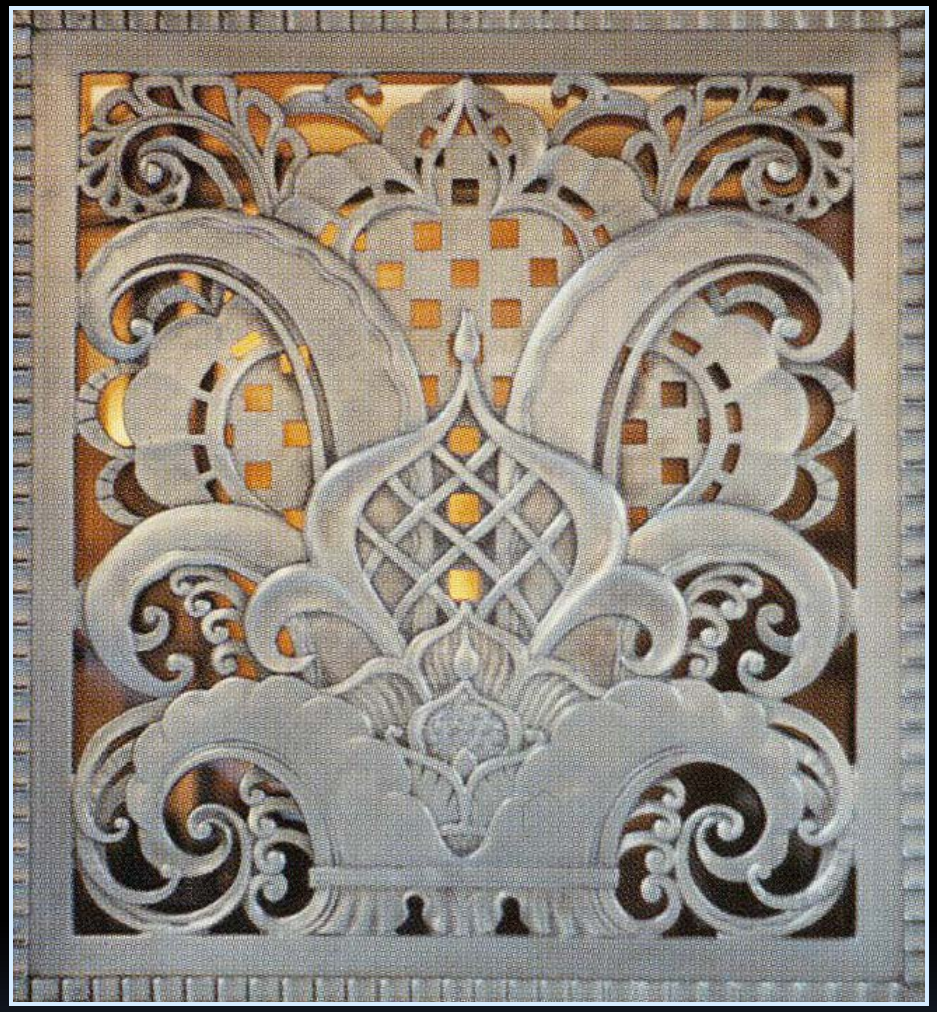
Goelet Building, 1932, New York City (E. H. Faile), Nickel silver entrance in the Art Deco style

Monel™

- Registered trademark, alloy of approximately 1/3 copper and 2/3 nickel
  - Small amounts of iron, manganese, silicon, and carbon added
- Process for manufacture discovered in 1907
- Harder to work than iron
- Can be forged, cast, welded, annealed, soldered, brazed, spun and drawn
- Cannot be extruded

Monel continued

- Used from 1909 — mid-1950s for roofing, heat and ventilation ducts, flashing, gutters, downspouts, lighting fixtures, and as ornamentation
- Often used for sinks instead of porcelain or copper because it was lightweight, durable, and "more sanitary"
- Stronger than steel, readily fabricated, low coefficient of thermal expansion so it resists fatigue cracking, unsurpassed corrosion resistance, expensive



1928 Apartment building at 3 East 84th Street , New York City (Howells & Hood); cast Monel door panels

1927 catalog, John Trageser Steam Copper Works



PANTRY SINKS

WHITE METAL MONEL METAL

Nickel silver & Monel Preservation

- Nickel silver resists corrosion; forms soft brown or greenish patina outdoors
- Monel oxidizes to silver-gray or greenish-brown protective patina
- Both used indoors can be cleaned with non-ionic detergent and natural-bristle brushes
- Cleaning of outdoor nickel silver or Monel can remove patina, texture, finish
- Clean only for a good reason

Nickel silver & Monel Preservation continued

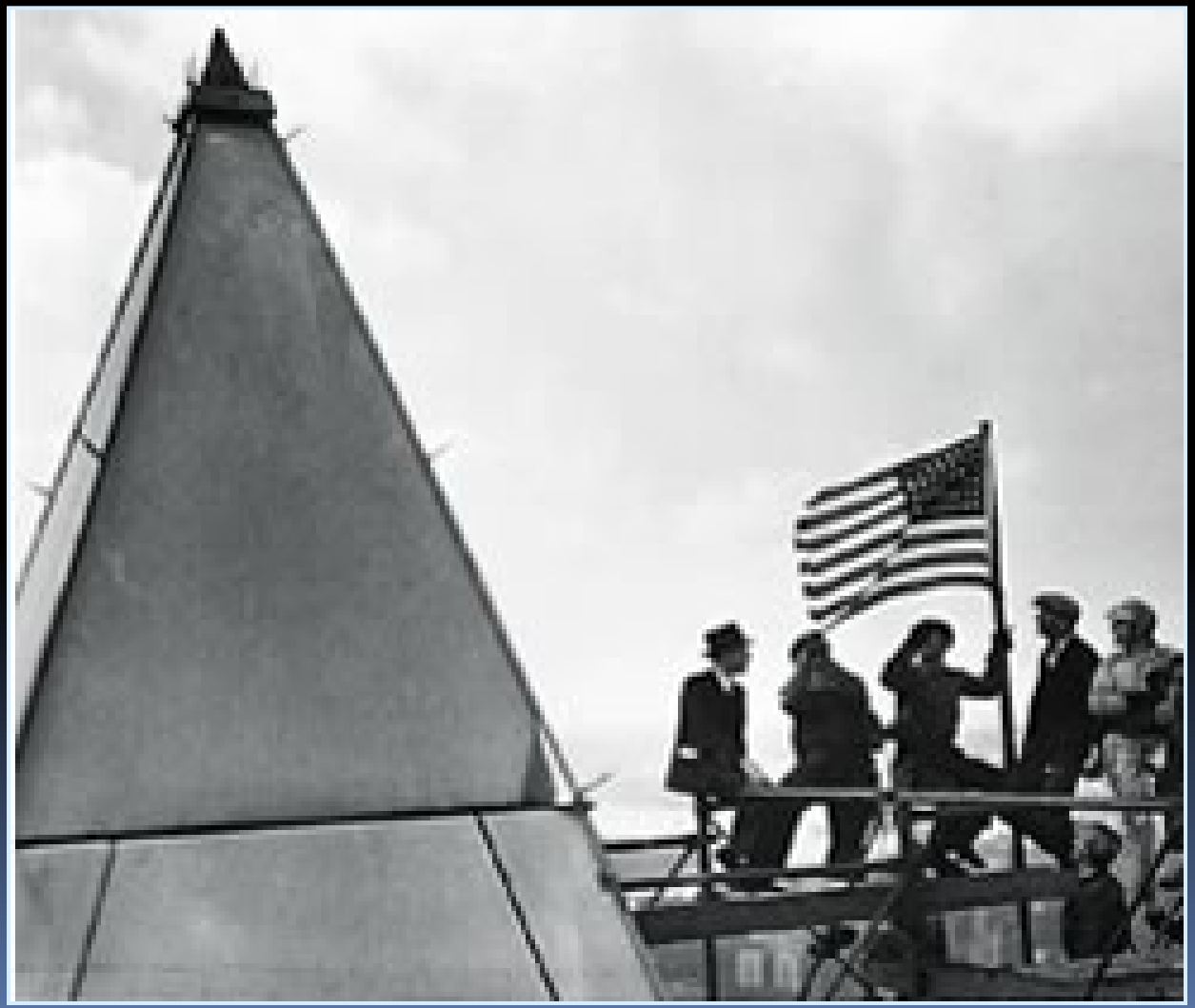
- White metals difficult to distinguish: nickel, nickel silver, Monel, stainless steel, aluminum. Only a metallurgist, chemist, or metal conservator should do testing
- For Monel roofing and sheathing, use only fasteners and nails of Monel or nickel alloys to prevent galvanic corrosion
- Replating by a professional can be done when surface has worn away or been damaged

Aluminum

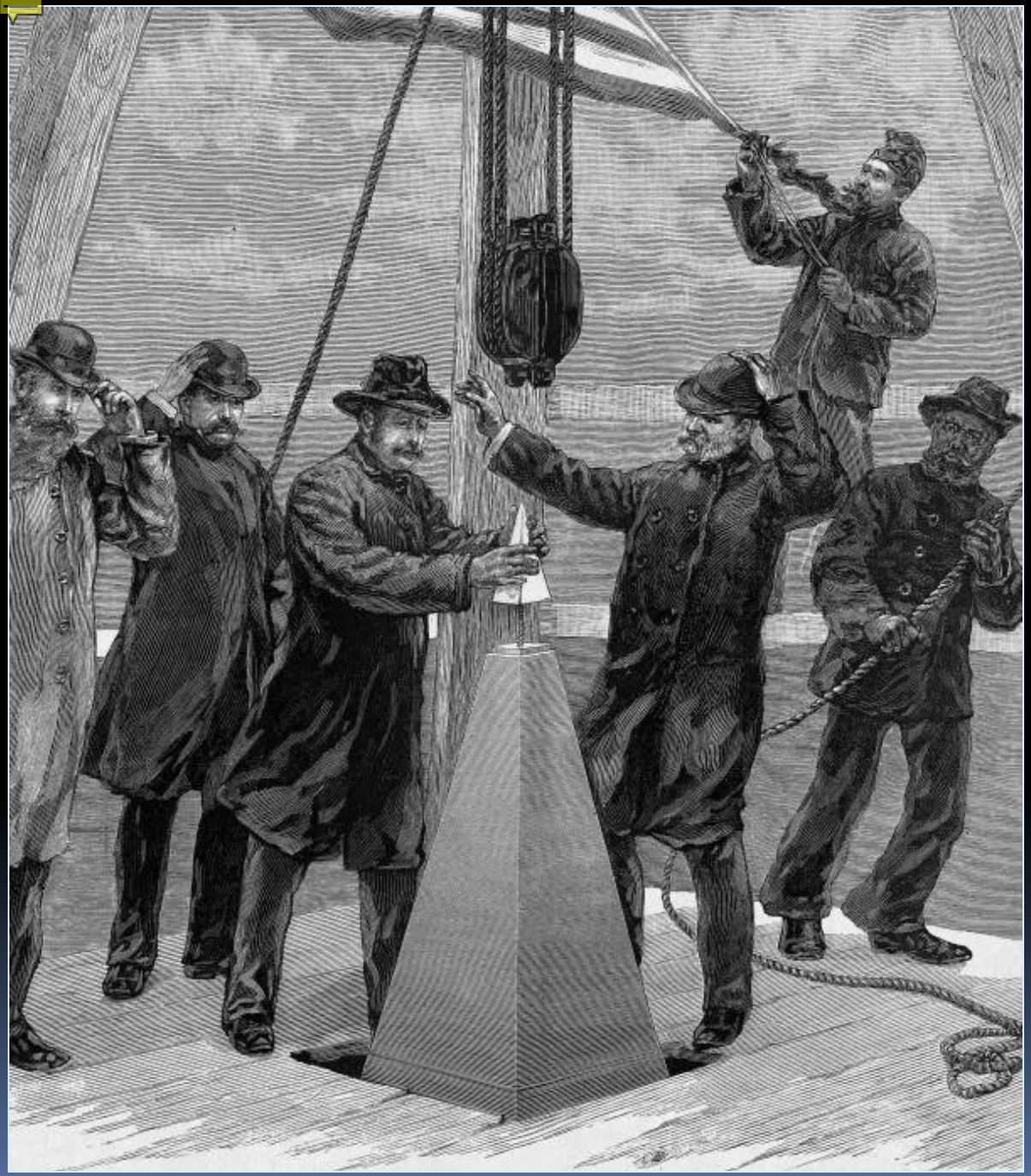


- One of most abundant metallic elements near the earth's surface
- Occurs naturally as the compound bauxite
- 1825: Metallic aluminum successfully extracted from bauxite
- 1852: One pound cost $545.00
- 1855 exhibit in Paris displayed small bars of aluminum alongside crown jewels of France

Aluminum Cap on the Washington Monument – 1st architectural use of aluminum in the U.S.







Setting the capstone on the Washington Monument

100-ounce cast aluminum, 9" tall cap set in place December 6, 1884.

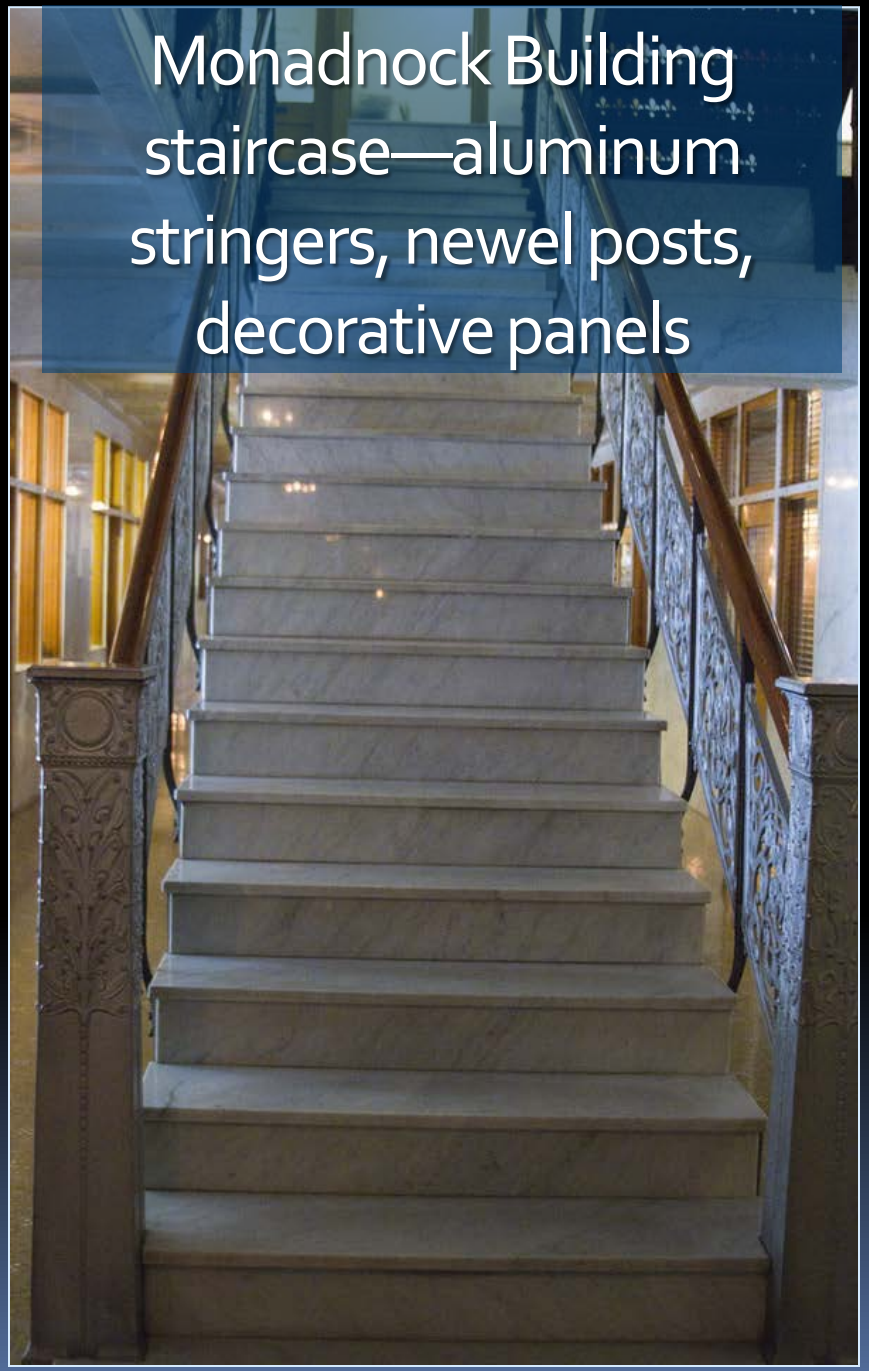
Harper's Weekly, Vol. XXVIII, No. 1461, December 20, 1884, p. 839,

Aluminum continued

- 1886: New electrolytic process developed by Charles Martin Hall; patented in 1889
- 1888: Pittsburgh Reduction Company formed (today ALCOA — Aluminum Company of America)
- 1892: cost had dropped to 57¢ per pound, but still 5 times more expensive than copper
- 1893: Monadnock Building in Chicago (Burnham and Root) one of first to use cast aluminum stairs, railing, elevators
- 1902-1904: Rhodes Hall aluminum ceiling glazed to look like gold leaf





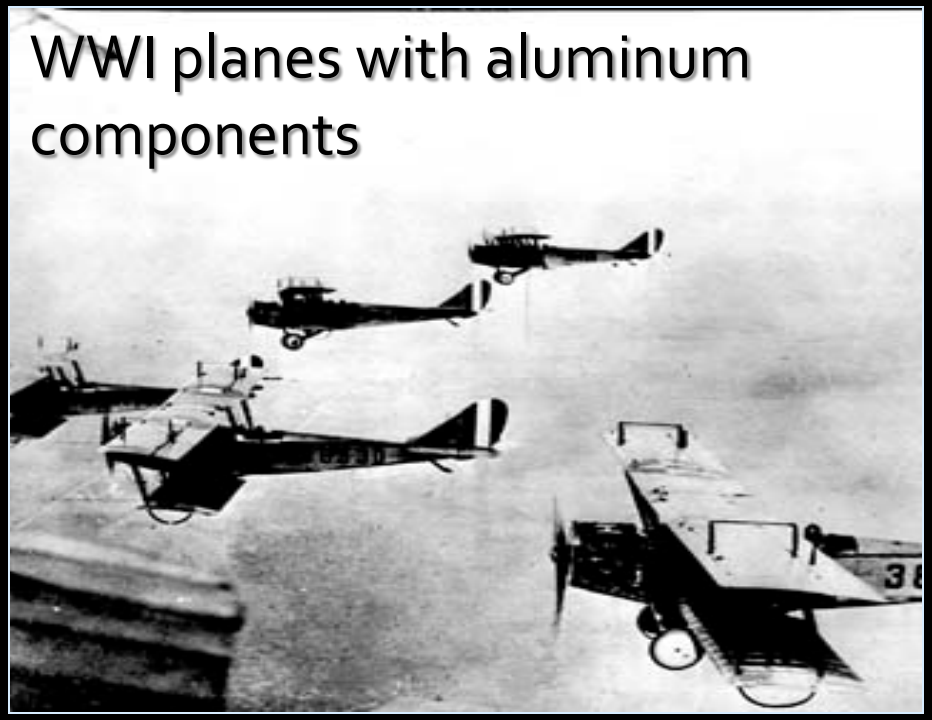


Monadnock Building staircase—aluminum stringers, newel posts, decorative panels

Aluminum continued

- Wright Brothers' plane engine at Kitty Hawk made of aluminum
- World War I
  - Used in airplanes because light and strong
  - Germans developed Duralumin (aluminum alloy) for use in Zeppelins
- By 1920s: used for Art Deco and Streamline Moderne decorative detailing, doors, windows, trim, signs, grilles, spires, handrails, spandrels
- 1930 Chrysler Building - pressed sheet aluminum spandrel panels set into the masonry (William Van Alen, New York City)

WWI planes with aluminum components



Duralumin zeppelin





Aluminum spandrels on the Chrysler Building, NYC



Folger Shakespeare Library, 1932, Washington, DC, (Paul Philippe Cret); aluminum alloy railing

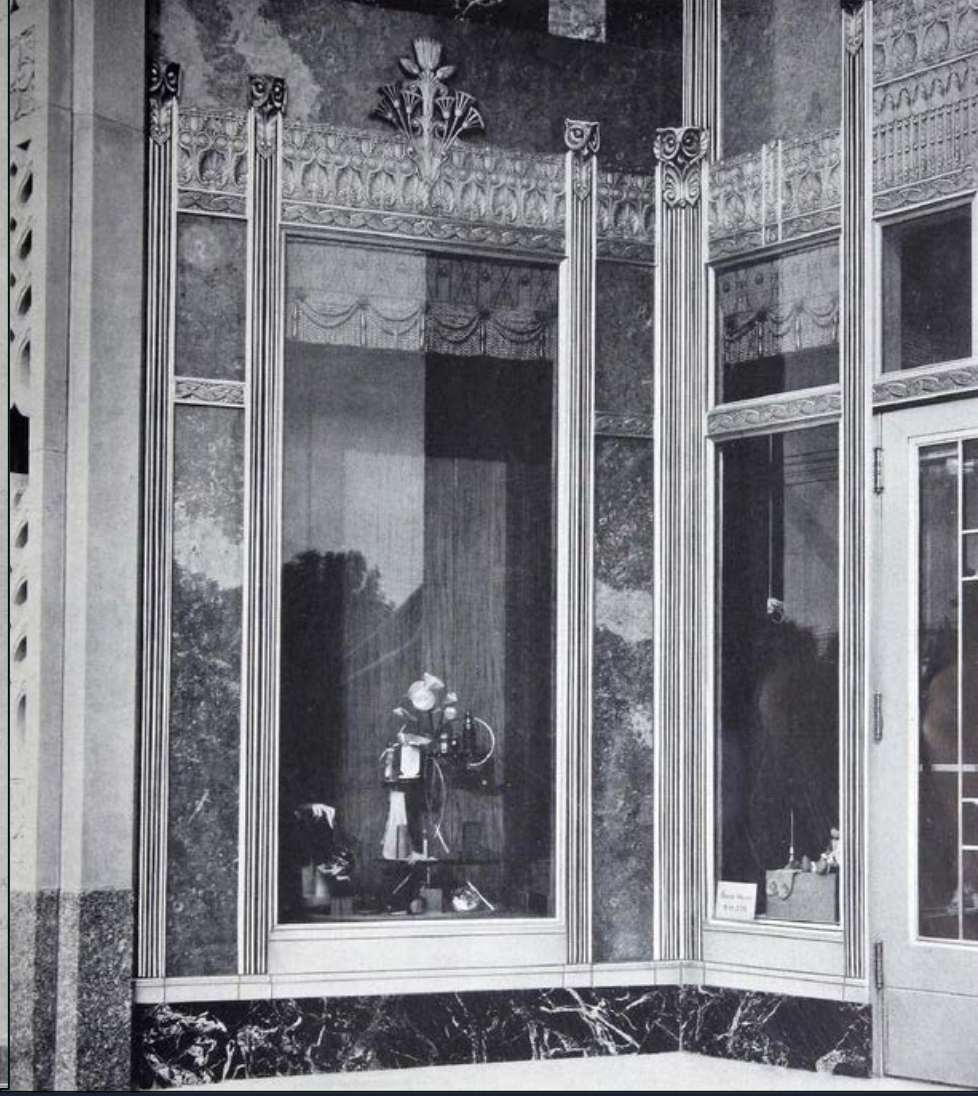
Seattle Art Museum, 1932 (Charles Bebb & Carl Gould), cast aluminum grilles, entrance bay



Aluminum continued

- Aluminum could be shaped by most known metalworking methods
- This quality led to increased usage: roofing, flashing, gutters, downspouts, wall panels, window mullions, window muntins and frames, storefront surrounds, interior trim and fixtures, sculptural figures





RECOGNIZING the great increase in the use of aluminum for buildings, Smyser-Royer Company has established an aluminum department, equipped to execute large contracts for entrances, window frames, spandrels, doors, railings and interior work. The many finishes obtainable, the lightness of the metal, its resistance to corrosion and its relatively low cost, make it an ideal building material.

THE photographs on these two pages illustrate a cast and extruded aluminum entrance frame, grilles and doors designed by Dreher & Churchman, Architects, for the Strawbridge & Clothier store, Jenkintown, Pa. This metal is readily adaptable to great delicacy of detail and it will retain its original finish far longer than other non-ferrous metals. The cast ornaments have a satin finish high-lighted.

Aluminum continued

- Post-World War II: new processes, techniques for fabricating, working aluminum
  - Anodizing — build up natural aluminum oxide coating in electro-chemical bath
  - Addition of dyes to color aluminum
  - Began to paint aluminum
  - Alloys and enamel-coating added to increase resistance to corrosion
- New uses: electrical wiring; plumbing pipes, heating, air conditioning

Characteristics of Aluminum

- Lightweight—about half the weight of iron, brass, copper
- Workable
- Takes a variety of finishes: anodized, lacquer, paint, plating, chemical conversion coating, porcelain enamel
- Highly resistant to most environmentally caused corrosion
  - Transparent aluminum oxide film forms on the surface
  - Alloys increase resistance to corrosion

Characteristics of Aluminum
continued

- Non-magnetic
- Thermal and electrical conductivity surpassed only by silver and copper
- Alloys added to increase strength

Deterioration of Aluminum

- Corrosive agents break down natural oxide film
  - Sulfates (air pollution)
  - Dirt, especially moist soils
  - High humidity
  - Contact with concrete, mortar, plaster, wet or damp brickwork; wet wood
  - Acid-based chemicals used to clean masonry
  - Galvanic corrosion (especially copper)

Conservation of Aluminum

- Clean surface gently; apply watertight coating
- Aluminum with applied surface treatment (enameled, anodized) much easier to clean and maintain
- Unfinished, weathered aluminum
  - Cleaning will not remove surface pitting
  - Only abrasive refinishing will restore surface appearance



Old Alcoa headquarters, Mellon Square, 1953, Pittsburgh, PA, (Harrison & Abramovitz); now the Regional Enterprise Tower

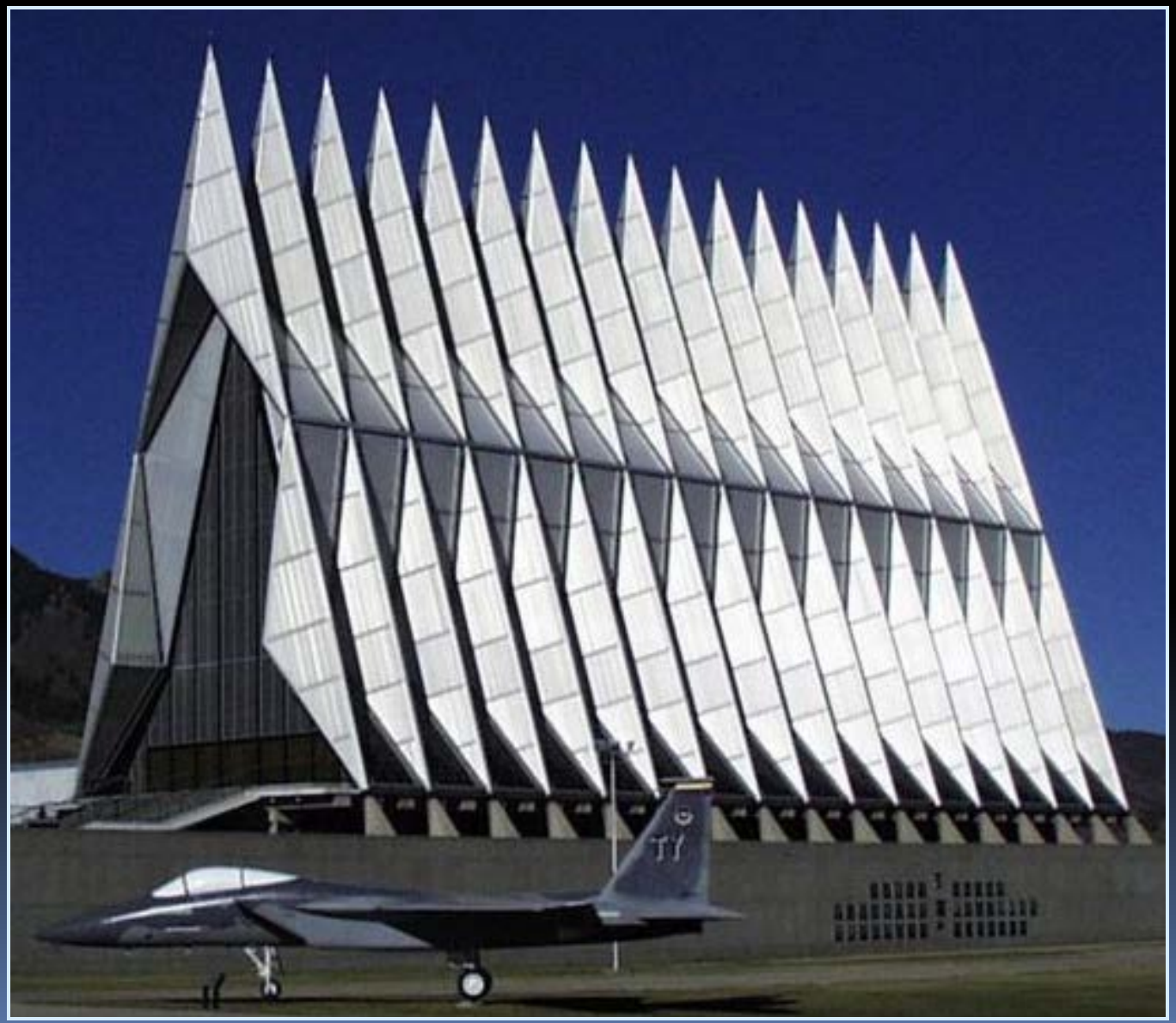






New Alcoa headquarters, on the Allegheny River, 1998, Pittsburgh, PA (Design Alliance Architects). Construction used 800,000 pounds of aluminum.

U.S. Air Force Academy, 1962, Colorado Springs, CO (W. A. Netsch of Skidmore, Owings & Merrill)



2500 tons of aluminum for exterior panels, windows, handrails, grills, and 17 roof spires--made of 100 preformed tetrahedrons.

Stainless Steel

- Diverse group of metal alloys containing iron, nickel, and at least 11% chromium
- Chromium alloy steels investigated as early as 1821, but their corrosion resistance was not recognized until 1908
- 1920s-1930s: Used for trim, ornament, railings, door hardware, elevator and entrance doors, light fixtures, furniture, signage, restaurant counters, equipment
- More expensive than aluminum, but had negligible maintenance and replacement costs



Chrysler Building, 1930 , New York City (William Van Alen) ; stainless steel spire, dome, American eagles





1926 Chrysler radiator cap







1924 Chrysler radiator cap

1931 Empire State Building (Shreve, Lamb & Harmon, New York City) Stainless steel vertical trim



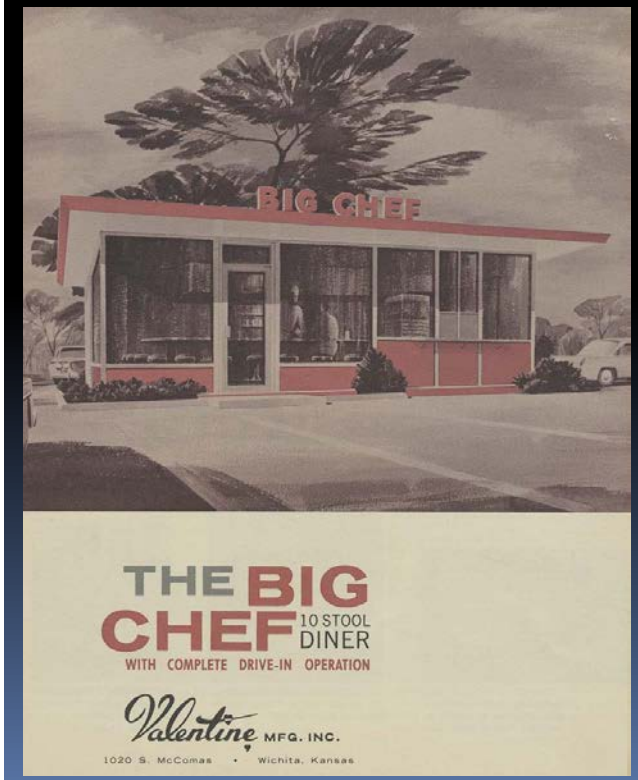
Stainless Steel continued

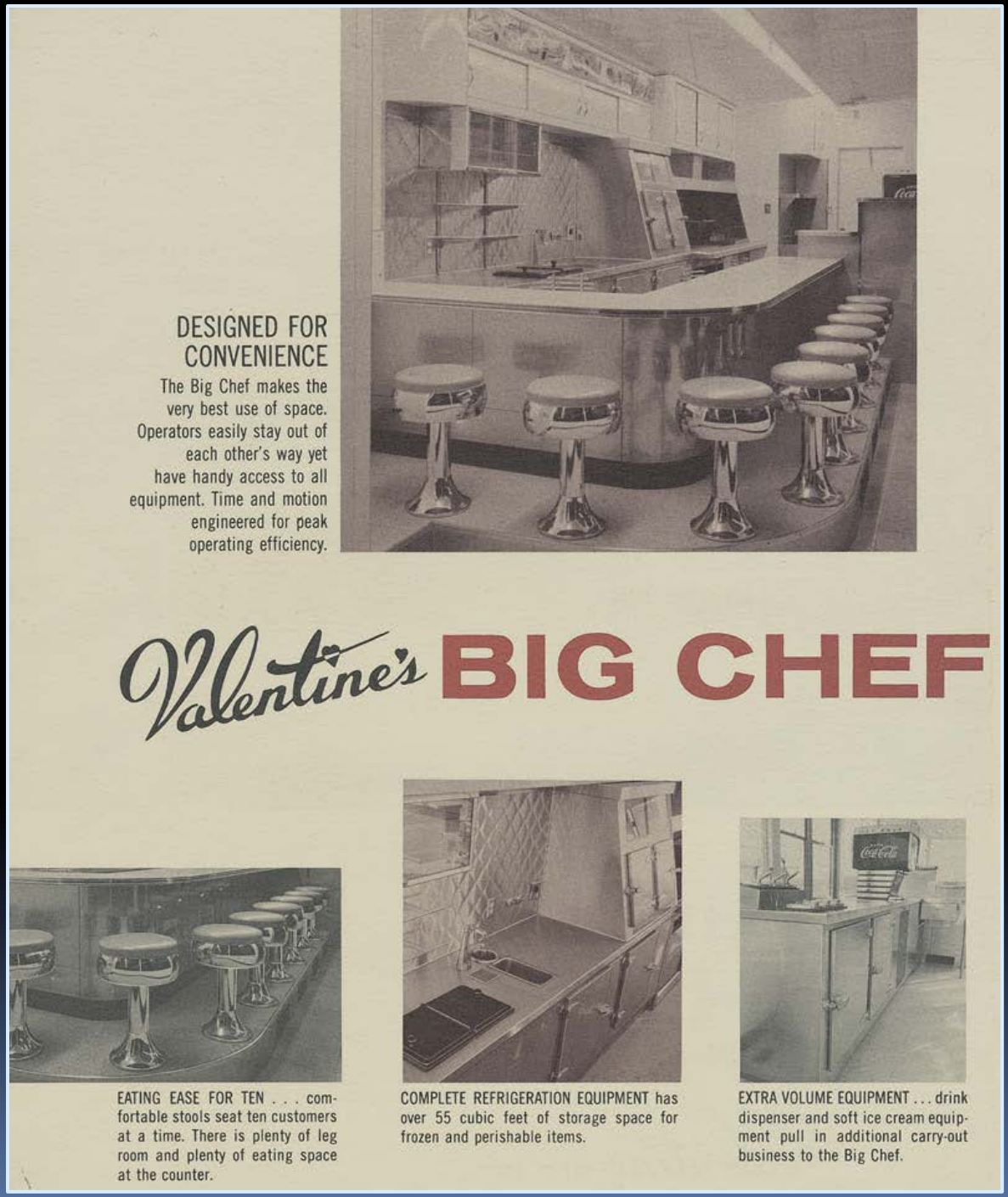
- Rigidized stainless steel produced in WWII



Salem Oak Diner, ca. 1940, Salem, NJ; stainless steel

- Quilted sheets used in diners for exterior and interior wall panels





- Stainless steel framing important component of Miesian (Mies van der Rohe, 1886-1969) glass curtain wall, characteristic of International style



General Motors Technical Center, 1956, Warren, MI (Eero Saarinen)

860-880 Lake Shore Drive, 1949-51 (Mies van der Rohe, Chicago, IL). What he called "skin and bones" architecture.



Steel vs. Stainless Steel

- Steel = iron with a controlled amount of carbon (usually < 1.7%)
- Steel rusts!
- Stainless steel = iron + nickel + chromium (at least 11%)
- Stainless steel forms surface film of iron-chromium oxide → resistance to corrosion and chemical attack
- Stainless steel does not rust!



Gateway Arch, 1963-65, St. Louis, MO (Eero Saarinen)

Interior is carbon steel; exterior is stainless steel.

Causes of Deterioration of Stainless Steel

- Hydrochloric acid
- Galvanic corrosion
- Dirt buildup:
  - Keeps oxygen from reaching metal's surface
  - Prevents formation of protective chromium oxide film
  - Reduces corrosion resistance
  - Warping from thermal expansion

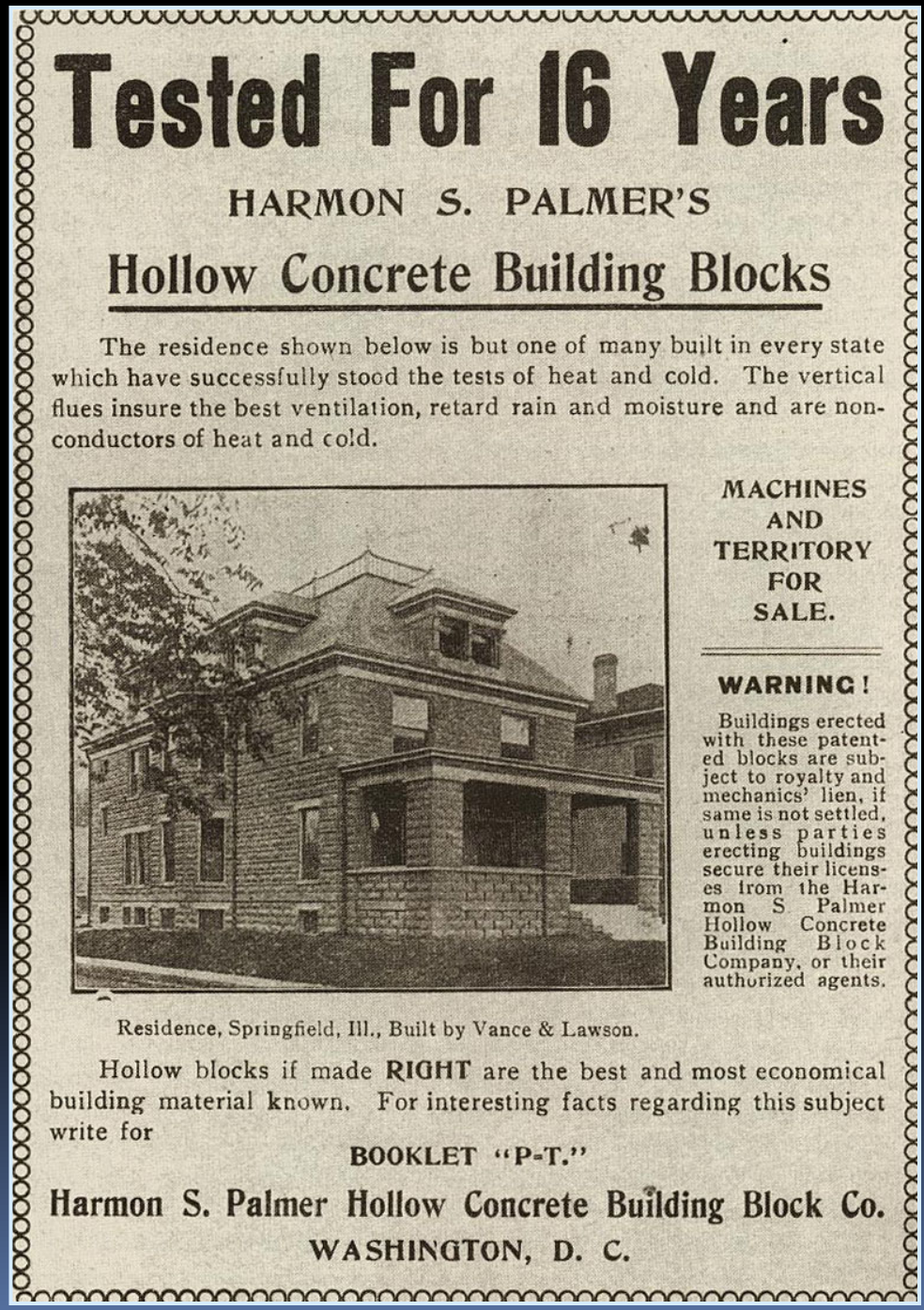
Conservation of Stainless Steel

- Keep it clean
  - Warm water, mild detergent, soft cloths/sponges
  - No steel wool → pitting
- Light scratches—use rubbing compound with a light abrasive
- Heavy scratches
  - Grind the surface
  - Fill with weld, then refinish

CONCRETE

Concrete Block

- 1900: hollow concrete block machine invented by Harmon S. Palmer
- 1902: Palmer formed Hollow Concrete Building Block Co.
- Machine cost $200



Tested For 16 Years

HARMON S. PALMER'S

Hollow Concrete Building Blocks

The residence shown below is but one of many built in every state which have successfully stood the tests of heat and cold. The vertical flues insure the best ventilation, retard rain and moisture and are non-conductors of heat and cold.

Residence, Springfield, Ill., Built by Vance & Lawson.

MACHINES AND TERRITORY FOR SALE.

WARNING!

Buildings erected with these patented blocks are subject to royalty and mechanics' lien, if same is not settled, unless parties erecting buildings secure their licenses from the Harmon S Palmer Hollow Concrete Building Block Company, or their authorized agents.

Hollow blocks if made **RIGHT** are the best and most economical building material known. For interesting facts regarding this subject write for

BOOKLET "P-T."

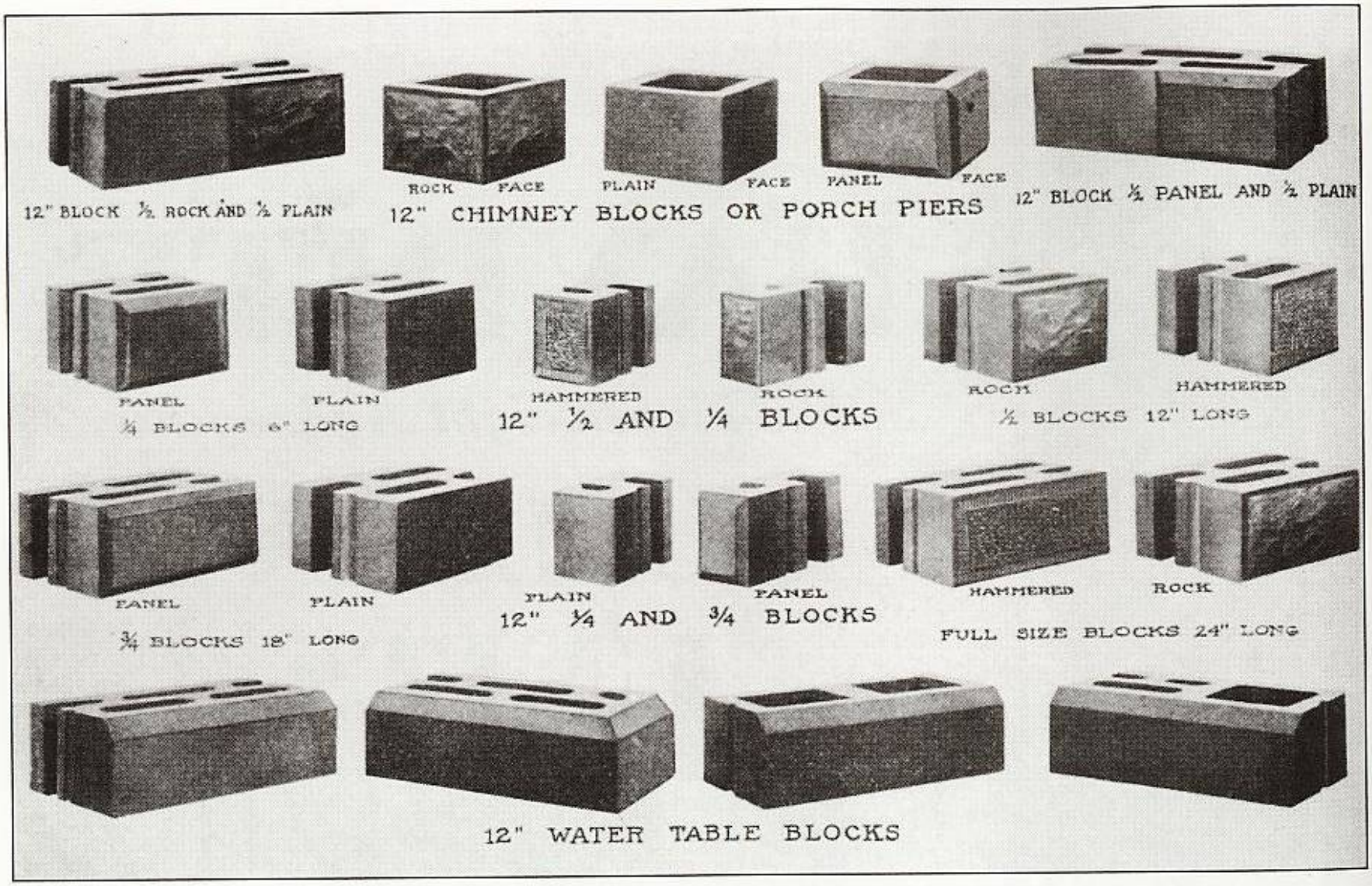
Harmon S. Palmer Hollow Concrete Building Block Co.

WASHINGTON, D. C.

Concrete Block continued

- Concrete blocks immediately popular because:
  - Easy to make
  - Cheaper to lay than brick
  - More lasting than wood
  - Fireproof
  - Did not have to be painted
  - Required little maintenance
  - Produced in many colors, a variety of faces (rockface, cobblestone, plain face ashlar, etc.)
  - Molds to produce variety of shapes, *e.g.*, blocks for chimney flues, porch piers, external walls, columns
  - Lumber, brick prices increased through early 1900s; concrete block was less expensive

Concrete Block Types



Philemon Bryan House, 1905, Ft. Lauderdale, FL







Ca. 1903 concrete block house and chicken coop, Fitzgerald, GA ("granitoid")

Concrete Block continued

- 1908: Sears offered a block machine for $42.50
- Low costs led to the "woodshed" (aka "do it yourself") phase of the concrete block industry
- People bought their own machines and made blocks to build their own houses
- Small businesses were created
- Early architectural criticism
  - Imitative
  - Not quarried—should not look like stone

$42.50 WIZARD CONCRETE BUILDING BLOCK MACHINE

THE WIZARD IS THE BEST

CONCRETE BUILDING BLOCK MACHINE MADE

It contains all up to date scientific improvements known to this class of machinery. In offering you this high grade machine, we claim it has no equal and that it is superior to concrete block machines which are sold as high as from $100.00 to $200.00.

8x8x16 INCHES

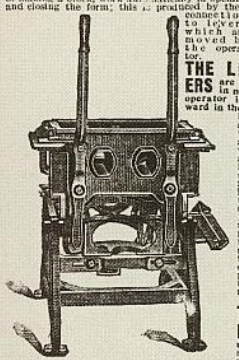
COMPLETE WITH BIG OUTFIT

As listed and described on page 577.

THIS ILLUSTRATION shows a Wizard Concrete Building Block Machine closed and ready to receive the concrete material for making the block. Observe its compact construction and note that every part is mechanical in detail; that is, it will automatically accomplish the work itself with but little assistance from the operator. These machines should not be confused with many concrete block machines of other makes, which are no more than mould boxes, flasks and forms. The **Wizard** is made to perform practically all the work and not **you**, and such a valuable consideration, together with many other superior qualities, places the Wizard in a higher class than so called concrete block machines which are only mere contrivances made to assist hand labor. We give you a machine which will do the work in greater proportion and much faster than it can be accomplished by any other method.

THE FRAME is well proportioned and supported with ribs and braces which prevent the flask or mould from jarring, sagging or shifting when the block is being made. A large percentage of blocks are broken during the process of their making in other machines because the frame or stand of the machine they are made on is too weak to prevent the jarring of the flask. A mere glance at the Wizard will show the substantial construction of the frame of our machine, which eliminates all possibility of blocks becoming cracked or broken by jarring of the flask or mould.

THE FLASK OR MOULD is constructed according to the face down principle. All parts of the flask or mould swing from perfect centers which gives the mould a perfectly square shape when it is closed and completely releases the block when the mould is opened. The face down feature of the mould gives the block a sharp and compact face, enables you to obtain a better proportioned mixture and makes it necessary to use coloring only for the face of the block. It also makes it possible to use a fine quality of mixture for the face of the block and a coarser mixture for the body of the block. The mould is proportioned so as to permit the proper percentages of air space and bearing area, making them about 33⅓ per cent air space or cores and 66⅔ per cent bearing surface. All parts of the mould which are put into action during the process of making a block, work automatically in opening and closing the form; this is produced by their connection to levers which are moved by the operator.



THE LEVERS are two in number and are used by the operator in turning the mould forward in the course of releasing the block. The end doors are separated from the block when the levers are spread and the face plate is withdrawn by a straight away release when the levers are lifted; also the entire mould is swung back and away from the block with the same operation which is used in withdrawing the face plate. These three actions completely release the block so that it can be carried away on its pallet. In closing the mould the same levers are used and the same number of operations are required. The time required for all operations both in releasing and in closing the mould is only a small fraction of a minute and the work is all performed by the two levers and does not require the handling of any other part of the machine. This is one of the automatic features of our Wizard machine.

THE CORES ARE TWO IN NUMBER on the 16-inch machine and three of them are used on the 24-inch machine. They are shaped in such a manner as to allow the concrete while being tamped ample opportunity to follow the surface of the cores to a point directly under the center of the cores. This shape of core is very superior to all others because it gives the block firmness directly under the cores and sufficient strength to the tie pieces, which eliminates all liability of the blocks cracking or breaking while being removed from the machine. The cores are attached to the automatic core extractor by a steel rod which swings between a yoke. This prevents binding when they are being withdrawn by the extractor.



OUR AUTOMATIC CORE EXTRACTOR is a wonderful improvement on modern concrete block machinery. The old way of extracting the cores by hand, weights and levers has been overcome by this our modern method. It takes a great deal of time to insert and extract the cores by hand and it is hard work, considering the way the concrete material is tamped around the cores. **OUR WIZARD CONCRETE BLOCK MACHINE** is provided with this automatic core extractor which extracts the cores automatically when the flask is turned over to release the stone and the simple act of stepping on the foot treadle inserts the cores when the mould is turned back for the tamping of the concrete mixture for a new block.

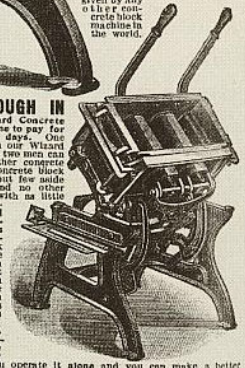
THE REGULAR OUTFIT we furnish with this machine is such as is most generally used in making a standard variety of blocks. Special attachments, such as **Bay Window, Circle Block and 4-Inch Course Block Attachments**, are extra and are furnished only when ordered and proper price allowed. The regular outfits furnished with the machines are illustrated and described on the following page.

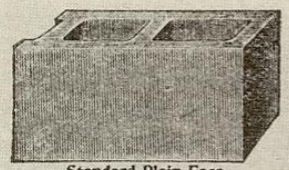
THE SHELF adds a valuable feature to our Wizard machine. The operator in making a block can use only one tool at a time and the shelf is a most convenient place upon which to place the remaining tools and keep them within easy reach when he wants to use them, otherwise they would be thrown on the floor and kicked about, making it necessary to look for them when they are wanted. All of this takes time and you can easily see the great amount of time and stooping that is saved by this shelf.

THE PALLET is an important part of a concrete block machine because much depends upon it. Weak and uneven pallets will crack the blocks. Wood pallets will warp and twist out of shape and they become too flexible. We have provided our Wizard machine with cast iron pallets of proportionate weight and strength. These pallets have handles on them so that the operator needs no carrying device to lift the block out of the machine and carry it away. Twenty-five pallets are furnished with each machine, but you should have as many pallets as you wish to make blocks per day.

THE WIZARD HAS NO COMPLICATED ADJUSTMENTS such as are found on concrete block machines of other makes. There are no gears, sprockets, ratchets, springs, screws or slides to get out of order or clog up with concrete mixture when you are at work. In order to obtain the full capacity from any concrete block machine, it is necessary that the machine shall work smoothly and without a hitch, for should you have to stop in the midst of your work to adjust complicated parts and clean gears, ratchets or slides which become clogged up with concrete mixture that spills over the edge of the mould during the tamping of the block, you cannot receive the full capacity of the machine. It is well to consider that your profit depends upon the quality and number of blocks your machine makes in a fair day's work and when you own a Wizard Concrete Building Block Machine you receive the full benefit from your investment and labor and greater value than is given by any other concrete block machine in the world.

YOU SAVE ENOUGH IN LABOR on our Wizard Concrete Block Machine to pay for the machine in sixty days. One man can make blocks on our Wizard machine about as fast as two men can make them on any other concrete block machine. All concrete block machines make blocks, but few aside from the Wizard make perfect blocks and no other machine will make them so rapidly and with as little exertion and expense on the part of the operator as the Wizard. We know of several instances where one man has made a perfect block on the Wizard in one minute's time. We do not mean to say that everyone under all conditions can make a block for every minute of the working day, but we simply mean to illustrate the speed of which the machine is capable and the great amount of work it is possible for you to do alone on this machine. If it takes two men to operate other makes of concrete block machines in order to get a fair product for one day's work and the cost of labor to do the work is approximately $2.00 per day for each man, add $2.00 a day for every day you use a man to assist you to the price of the machine and you will find that it will make the machine an expensive one. You buy our Wizard Concrete Block Machine and you operate it alone and you can make a better block and about as many blocks as two men could make on the other machine. You are that $2.00 a day that you would have to pay for the extra man had you the other machine; deduct that $2.00 saved every day from the price paid for the Wizard and you will find that this saving of $2.00 a day will in a very short time pay for your Wizard machine and all over that can be applied to your net profits. Should you choose to operate the Wizard Concrete Block Machine with two men you can do so and by so doing you will double its capacity.

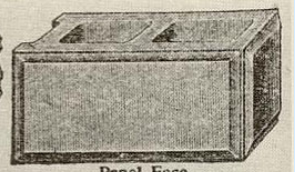




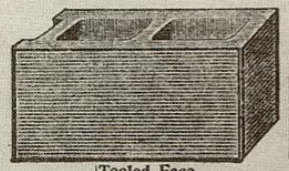
Standard Plain Face.



Standard Rock Face.



Panel Face.



Tooled Face.



Tooled Edge Rock Face.



Cobblestone Face.



Broken Ashler Face. Style A.



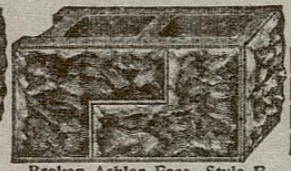
Broken Ashler Face. Style B.



Broken Ashler Face. Style C.



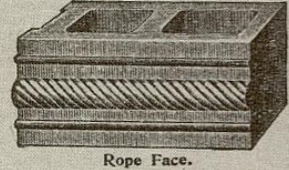
Broken Ashler Face, Style D.



Broken Ashler Face, Style E.



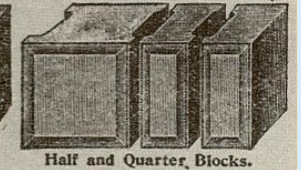
Pressed Brick Face.



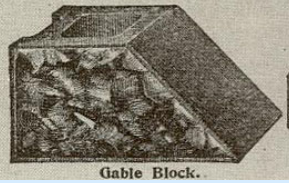
Rope Face.



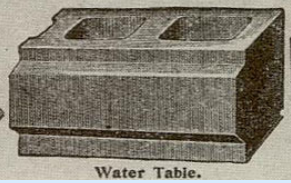
Scroll Face.



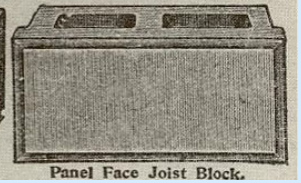
Half and Quarter Blocks.



Gable Block.



Water Table.



Panel Face Joist Block.

Vogl House, 1915, Kent County, DE



Durst,-Hargroves-Nicholson House, Winder, GA, ca. 1910; concrete block

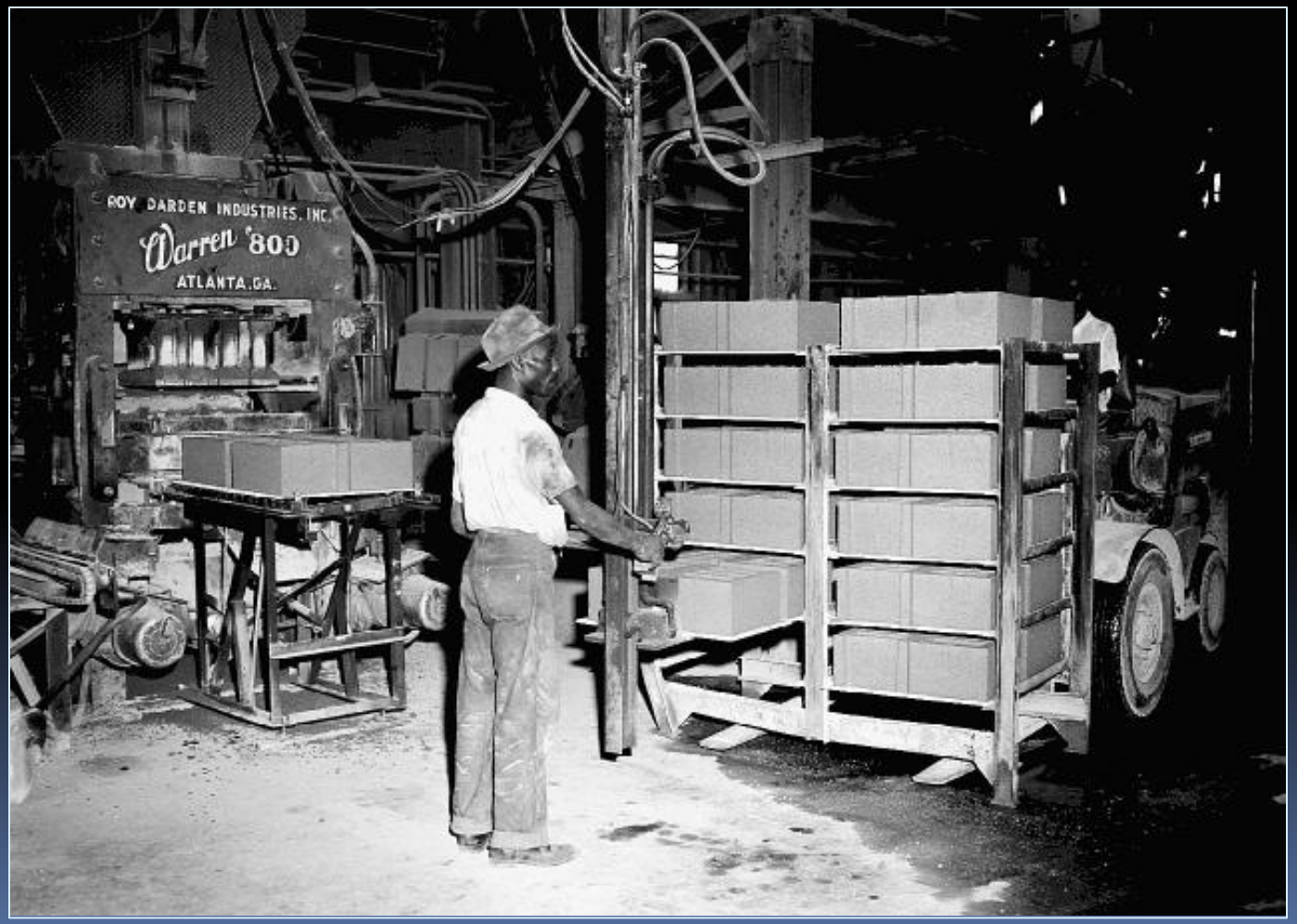




Concrete Block continued

- 1917: F. J. Straub introduced first lightweight aggregate (coal cinders) — the cinder block
  - Stronger, lighter, easier to lay
- 1919: standardized block size 8"x8"x16"
- 1919: Concrete Block Manufacturer's Assn. formed
- By the end of 1930s: fully automated industry; end of the "do it yourself" era
- 1930s-1940s: introduction of other lightweight aggregates, better machines; no longer economical to do ornamental forms; plain, lightweight CMUs (concrete masonry units) produced exclusively

Concrete Manufacturing Company, 818 Williams Mill Road, Atlanta, 07/03/1953



Deterioration of Concrete Block

- Cracking
  - Shrinkage of concrete
  - Movement of the blocks
- Efflorescence — an accumulation of salts on surface
- Spalling — water infiltration + freeze/thaw causing the exterior surface to pop off
- Improper block mixture often cause of cracking, spalling blocks

Conservation of Concrete Block

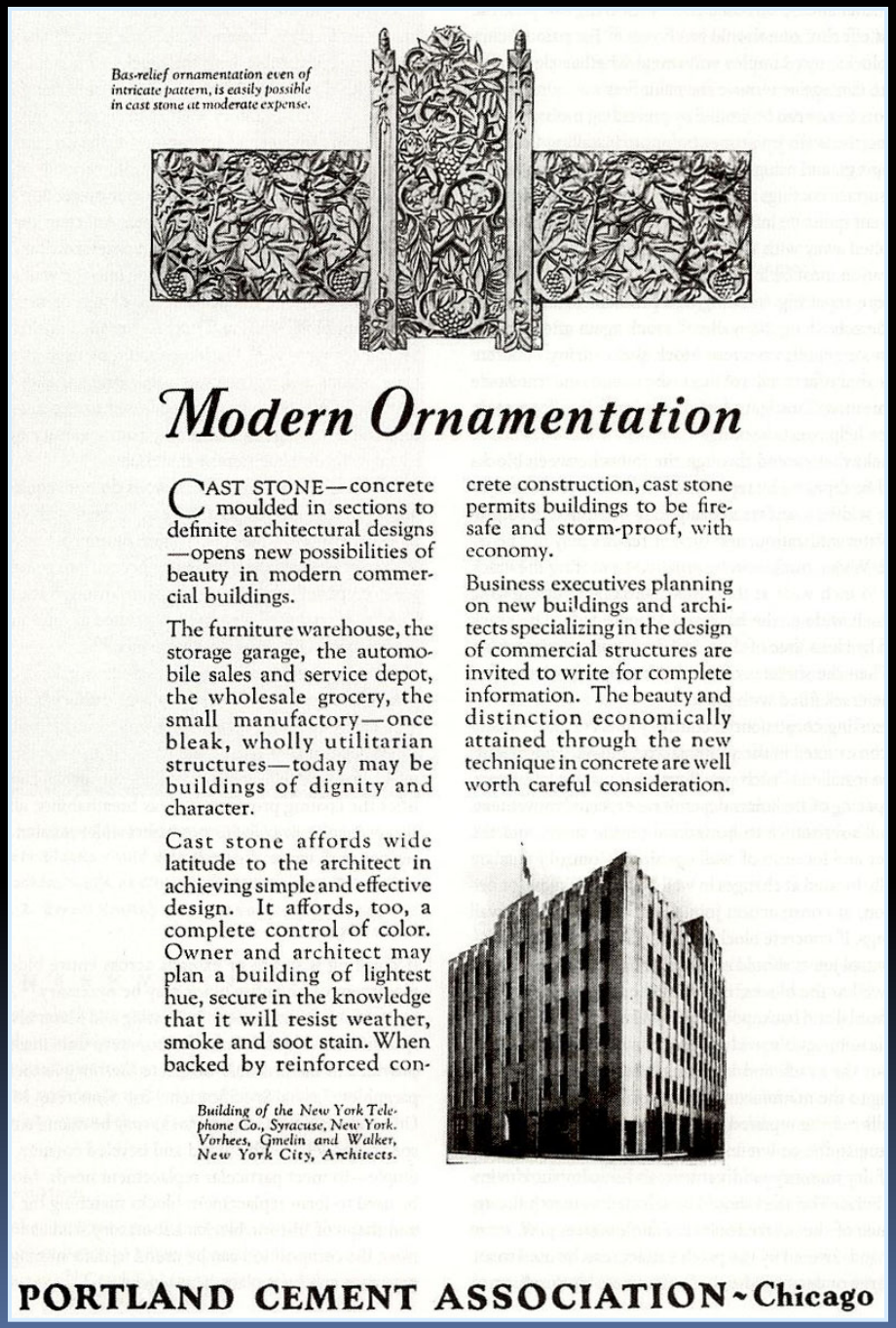
- Clean with water and non-ionic detergent
- Re-point mortar joints to prevent moisture from entering block
- Use flashings, copings, weep holes
- Paint sealants can be used
- Before repairing cracks, solve problems of movement (reinforce) and/or moisture
- Replace faulty blocks

Preservation Brief

- #15: Preservation of Historic Concrete

Cast Stone

- Highly refined concrete made from Portland cement, fine & coarse aggregates, and water
- Veneer, block, or ornament
- Simulates veined and colored stones
- Wide range of colors, textures



Bas-relief ornamentation even of intricate pattern, is easily possible in cast stone at moderate expense.

Modern Ornamentation

CAST STONE—concrete moulded in sections to definite architectural designs—opens new possibilities of beauty in modern commercial buildings.

The furniture warehouse, the storage garage, the automobile sales and service depot, the wholesale grocery, the small manufactory—once bleak, wholly utilitarian structures—today may be buildings of dignity and character.

Cast stone affords wide latitude to the architect in achieving simple and effective design. It affords, too, a complete control of color. Owner and architect may plan a building of lightest hue, secure in the knowledge that it will resist weather, smoke and soot stain. When backed by reinforced concrete construction, cast stone permits buildings to be fire-safe and storm-proof, with economy.

Business executives planning on new buildings and architects specializing in the design of commercial structures are invited to write for complete information. The beauty and distinction economically attained through the new technique in concrete are well worth careful consideration.

Building of the New York Telephone Co., Syracuse, New York. Vorhees, Gmelin and Walker, New York City, Architects.

PORTLAND CEMENT ASSOCIATION ~ Chicago

Cast Stone continued

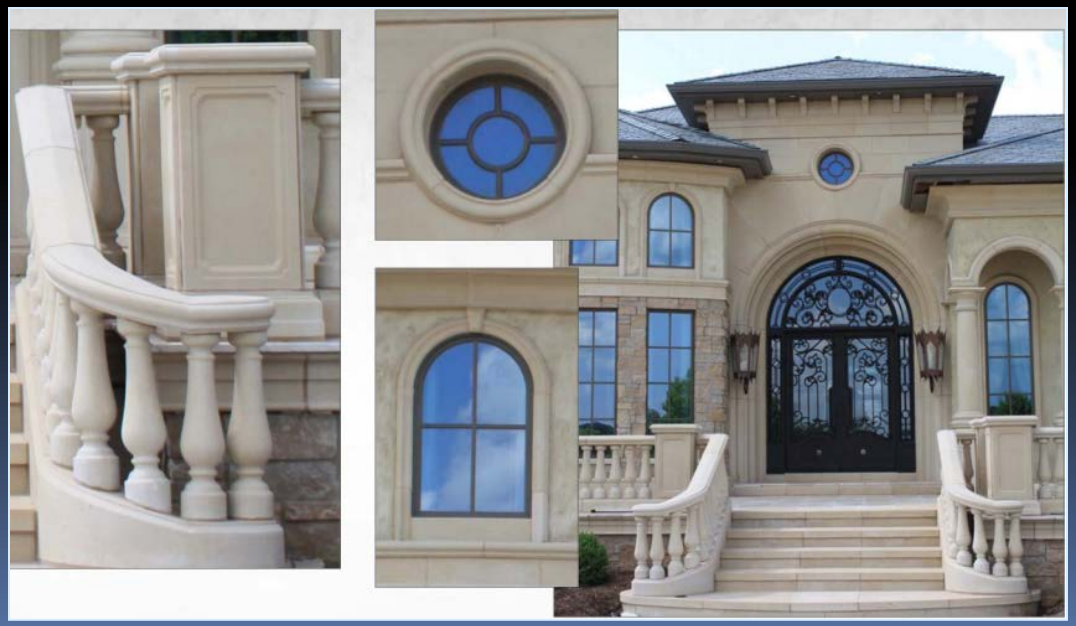
- Inner core of concrete is poured first
- Outer layer of expensive pigments and aggregates poured later
- Manufactured in virtually any shape or size
- Cast stone is laid in mortar like natural stone or attached as a veneer (with metal fasteners)
- 1868: George Frear granted first U.S. patent for cast stone; he used Portland cement imported from England
- When Portland cement manufactured in U.S. (1870s) → rapid expansion of cast stone industry

Cast Stone continued

- Very popular late 19th - early 20th centuries
- Used on houses, banks, churches, schools, libraries, office buildings,
- Used as: water tables, window sills, steps, beltcourses, chimney caps, sculpture, spandrels
- Problems with buildings falling down due to poor product (inadequate compressive strength of 1500 ppsi)
- By 1927, Association of Cast Stone Manufacturers set new standard of 5000 ppsi compressive strength

Cast Stone continued

- Most cast stone companies out of business by early 1950s or absorbed into precast concrete industry [Mizner Stoneworks, FL, since 1922]
- Cast stone has made a comeback; see Cast Stone Institute, http://www.caststone.org/



2012 residence uses cast stone in balustrade, archways, columns, window surrounds, wall coping, keystones, cornices, stair treads and risers, front entryway

Soldier Field, 1924, Chicago (Holabird & Roche)



Level Club, 1926, New York City (Clinton & Russell)
Ornamental cast stone panels



Deterioration of Cast Stone

- Problems with historic manufacturing techniques, e.g., aggregates that were not durable led to accelerated weathering
- Cracking, crazing
- Aggregates of non-uniform size form a more porous, less durable surface
- De-lamination of facing layer from core
- Like other concrete products, cast stone deteriorates in an acidic environment
- Corrosion of metal reinforcement embedded in the stone

Conservation of Cast Stone

- Clean by gentlest means possible
- Replace rusted metal reinforcements or fasteners
- When patching stone or replacing mortar, match the original
- Epoxy adhesives can be used to re-establish the bond between the delaminated facing and the inner core

Preservation Brief

- #42: The Maintenance, Repair and Replacement of Historic Cast Stone

Reinforced Concrete

- Concrete has great compressive strength but little tensile strength
- Addition of metal bars to increase tensile strength expanded the range of applications



Reinforced Concrete continued

- 1860: US patent for reinforced concrete wall
- 1877: Thaddeus Hyatt's *An Account of Some Experiments with Portland Cement Concrete, Combined with Iron as a Building Material*
- 1897: First practical commercial building of reinforced concrete, E. L. Ransome's borax refinery in Bayonne, NJ
- By 1900: new reinforcing materials
  - Metal netting, fabrics for reinforcing flat slabs
  - Various bars, cables for reinforcing beams, columns

Reinforced Concrete continued

- After 1900, methods to transfer load-carrying capacity of beams and girders to floor slabs were developed
  - Saved interior overhead room, important in factories
  - New applications — bridges, grain elevators, storage tanks
- By 1910: concrete shells and domes built for railroad stations and airplane hangars
- 1922: German engineers sprayed concrete onto hemispherical metal framework—inventing thin shell construction

Fallingwater, 1937, Mill Run, PA (Frank Lloyd Wright)

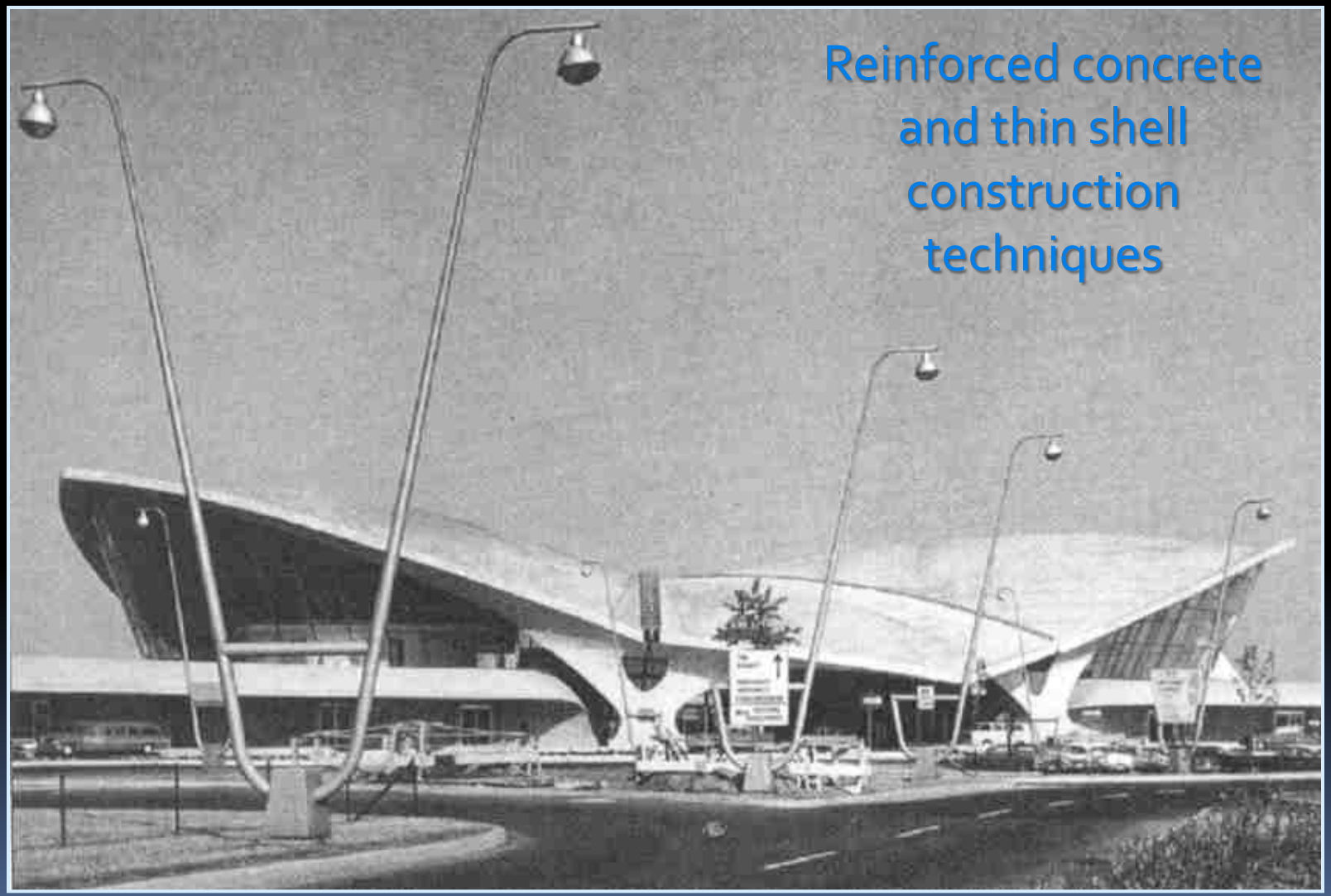






Johnson Wax Administration Building, 1939, Racine, WI (F. L. Wright)

TWA Terminal, JFK Airport, 1956-1962, New York (Eero Saarinen)



Deterioration of Reinforced Concrete

- Most problems associated with moisture
- Corrosion of embedded steel rebar
  - Cracking, spalling, rust staining
- Highly acidic environment → significant corrosion
- De-icing salts → significant corrosion



Cracking, pitting, and exposed rebar
on a reinforced concrete building

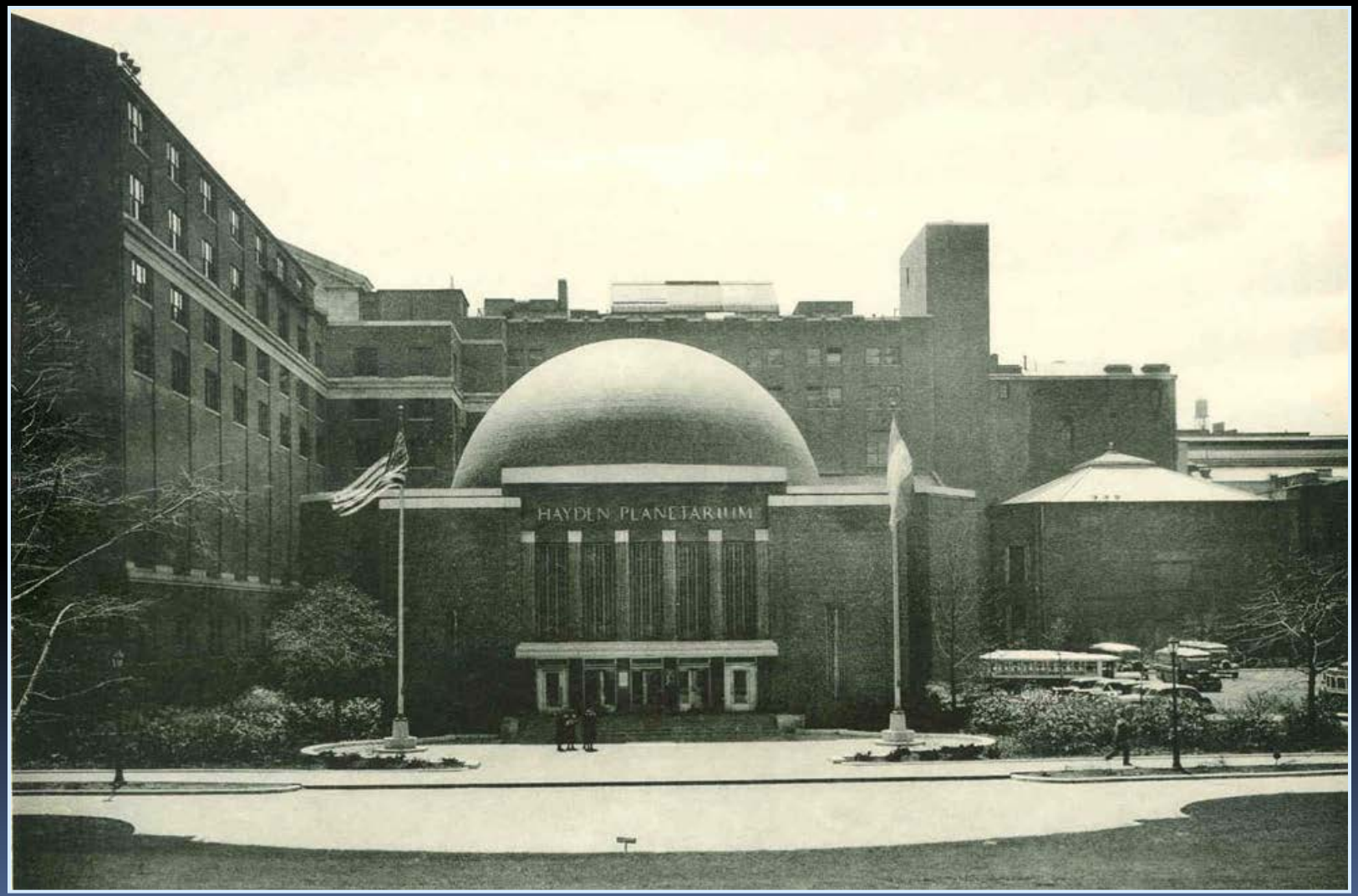
Shotcrete

- Mortar or concrete pneumatically projected at high velocity onto a surface
- 1908: U.S. patent for machine that applied wet plaster using compressed air (C.E.A. Keley)
- 1912: Cement gun. "Gunite" trade name for the concrete used in the gun
- Used industrially as coating for mine shafts, tunnels, and linings for furnaces and boilers (and swimming pools!)
- Architectural shotcrete→ used for a coating over masonry or steel, and for repairing or replacing deteriorating stucco, brick, or concrete

1910: Shotcrete used to repair the Palace of Fine Arts from the World Columbian Exposition—now the Field Museum of Science and Industry (1893, Charles B. Atwood, Chicago, IL)



Shotcrete dome, Hayden Planetarium (1935, Trowbridge & Livingston, New York City)



ENGINEERED WOOD PRODUCTS

Fiberboard/Wallboard



- Wood or plant fibers (grasses, reeds, straw, jute, flax, hemp) compressed with a binder into a single-layer rigid sheet
- Produced in various densities and thicknesses; Standard: 4'wide, 5'-14'long, 7/16"-3" thick
- Used to insulate (heat and sound), sheath, and finish interiors and exteriors
- Can be painted, enameled, glazed, or covered with fabric or paper
- Widely used in the furniture industry



Man installing beaver board, from the Beaver Board Company catalog



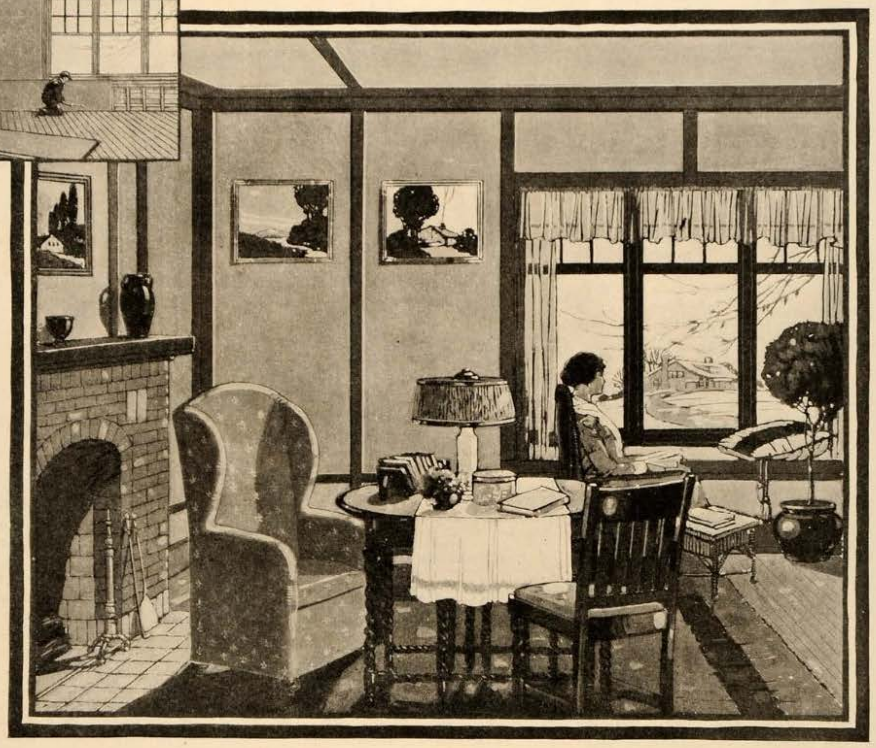
- Pulp boards existed in various forms since late 1700s
- 1906 - fiberboard first used to take the place of lath and plaster
- By early 1900s, many companies were producing pulp board
- One of most prolific was the Beaver Board Company of Beaver Falls, NY

BEAVER BOARD

FOR BETTER WALLS & CEILINGS



Beaver Board is quickly and easily put up with saw, hammer and nails.



You can't expect Beaver Board results unless this trade-mark is on the back of the board you buy.

At First or At Last?

Sooner or later you will Beaver Board that room. The one question is whether you will do it at first or at last. For here's a significant fact. A surprisingly large proportion of all the Beaver Board that is made is used for the purpose of covering over cracked worn-out lath and plaster walls.

You never heard of anyone putting lath and plaster over Beaver Board. When a Beaver Board wall or ceiling is up, it's up to stay.

True enough, Beaver Board will make a new room out of an old one. But even so, it isn't quite as satisfactory as if it had been Beaver Board to start with.

Why the useless expense?

Why not have your Beaver Board room at first instead of at last and avoid the extra job and extra cost?

Beaver Board is a lumber product built up from the fibre of clean white spruce. It comes in sturdy, durable, handsomely-surfaced panels without a crack, knot or blemish. It will last as long as the building in which it is used. It resists heat, cold and sound better than lath and plaster. It is completely sanitary and easy to apply. Warping is prevented by a special patented *Sealtite* process which no other manufacturer is licensed to employ.

Send for booklet—"Beaver Board and Its Uses."

THE BEAVER BOARD COMPANIES, 101 Beaver Road, Buffalo, N. Y.

Canada: 301 Wall St., Beaverdale, Ottawa.
England: 4 Southampton Row, London, W. C.
Australia: Builders' Exchange, Sydney, N. S. W.
United States Branches at Boston, New York, Baltimore, Cleveland, Detroit, Chicago, Minneapolis, Kansas City and San Francisco.

Manufacturers also of Beaver Greenboard, Beaver Blackboard and Beaverbilt Utilities

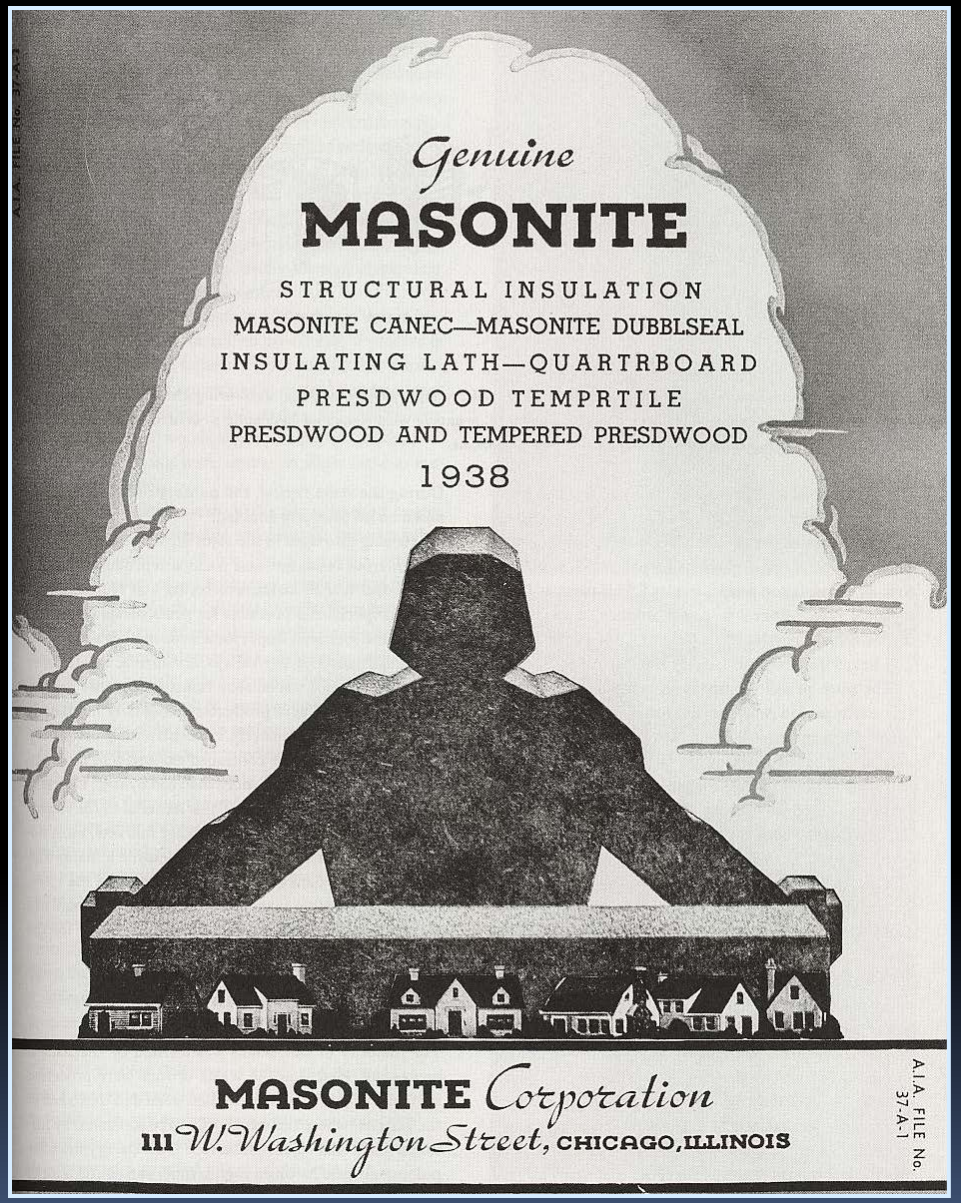
"Sooner or later you will Beaver Board that room." *Saturday Evening Post* ad, March 24, 1917;
OR
You might paint a masterpiece on a piece of Beaver Board. Grant Wood did in 1930 (*American Gothic*).



Hyde Farm, mid-1900s kitchen beaver board, Cobb County, GA



- 1920s: hardboard 1st manufactured--a very dense, compressed wood fiberboard
- 1926: Mason Fiber Co. of Chicago produced first tempered hardboard--hardboard impregnated with oil or resin, then baked to improve hardness and moisture resistance. Tradename: Masonite



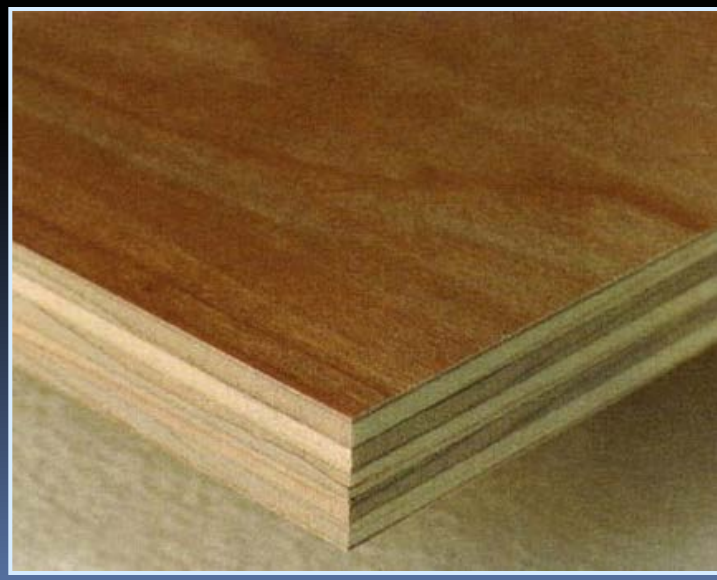


Hardboard tile for use in kitchens and bathrooms, available in the 1940s.

Unfortunately, Celotex hardboard contained asbestos.

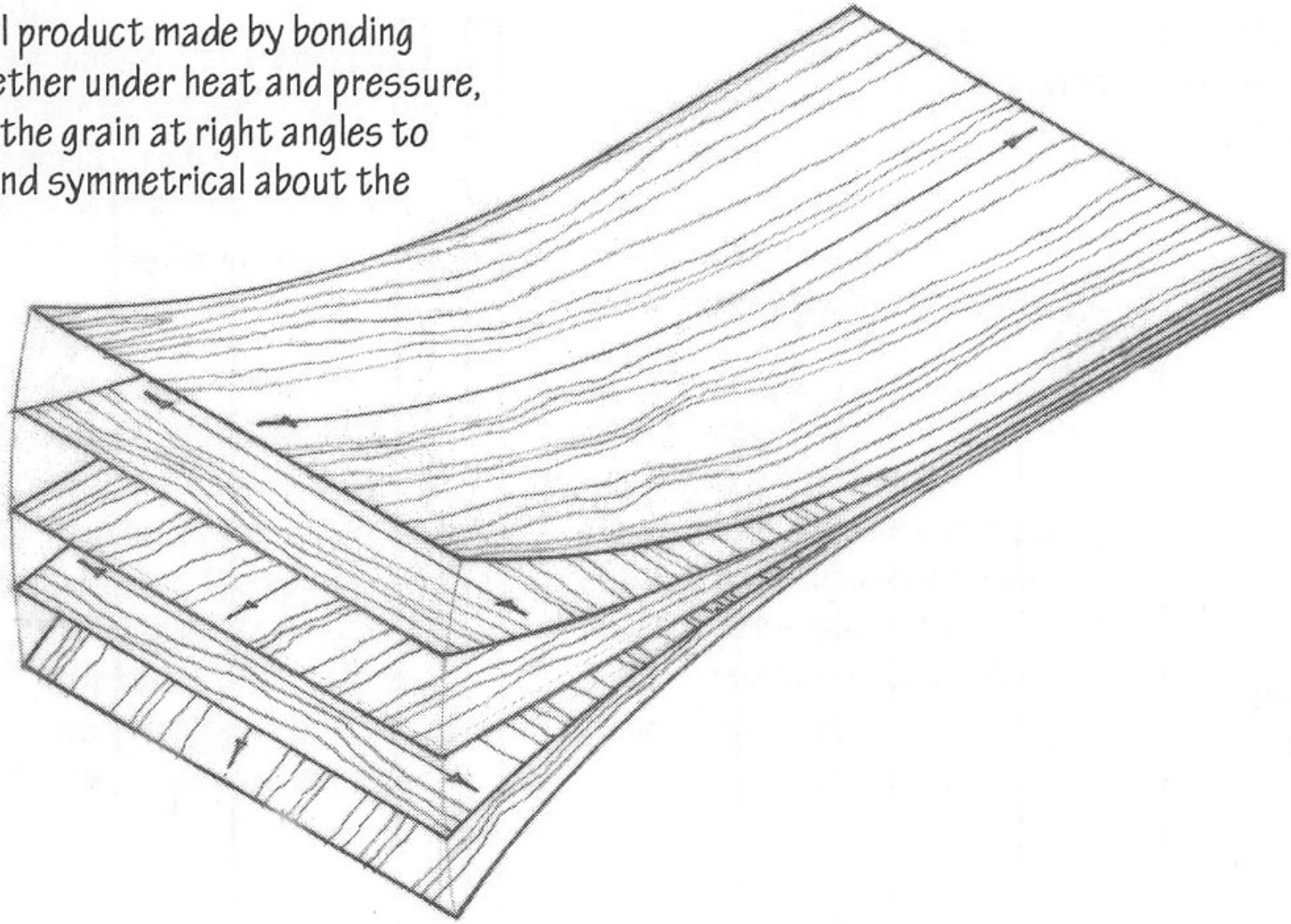
Plywood

- Assembly of:
  - Odd number (usually 3, 5, 7) of hardwood or softwood veneers (thin sheets called plies)
  - Plies are bonded together with adhesive
  - Grains of alternating layers are perpendicular, increasing strength
- High strength-to-weight ratio
- Resistant to splitting
- Can be molded into curves



plywood

A wood panel product made by bonding veneers together under heat and pressure, usually with the grain at right angles to each other and symmetrical about the center ply.



First Plywood and Adhesive Technology

- Egyptians cut thin sheets of wood veneers and glued them together using animal glue. They used bags of sand as weights to hold the wood sheets flat while gluing.
- This first plywood was used in overlaid and inlaid furniture found in Egyptian tombs dating before 1500 BCE.
- 1865: 1st U.S. patent; not produced in significant quantities until late 1880s — used for concealed furniture parts.

Plywood continued

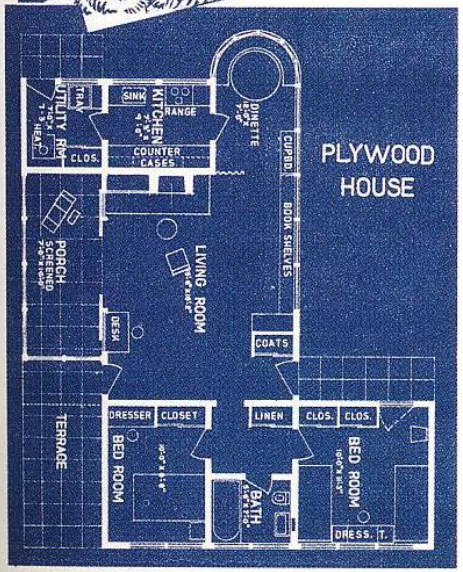
- 1890: Plywood door panels
- World War I: Used in airplane construction
- 1920s: Used in automobile industry
- Non-structural uses: doors, paneling, formwork for concrete, bases for countertop laminates
- 1931: First truly water-resistant adhesive developed → plywood used as building material (subflooring and sheathing)
- 1930s: Standardized size of 4' x 8'
- 1934: First waterproof plywood for external use
- Late 1930s: Hollow-core plywood door

the town of tomorrow

DEMONSTRATION HOME No. 2

NEW YORK WORLD'S FAIR 1939





No. 2

THE HOUSE OF PLYWOOD

Sponsored by

Douglas Fir Plywood Association

Crane Co.
General Electric Company
Johns-Manville
Johnson Wax Products
National Better Light-Better Sight Bureau
New York Telephone Company
Orange Screen Company
Truscon Steel Company
Wall Paper Institute

Furnishings by Modernage

G-E ALL-ELECTRIC HOUSE

Architect: A. Lawrence Kocher, 4 Park End Place, Forest Hills, N. Y.



Richard Neutra's 1942 plywood Boomerang Chair

Particle Board

- Composite, engineered wood product (aka "waste wood product"), first produced post-World War II as a replacement for plywood
- Manufactured from wood chips, shavings, sawdust mixed with synthetic resin binder
- Bonded under heat and pressure, pressed, and extruded as a rigid board with relatively uniform surface
- Cheaper, denser, more uniform than wood or plywood; will not bow or warp

Particle Board continued

- Good for sound insulation
- Often painted or covered with wood veneer
- Lightest and weakest of the fiberboards, except for insulation board
- Prone to expansion and discoloration if not painted or sealed
- Exterior grades are available, but generally not for use outdoors
  - Soaks up water like a sponge
  - Once water logged, chipboard swells, breaks down

Particle Board





Particle Board flooring

Medium-density Fiberboard (MDF)

- Composite engineered wood product (aka "waste wood product")
- Wood fibers formed by breaking down hardwood or softwood residuals
- Fibers combined with wax and resin binder
- Application of high temperature and pressure to form panels
- Denser than plywood; can be used in similar applications to plywood, often for furniture
- Stronger and denser than particle board
- 1980s: Large-scale production began

Medium-Density Fiberboard

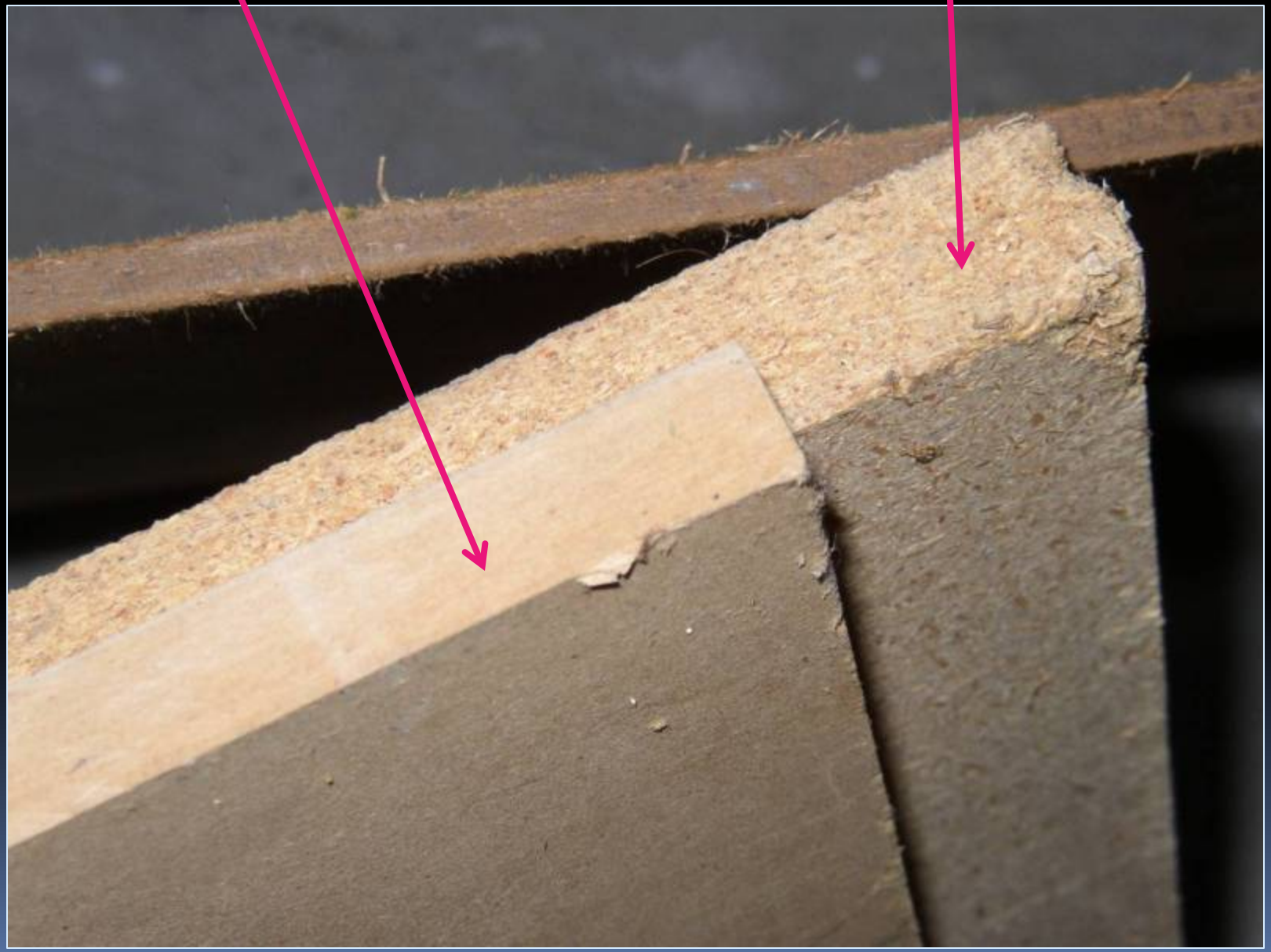






MDF

Particle Board



Oriented Strand Board(OSB)

- Composite engineered wood product
- First produced in early 1980s; by 2000 had surpassed plywood production in US
- Manufactured from thin, rectangular wood strips laid in layers 90° to each other
- Compressed and bonded with resin adhesives under heat and pressure
- Mats cut into various sizes
- Similar to plywood, but cheaper
- Not for exterior use
- Used as sheathing in walls, floors, roofs

Oriented Strand Board (OSB)







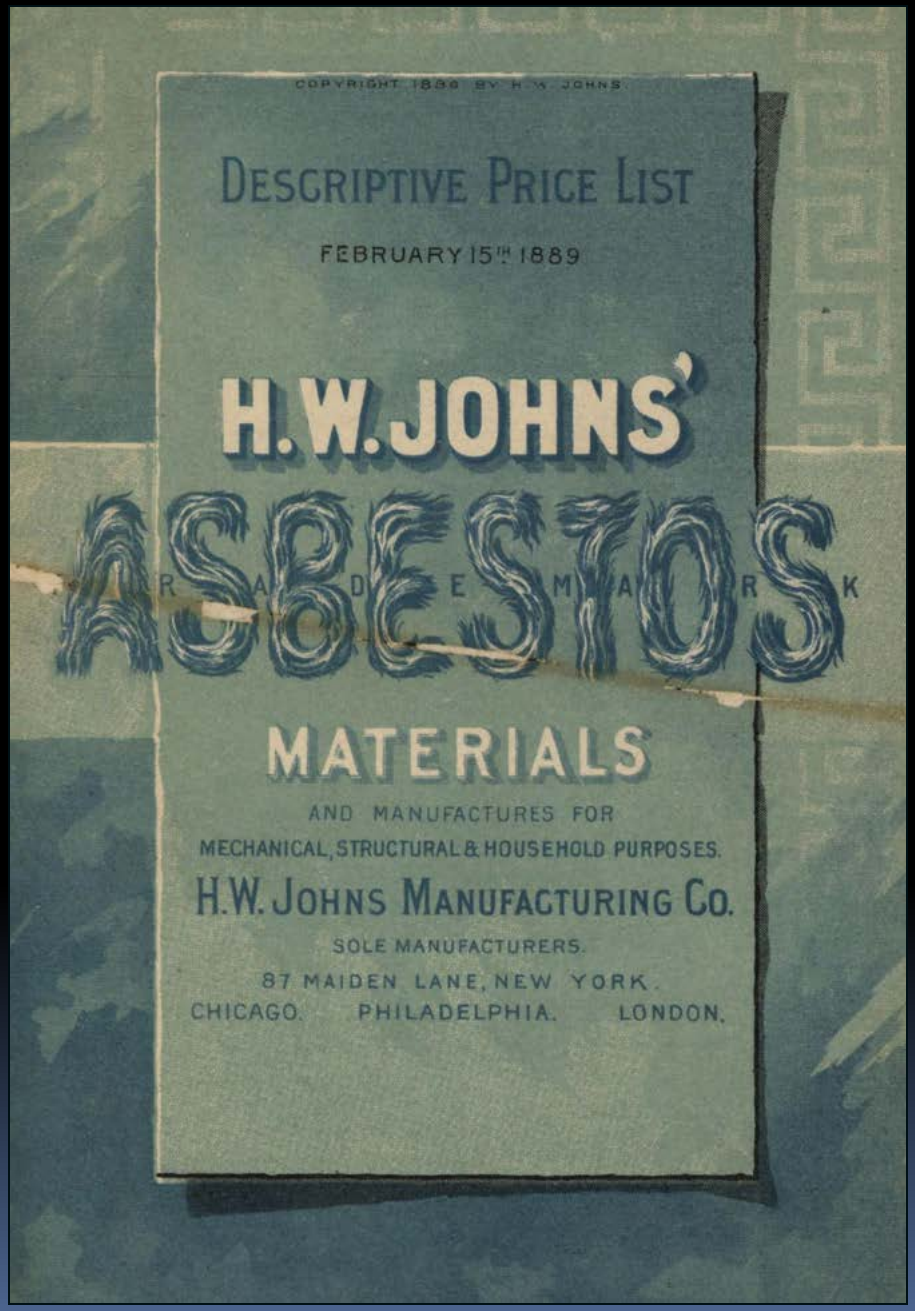
ASBESTOS

Asbestos



- General name given to types of naturally-occurring minerals found in rock, that can be separated into fine, extremely durable fibers.
- Inexpensive to process, chemical resistant, fire resistant, strong, flexible, virtually indestructible
- Airborne asbestos fibers can be breathed in, leading to mesothelioma—type of cancer that attacks the mesothelium-the thin layer of cells lining the body's internal organs
- Other diseases from breathing asbestos fibers: asbestosis, pleural effusion; pleural plaques

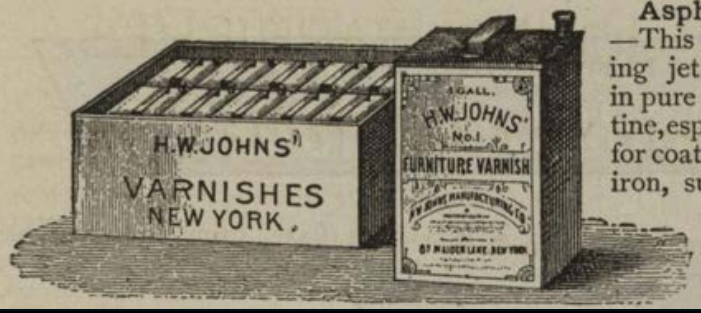
- Greeks spun asbestos fibers for blankets, tablecloths
- Romans used asbestos in candle wicks
- Late 1800s: large deposits discovered in northern US and Canada
- 1905: Asbestos cement first manufactured (Portland cement reinforced with asbestos), used as insulating coating for pipes
- Later improvements → asbestos cement roof shingles, siding shingles, flat sheets (for partition walls, tabletops, acoustical panels), corrugated panels (to enclosed factory buildings, warehouses, train sheds), and decorative moldings
- During Post-World War II building boom, asbestos was marketed as fire proof, rot proof, termite proof



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Asbestos Felt, Wire Cloth, etc.	18
Asbestos Lining Felt, Corded Sheathing, etc	19
STEAM PACKINGS, ETC.	
Asbestos Piston-Rod Packing, Wick Packing, Sheet Packing, Gaskets, etc.	20 & 21
FIRE-PROOF CEMENTS, CLOTHS, ETC.	
Asbestos Plastic Stove-Lining	22
" Furnace Cement.	22
" Retort Cement	23
" Cloth, Rugs, etc.	23
" Rope, Cord, Twine, Yarn, etc	24
VULCABESTON.	
Electric Insulating Sheets, Rings, Washers, etc., Moulded Gaskets, Steam Packings, etc., etc	25, 26 & 27
Indurated Fibre Conduits	28 & 29
" " Pails	29

2-1-9-200 1.



Asphalt Varnish.—This is a quick-drying jet-black Varnish in pure Spirits Turpentine, especially adapted for coating new and old iron, such as Fences, Railings, large and small Castings, Tin, Zinc, etc.

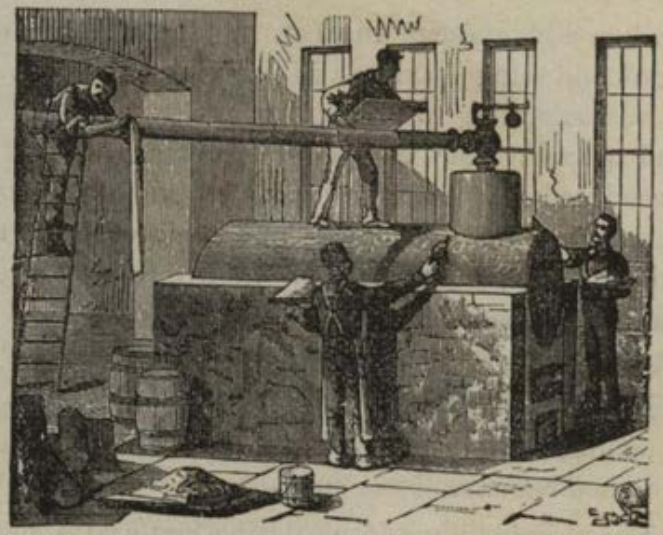


H. W. JOHNS'
FINE COACH COLORS.

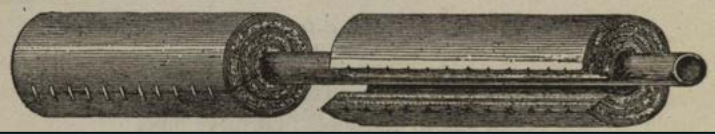
H. W. JOHNS'
Asbesto-Sponge Cement Felting.

(PATENTED.)

A Non-Conducting Covering for Steam Pipes, Boilers, Stills, and Other Steam-Heated Surfaces.



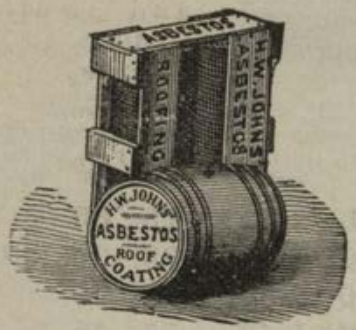
ASBESTO-SPONGE
SECTIONAL COVERING.



This Covering is made entirely of pure Asbestos, felted and formed into cylinders of any desired size and thickness, which are cut longitudinally, so they can be readily "sprung" upon the pipe.

It is *strictly fire-proof*, is superior to Hair Felt as a non-conductor and is also much stronger and less liable to injury from hard usage.





This is the perfected form of the portable Roofing manufactured by us for the past thirty years. It is suitable for Factories, Foundries, Warehouses, Railroad Buildings, Bridges, Car and Steamboat Decks, etc.; also for lining Gutters, etc.; and consists of strong canvas, combined with an Asbestos-coated felt and a manila lining or "backing," water-proofed and compressed into a compact, flexible sheet resembling leather. It is supplied ready for use, in rolls 28½ inches wide, containing 400 sq. ft. with



THE CENTENNIAL

PRIZE MEDAL AND DIPLOMA OF MERIT

WERE

AWARDED FOR OUR ASBESTOS MATERIALS.

FIRST PREMIUM AWARDED BY

American Institute, '58 to '70, '71, '72, '73, '74, '75, '77, '78, '79, '80 and '81.

New Hampshire State Fair, 1871.

Louisiana State Fair, 1870.

Pennsylvania State Fair, 1872.

Texas State Fair, 1871.

Rhode Island State Fair, 1872.

N. E. Agricultural Society, 1874.

Chilian Exposition, 1875.

N. C. Agricultural Society, 1877, 1887.

Atlanta Cotton Exposition, 1881.

Inter-Colonial Exposition, Melbourne, Australia, 1880.

Gold Medals (2), Matanzas Exposition, 1881.

Silver Medal, Amsterdam Exposition, 1883.

Crystal Palace Medal, London, 1884.

Medal of the First Class, New Orleans, 1885.

☞ The Highest Premiums have in every instance been awarded to our Asbestos and other Materials at all Expositions and Fairs wherever exhibited.

Ambler Asbestos Reinforced Concrete—The Permanent and Non-Combustible Building Material

Portland or hydraulic cement is permanent, insoluble and weather and fire resisting, but due to its low tensile strength it has been widely used only when reinforced or in massive construction. Layers, sheets or plates of cement must necessarily be reinforced, but metallic reinforcement is not practicable for thin sheets, as water and air will somewhere come in contact with and corrode the iron or steel.

In seeking to adapt hydraulic cement to the formation of light sheets or slabs for building purposes, Ludwig Hatschek, an Austrian asbestos worker, hit upon the idea of using asbestos fiber as the reinforcing material. His patents are now worked extensively in all civilized countries, the Hatschek plants in Austria alone turning out each year more than one hundred million square feet of this asbestos concrete roofing material.

Asbestos is a fibrous, hydrated silicate of magnesia, found in considerable quantities as veins in the serpentine rocks of the Province of Quebec and in some other mountainous districts. The better qualities, as found at Thetford, P. Q., are exceedingly fine, tough and flexible, and have a tensile strength of about 25 tons per square inch. A beautiful representation of the finest quality as it comes from the mines is shown in our circular describing Ambler Asbestos Building Lumber.



Applying Ambler Asbestos Corrugated Roofing on Steel Structure



Ambler Asbestos Corrugated Siding, showing method of fitting around windows
Window frame constructed of Ambler Asbestos Building Lumber

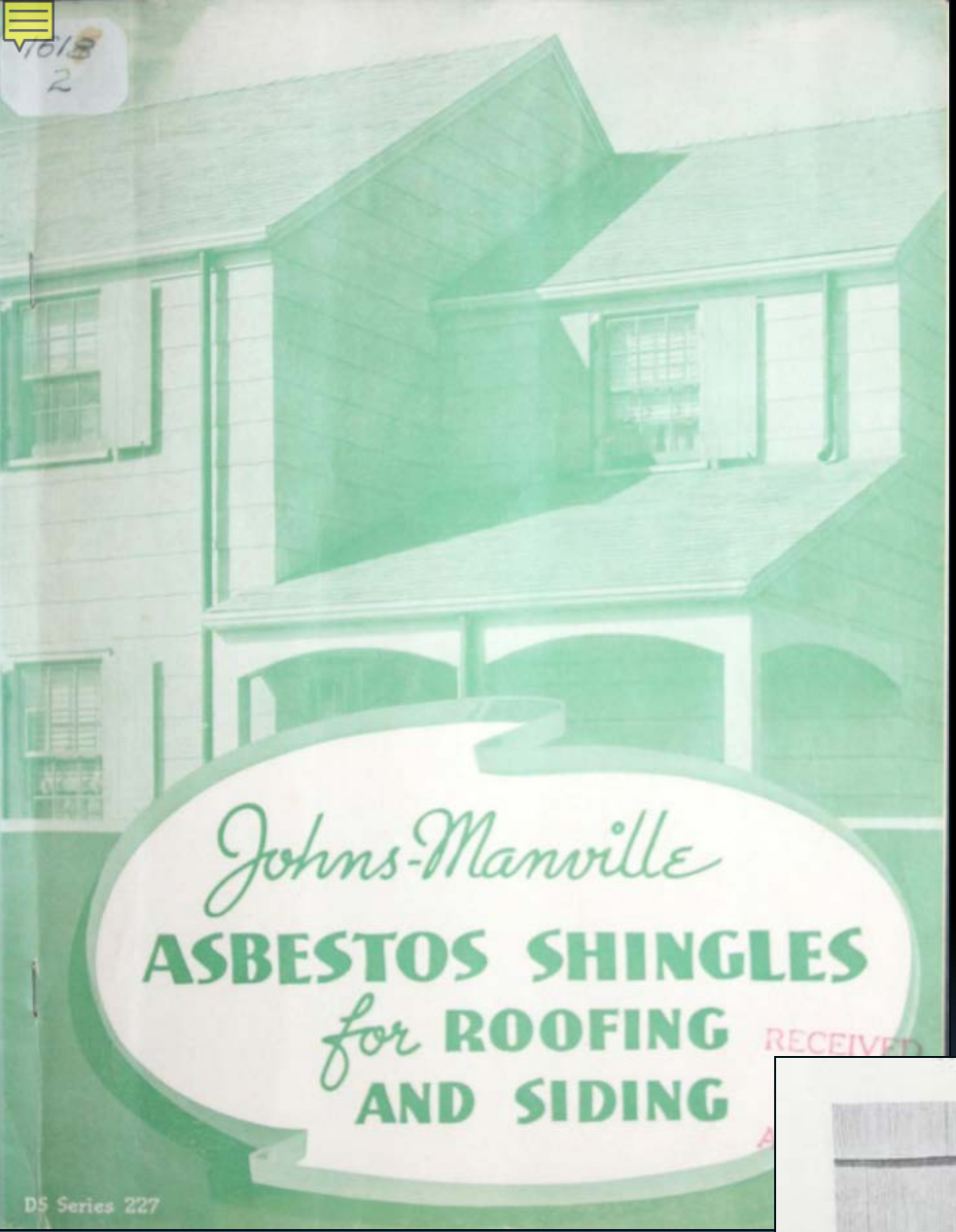
By the 1920s, large asbestos-cement roof shingles were available in a natural gray color, as well as red and blue-black colors that resembled tile and slate. Like their asphalt counterparts, asbestos-cement shingles were characterized by a variety of shapes (square, rectangular, diamond, chamfered, scalloped, and ogee) and method of installation (American, French, or interlocking).
Asbestos-cement roofing tiles shaped to imitate clay tiles found on French and Spanish-style buildings were also produced.

Siding made of asbestos cement was another popular building material. Individual square, rectangular, and hexagonal shingles dominated, although long planks resembling clapboard were offered by the late 1930s. The
surfaces of siding produced in the 1920s and early 1930s were smooth. Textured finishes, particularly wood-grain patterns, were available beginning in 1937. Sears, Roebuck and Co. was one of the first suppliers to introduce asbestos-cement siding with a wavy bottom edge.

Installing asbestos-cement shingles, whether on roofs or walls, was relatively easy. Most shingles, typically 12 by 24 inches, were easy to handle and came drilled for nailing. Often, they were applied over existing materials using
furring strips. Asbestos-cement products, once deemed a miracle material, remained popular until the 1970s when the U.S. Environmental Protection Agency (EPA) began regulating asbestos-containing materials.

http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf08732308/pdf08732308dpi72.pdf

1618
2



Johns-Manville
ASBESTOS SHINGLES for ROOFING AND SIDING

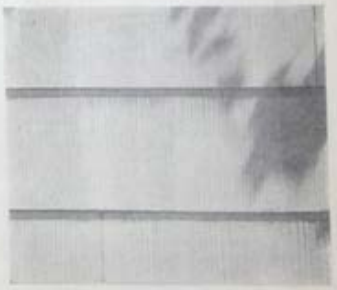
RECEIVED

DS Series 227





Uniform thick, Asbestos Siding Shingles with Cedargrain Texture and wavy or straight butt lines, respectively



ASBESTOS SHINGLES

J-M No. 90 DIAMOND THATCH

The J-M No. 90 Diamond Thatch Shingle is a refinement of the popular hexagonal, or French, roof pattern.

Each shingle has a greater coverage, making fewer pieces to apply per square, with consequent lower application cost. Added to this, there is a further saving in labor effected through its self-spacing design and the use of the new J-M Clincher.

This new asbestos shingle is offered at new low prices which put the advantages of permanent, fireproof roof protection within the reach of everyone.



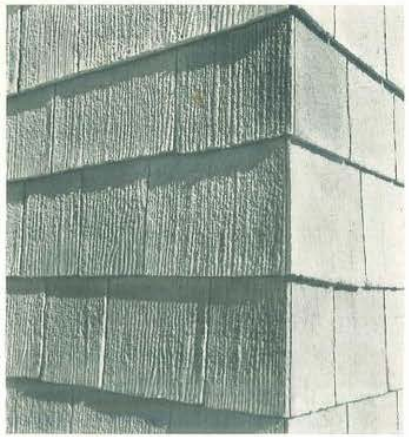


DUO-BLEND RED



Above—COPPER
Below—MOTTLED GRAY

Above—MOTTLED BLUE-BLACK
Below—DUO-BLEND GREEN



J-M No. 45 Siding Shingles bring to the sides of the home protection from fire and weather in a permanent, attractive form.

ASBESTOS SHINGLES

J-M SIDING SHINGLES

Siding constructed of J-M Asbestos Shingles is permanent and fireproof, for these shingles will not rot, corrode, warp or split. Nor will they burn. Moreover, when used for re-siding work, they can easily be applied right over the old wood siding, thereby saving the expense of tearing off the old material.

The two special J-M Shingles described on this page offer a choice of color, texture, effect and price, in the same permanent materials as J-M Roofing Shingles—asbestos fibres and Portland cement.

When used in combination with a roof of J-M Asbestos Shingles, they complete the protection of the home on all sides from fire, weather and deterioration.

J-M No. 45 SIDING SHINGLE

In the J-M No. 45 Shingle, with its tapered butts, textured surface and pleasing Silver Gray color, is found a permanent siding material that is at once easy to lay and unusually attractive. Its color and texture so closely simulate stained wooden shingles that it has received the approval of architects for use on the finest homes. Should a different color effect be desired, however, the No. 45 Shingle can readily be painted.

Furnished in random widths only, to further the resemblance to high-quality wooden shingles.

J-M No. 130 SIDING SHINGLE

The J-M No. 130 Siding Shingle applies the economical Dutch Lap principle to siding use. It is fast laying and self-aligning, and requires no furring. Its small size does away with the need for anchors or fasteners, so that the application is quick, simple and very economical.

Added to these features is the low cost of the shingles, which helps to bring the advantages of permanent, unburnable siding within the reach of all.



FLINTKOTE ASBESTOS-CEMENT SIDINGS

Flintkote Asbestos-Cement Sidings are made in a variety of styles and are ideally adapted to new construction home needs, in addition to their wide acceptance for remodeling of existing construction.

TAPERTEX Asbestos-Cement Siding, a comparatively recent Flintkote development, has a straight line, edge-grain texture that is new, distinctive and attractive. The texture tapers from a flat surface at the top to deep indentations at the lower edge, giving a deep, grooved surface texture at the butt.

The **WAVELINE** Edged Siding reproduces the beauty of wood shingles applied with a wavy edge, combining it with the natural qualities of asbestos-cement products—fireproofness and durability. Its shadows and butt lines further contribute to the attractive effect.

Flintkote Asbestos-Cement Sidings, available in distinctive styles, are ideally adapted to new construction residential needs and are widely used in remodeling present structures since new sidewalls not only cover unsightly old walls but also add to the value of the property and effect savings in upkeep expense. Interesting effects, architecturally appropriate, are easily achieved by combining different styles of Flintkote Asbestos Sidings on the same wall or by using Asbestos Sidings for part of the sidewall in combination with other materials.



TAPERTEX ASBESTOS-CEMENT SIDING



WAVELINE ASBESTOS-CEMENT SIDING

1933

Asbestos Umbrellas for Firemen

THE utilization of asbestos umbrellas has helped the "smoke-eaters" of a German provincial city to combat the fire peril. The novel device, illustrated below, is an imitation of the asbestos protective method used during the World war by Allied troops against the terrible effects of liquid fire.

Every brigade member is equipped with one of these umbrellas, which permits closer approach to base of flames.



This large type of asbestos umbrella permits several hose nozzles to be thrust through it, protecting firemen from heat.



1946



1952-1957

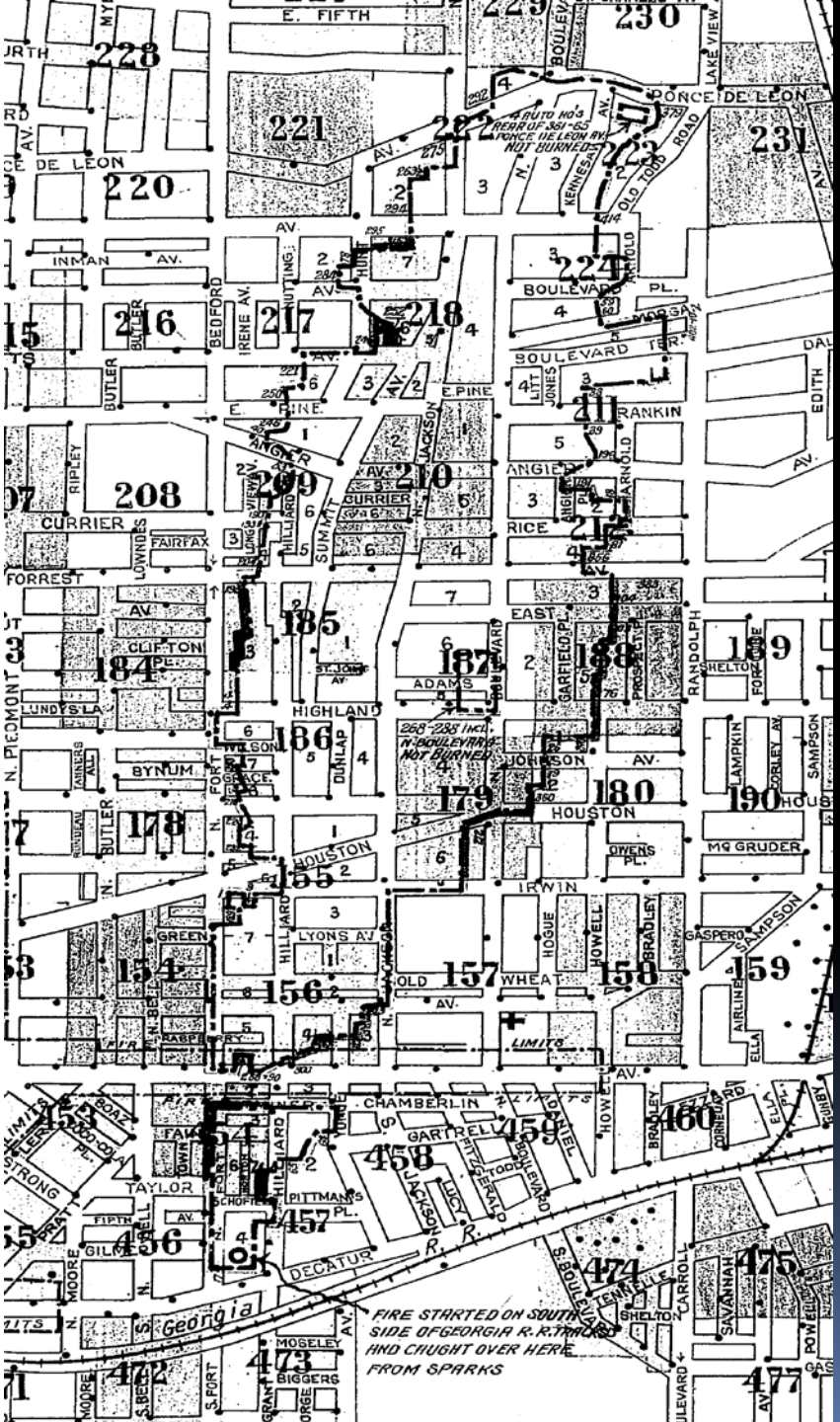
"The lessons of ... Atlanta, are bearing fruit.... There is a roofing that repels fire.... It is made of Johns-Manville Asbestos...."



The Literary Digest, November 10, 1917, p. 42.

Sanborn map (May 31, 1917) showing area destroyed by the Great Atlanta Fire on May 21, 1917





Fire extended from
Decatur Street (south),
Fort Street (west)
Ponce de Leon Avenue
(north)
Randolph Street (east)

- Asbestos can be found in a building in:
  - Surfacing materials—plaster, stucco, paint, spackling compound
  - Roofing materials—asphalt shingles, roofing felt, flashing, adhesives, insulation, simulated wood trim
  - Flooring—vinyl floor tiles, linoleum, terrazzo tiles
  - Cement products—siding and piping
- Two types of asbestos-containing materials:
  - Friable—can be crushed to powder by hand (insulation, textured ceiling spray). Fibers easily become airborne.
  - Non-friable—has fibers bounds in hard matrix (flooring, siding, roofing). Fibers only become airborne when material is damaged or being removed.
- As long as asbestos-containing material remains in good condition and will not be disturbed, it does not pose a significant health risk

HOME INSULATION

J-M HOME INSULATION

the ultimate in house insulation

J-M Home Insulation is, first of all, a thick insulation—three to four inches of rock wool, a permanent, vermin-proof, rot-proof, odorless material that absolutely will not burn. Used in old or new homes, it not only provides the maximum in year 'round living comfort and winter fuel savings, but also brings added protection from fire.

Type B

J-M Type B Home Insulation is felted rock wool, wrapped on chipboard centers, into "bats," 15″ wide x 18″ long x 3″ thick, which are resilient and easy to handle. These bats can readily be pressed between studs or floor beams and can easily be sawed, cut or even torn with the hands to fit around windows, doorways, pipes, etc.

The convenient size of the bats enables the workman to cover large areas more quickly and economically than if loose material were used. Furthermore, when installed during construction, Type B Home Insulation at once removes any insulation problem with respect to heating or summer comfort which otherwise would confront the owner later on. It also gives added security from fire.

J-M Type B Home Insulation can likewise be applied in open attics and other accessible places in old homes, thereby making the homes much more comfortable all year 'round and much easier to heat in cold weather.

Type A

For insulating the walls and finished attics of existing homes, J-M Type A Home Insulation is recommended. Type A Insulation is loose, nodulated rock wool, which is "blown" into the wall and attic spaces under pneumatic pressure, by Approved Home Insulation Contractors who have the necessary equipment. We shall be glad to give you the name of the Approved Contractor in your neighborhood.

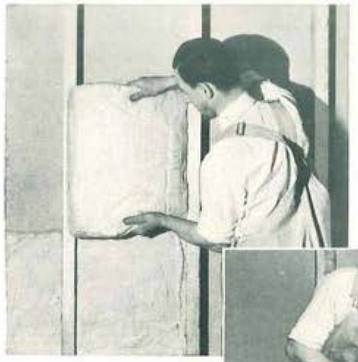


"Blowing" Type A Insulation.

Type B Home Insulation—Shipped 6 bats per package, slip-sheeted for ease in handling. One bat covers approximately 2 square feet. Approximate weights: per bat, 5½ lbs.; per package, 33 lbs., net; shipping weight, 35 to 38 lbs. per package.



A package of Type B "bats," slip-sheeted for easy handling.



The "bats" need only a slight bit of pressing to fill out the entire space between the studs or floor beams. Being compact, they leave no voids.



The "bats" can easily be sawed, cut with a butcher knife, or torn with the hands, to fit odd-shaped spaces.



Just a rough cut and a little pressing and the space is filled with three inches of insulating material.

J-M ASBESTOS WAINSCOTING

•

The new, permanent wall material in tile design— sanitary, colorful, low in cost

•

J-M Asbestos Wainscoting provides all the advantages of tile, in a thick sheet material that can be nailed on by any carpenter, using ordinary carpenters' tools. For this reason, it is ideal for both remodeling work and new construction.

J-M Asbestos Wainscoting is made of asbestos and Portland cement, with a tough, colorful, wear-resisting surface that will stand up under the most trying household conditions. Its use adds permanent value to any home at a very moderate cost, due to the new, reduced prices of the material, and the simplified method of application.

With a variety of finishes and colors, J-M Asbestos Wainscoting offers a wide choice in the selection of wall effects for every service requirement or personal preference.

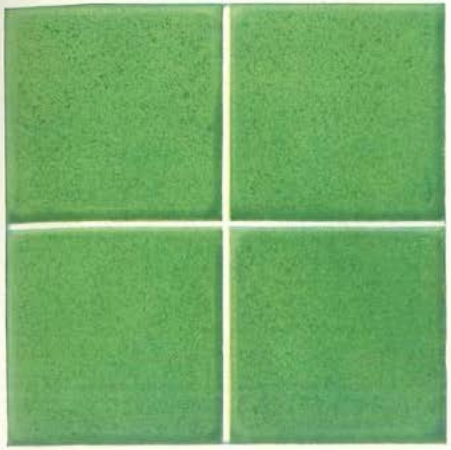






Kitchens, bath rooms, lavatories, breakfast nooks, entrance halls, etc.—these are some of the places to which J-M Asbestos Wainscoting will bring enduring beauty, that is a source of pride and satisfaction to every home owner. Its surface will not spot or stain, and its original beauty can be restored by a simple wiping with a damp cloth or a cleansing with soap and water.

J-M Asbestos Wainscoting has the effect of tile set in cement of a contrasting color. Its surface, however, will not crack or craze, nor are there any units to loosen or fall out.



Mottled Green
with white scoring



Light Green
with white scoring



Light Blue
with white scoring

The base and cap mouldings of asbestos or of wood are available in all the colors of the wainscoting and in Black, offering a choice of trim.

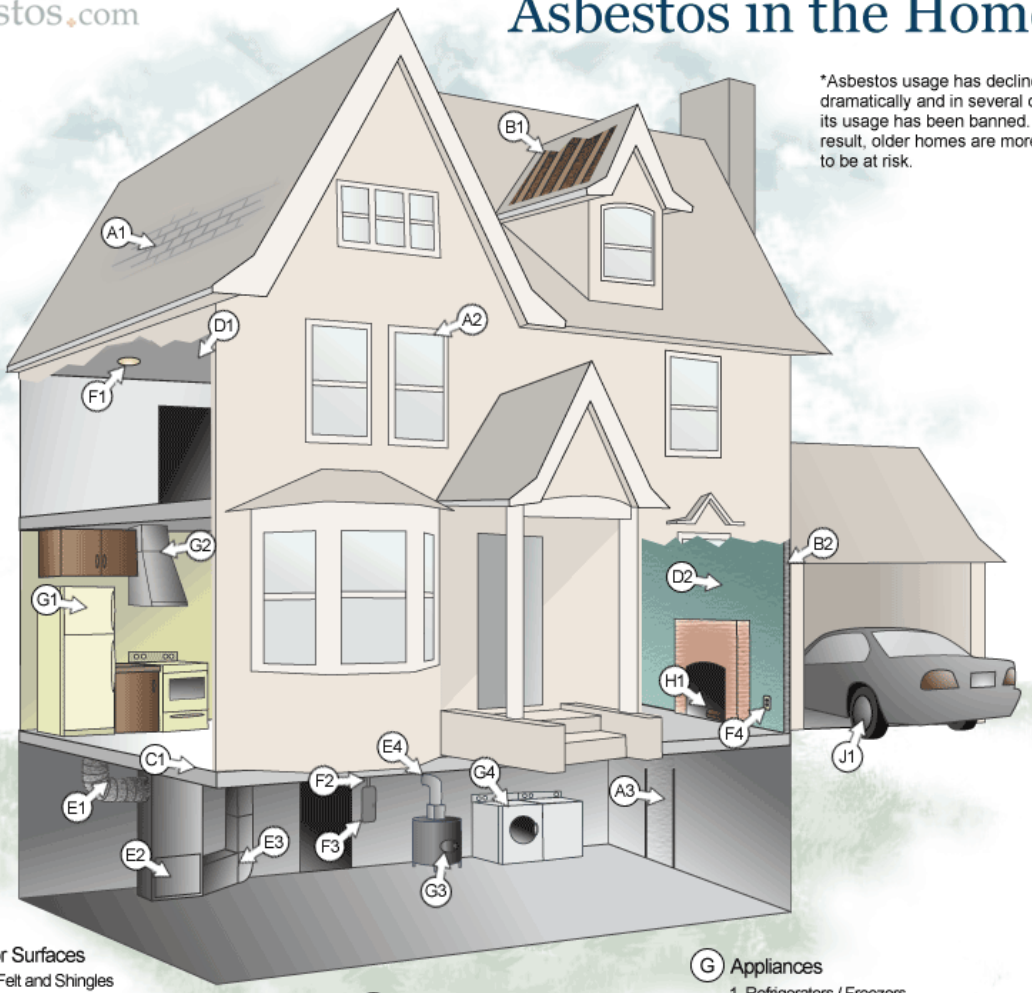
Asbestos Wainscoting in all these colors is also available without the tile design. In addition, it can also be obtained in the tile design, *semi-finished*, when it is desired to carry out some special color scheme; the lacquer or paint being applied on the job.

It is an easy job for any carpenter to install J-M Asbestos Wainscoting. Only the simplest of carpenters' tools are required. The sheets are nailed to the walls

©Asbestos.com

Asbestos in the Home

*Asbestos usage has declined dramatically and in several cases, its usage has been banned. As a result, older homes are more likely to be at risk.



A Exterior Surfaces
1. Roof Felt and Shingles
2. Window Putty
3. Cement Asbestos Board Siding / Undersheeting

B Insulation
1. Vermiculite Insulation
2. Batt Insulation

C Flooring
1. Vinyl Asbestos Flooring Material

D Interior Surfaces
1. Sprayed-on Ceiling Material
2. Textured Paint

E Boilers, Heating and Piping
1. Heat Source Covering
2. Door Gaskets
3. Duct Lining
4. Wall Gaskets and Lining

F Electrical Equipment
1. Recessed Lighting
2. Wiring Insulation
3. Fuse Boxes
4. Outlets

G Appliances
1. Refrigerators / Freezers
2. Range Hoods
3. Woodstoves (Heat Reflectors)
4. Clothes Dryers

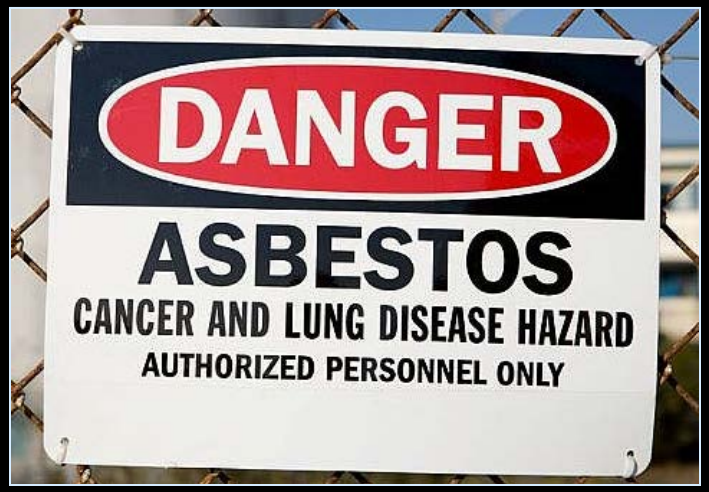
* Not Shown: Dishwashers, Toasters, Slow-cookers, Portable Heaters, Hair Dryers

H Miscellaneous
1. Fireplace Logs

J Automotive
1. Brake Linings, Gaskets, and Clutch Facings

©Asbestos.com

No Total Ban on Asbestos



- 1989: Most asbestos-containing products were banned in US
- 1991: Ban overturned, allowing uses of asbestos established prior to 1989
- "New Uses" of asbestos remain banned
- No safe level of asbestos exposure
- 10,000 deaths in U.S. annual to asbestos-related disease (under-reported)

Asbestos Siding











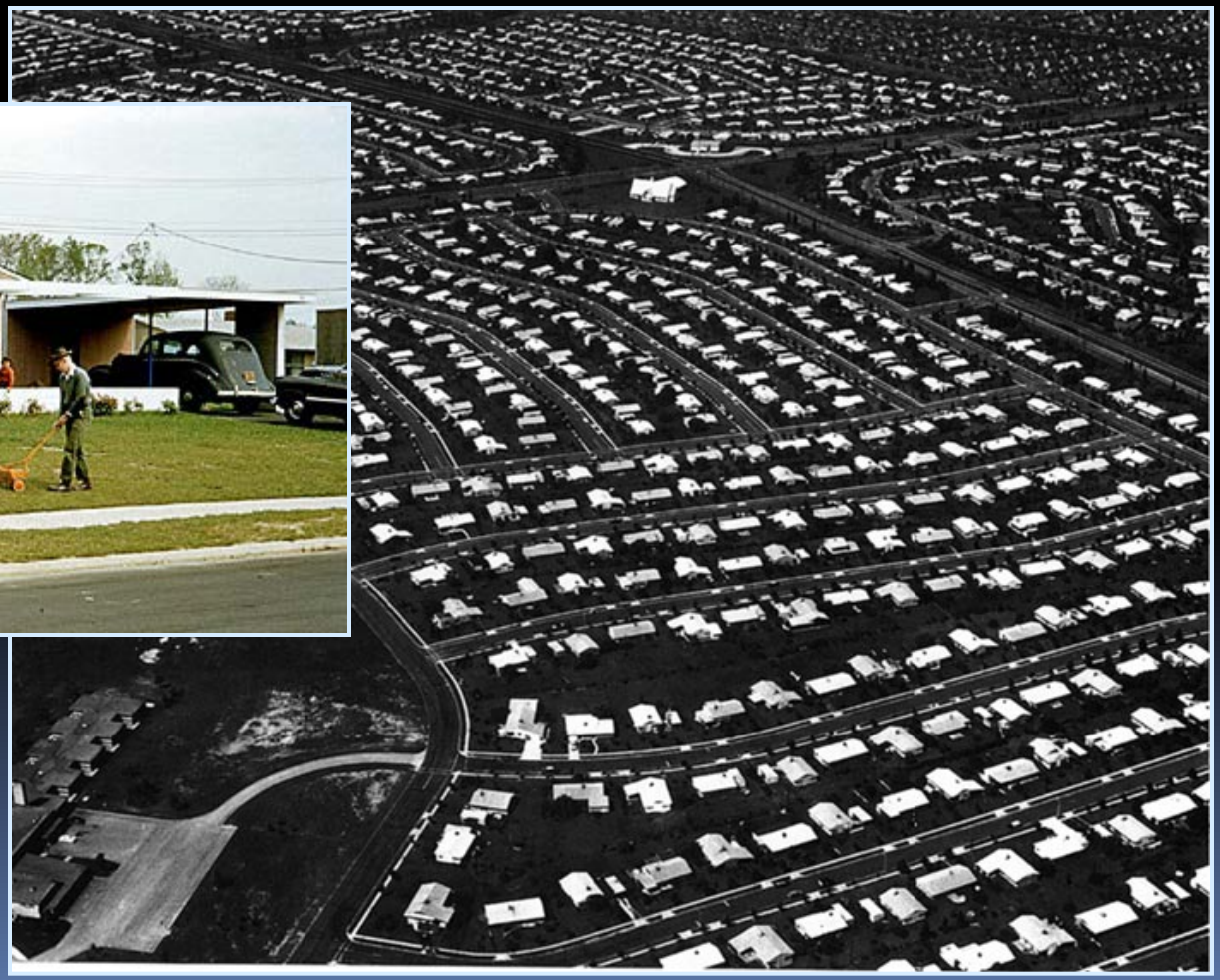
244 Inman Drive, Decatur, GA, 1940
Winona Park National Register District



Levittown, PA, 1958

5500-acre planned neighborhood; developed by William J. Levitt; all 17,311 houses had asbestos siding





Why has the little historic house not been replaced yet?



Conservation of Asbestos-Cement Products

- Not considered friable, unless severely deteriorated or subjected to drilling, sawing, sanding, grinding
- Clean with trisodium phosphate added to warm water in the proportions recommended by the manufacturer; Add bleach to remove moss or other fungi

Conservation of Asbestos-Cement Products continued

- Asbestos cement is brittle and susceptible to cracking and chipping; therefore, minimize damage by controlling the environment
- Plant shrubs or flower beds around the foundation so siding will not be damaged by lawn equipment
- Add a drip cap below the bottom row of siding to serve as a bumper
- Trim branches that might fall on the roof

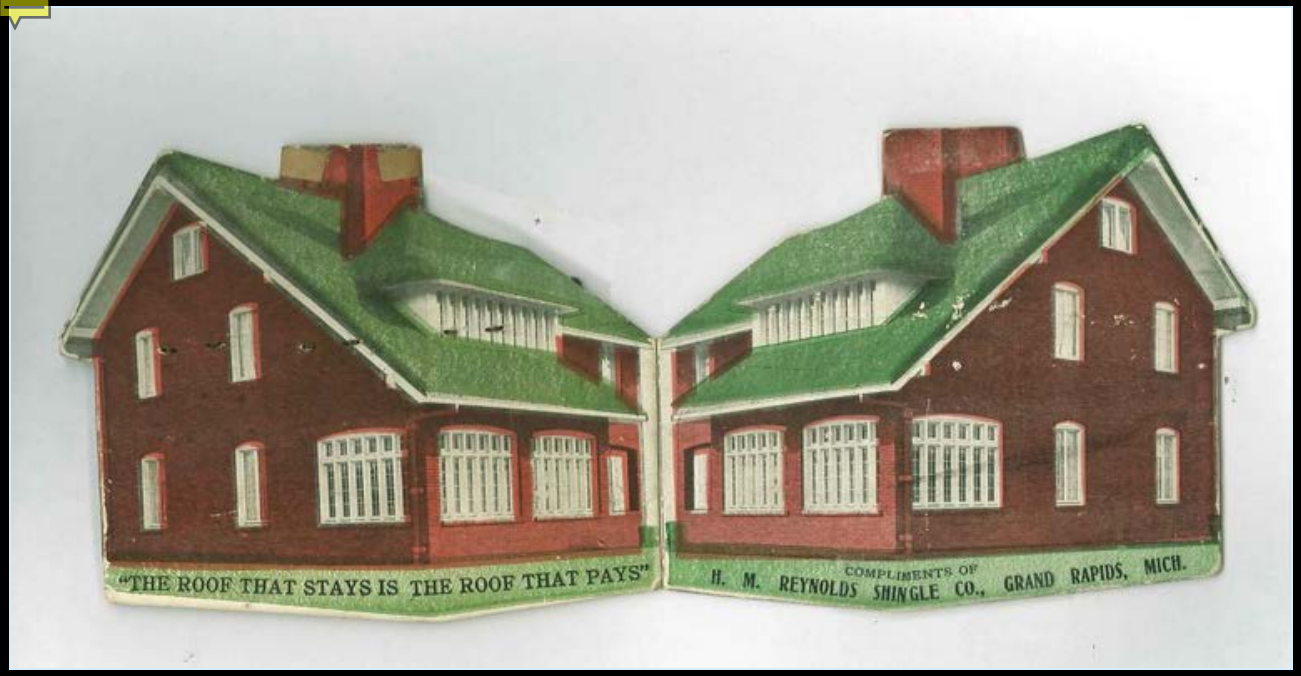
Conservation of Asbestos-Cement Products continued

- Patch hairline cracks with clear epoxy
- Large gaps can be patched with a thin grout made of Portland cement and water
- Replace damaged siding or roofing with an alternative material, such as non-asbestos fiber-cement shingles or fiberboard
- Match the original material in appearance as closely as possible

ASPHALT SHINGLES

Asphalt Shingles

- Asphalt—a bitumen, mixture of hydrocarbons + other materials made by distilling coal or petroleum
- Asphalt shingles—roof felt, coated with asphalt, colored mineral or ceramic granules
- 1840s: Composition roofing of fabric covered with pine tar and sometimes sand developed
- 1847: Rolls of felt covered with pine tar and gravel introduced
- 1903: Shingles cut from asphalt roll roofing; Earliest ones imitated wood shingles, measured 8" x 12.5"



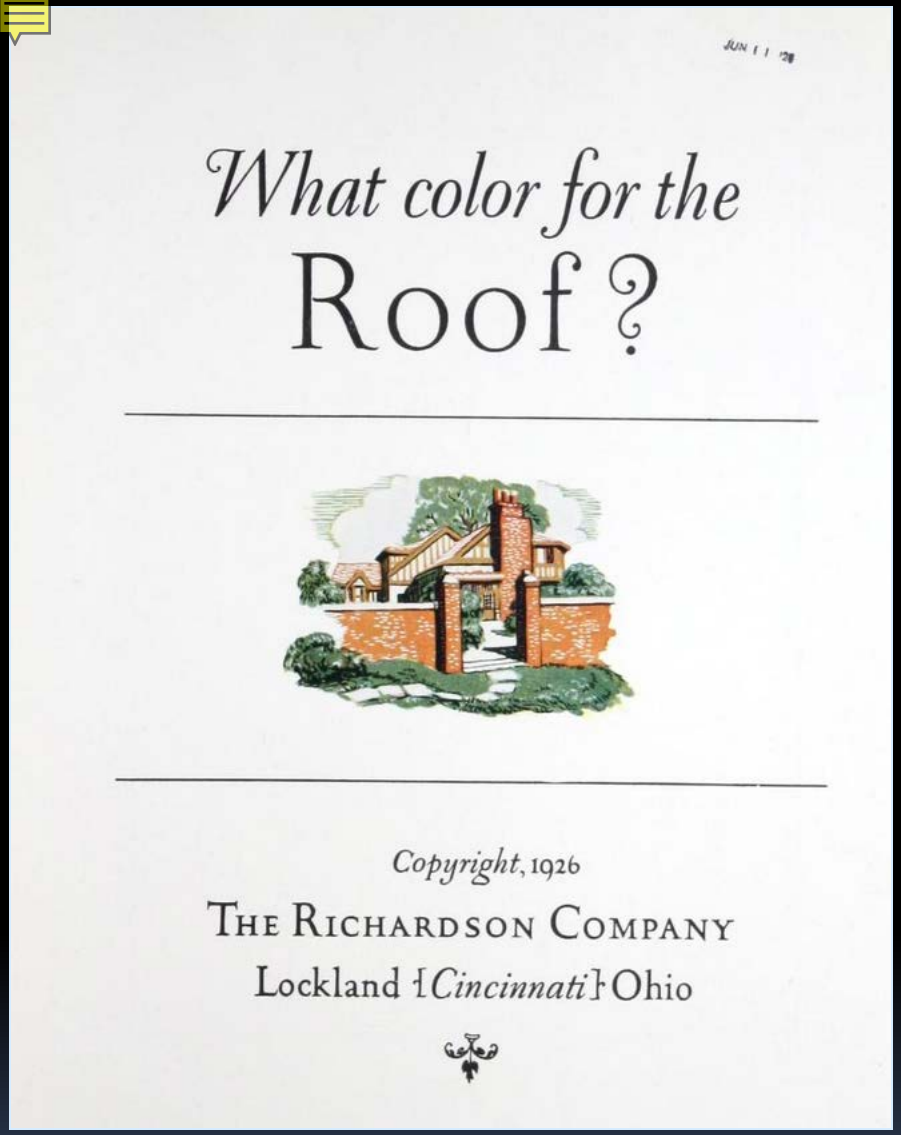
1910 Asphalt shingle advertisement, H. M. Reynolds Shingle Co.



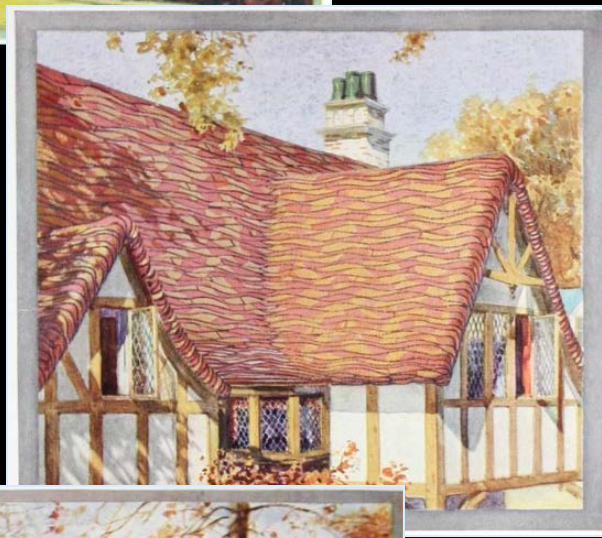
- World War I: Popular because light, inexpensive, did not use war materials
- 1920s: More shapes, colors, sizes introduced; Rectangular and hexagonal most common
- 1930s: Industry shrank. Standard 12" x 36" multi-tab shingle introduced
- 1940s-1950s: Textured shingles popular; bright blue was favorite color

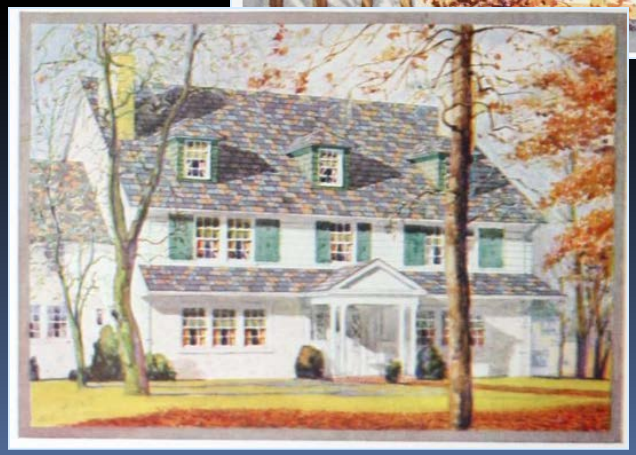


- 1970s: Glass-fiber reinforced felts made stronger shingles so they could be made thinner, and were more lightweight
- Typical asphalt shingle roof lasts about 20 years





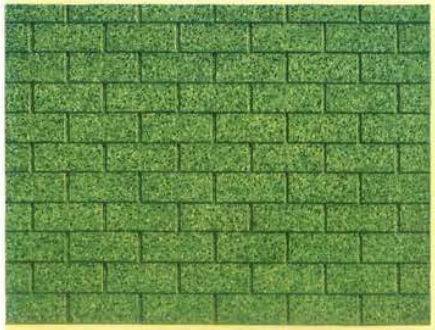




1926 catalog of slate-surfaced asphalt shingles, made with Georgia slate flakes (not granules)

THESE ARE THE BEAUTIFUL COLORS AND BLENDS OF JOHNS-MANVILLE ASPHALT SHINGLES

ASPHALT SHINGLES



Chateau Green



Fieldstone Green



Standard Red

These four standard colors have earned a prominent place in the Johns-Manville line through their appeal to those who desire roofs of a single color. Used singly, or in individually blended combinations, they make a roof that is attractive and distinctive.

These popular, pleasing colors are available in the following styles:



Standard Blue-Black



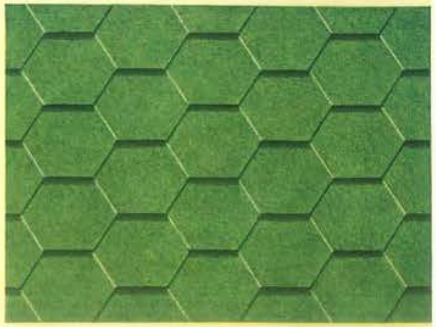
Tile Red

Fieldstone Green: *All styles.*

Standard Red: *Standard 12⅓" Hexagonal, Standard 11⅓" Hexagonal, Standard 10" and 12½" Strip and Standard Individual.*

Standard Blue-black: *All styles.*

Tile Red: *All styles except Standard 12½" Strips.*



Charmaine Green



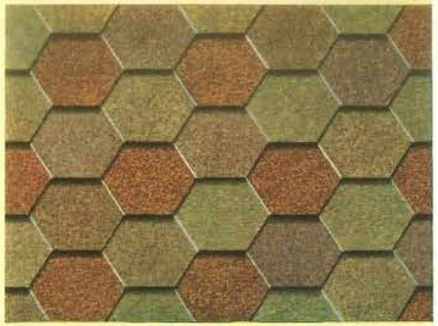
Gascony Duo-Blend



Picardy Duo-Blend



Burgundy Duo-Blend



Brittany Blend

CHATEAU GREEN: a lively tone, enriched by sparkling black—a roof which harmonizes with practically any wall coloring.

Available in Standard 11⅓" Hexagonal and Standard 10" strip.

GASCONY DUO-BLEND: a gray-green base with broad dashes of brilliant green—an effect that goes well on a house with light walls.

Available in Giant Hexagonal and Standard 11⅓" Hexagonal.



Blended Romany Reds

PICARDY DUO-BLEND: over the warm autumnal brown base, irregular splashes of yellow add variation and interest. Particularly suited to half-timbered construction.

Available in Standard 11⅓" Hexagonal.

BLENDED ROMANY REDS: Three shades of bright red that harmonize into a blend of warmth and color, suitable for many types of architecture.

Available in all styles except Standard 12½" Strips.

BURGUNDY DUO-BLEND: This attractively contrasted combination of brown, red and green goes well with small homes.

Available in Giant Hexagonal and Standard 11⅓" Hexagonal.

BLENDED NORMANDY GREENS: Four greens resembling variegated slate.

Available in Giant Hexagonal, Standard 11⅓" Hexagonal, Standard 12½" Double-coverage Hexagonal, Standard 10" Strip and Giant Strip.



Blended Normandy Greens

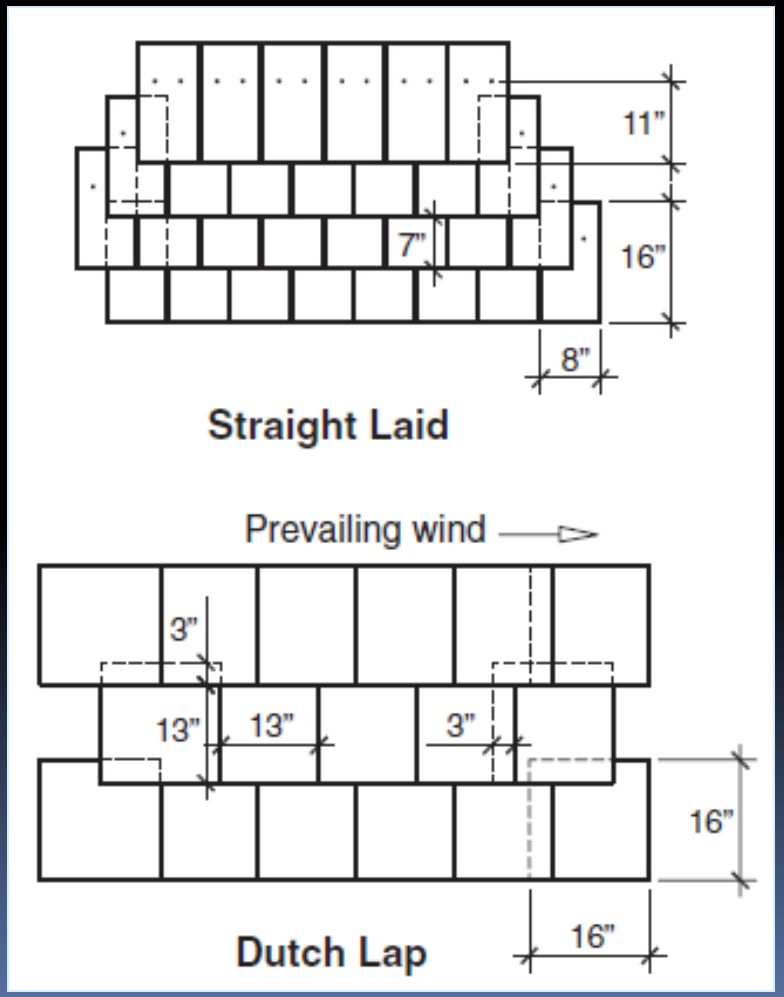
CHARMAINE GREEN: a pure, brilliant color which is richer and deeper than other greens, with almost unlimited possibilities for use.

Available in Giant Hexagonal, Giant Strip, and Giant Individual.

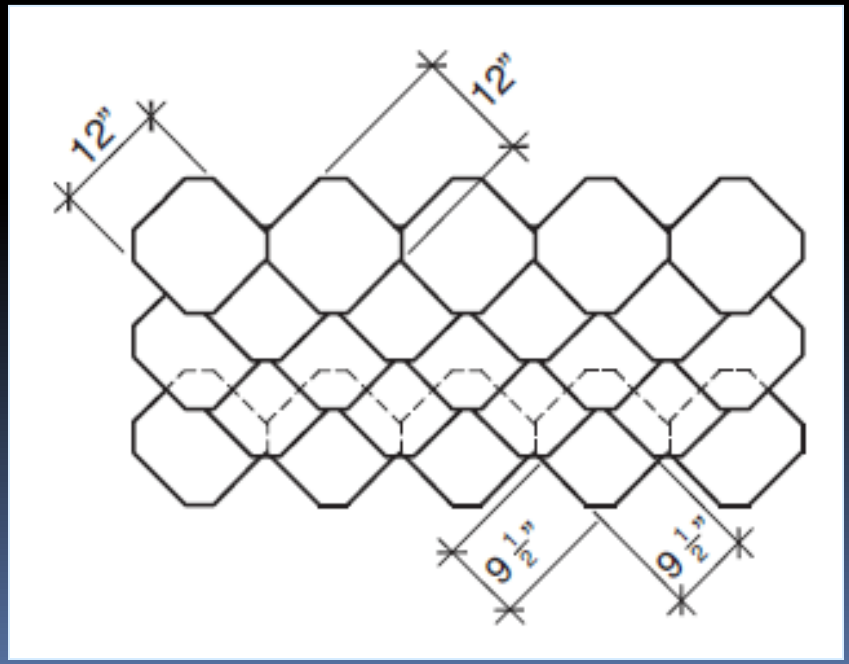
BRITTANY BLEND: Four pleasant, closely blended shades that look well on any roof.

Available in all styles except Standard 12½" Hexagonals and Standard 12½" Double Coverage Hexagonal.

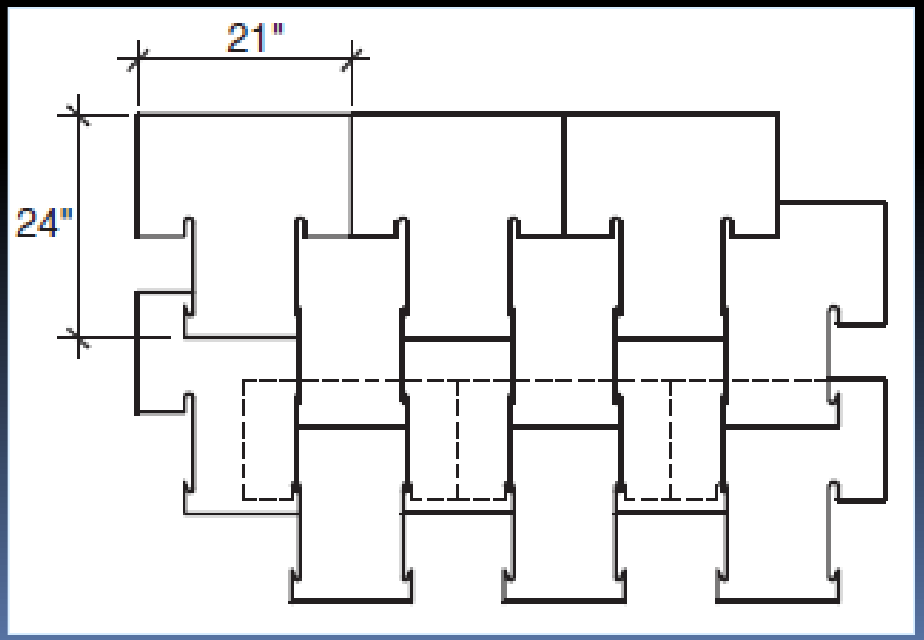
American method or "straight" shingles of the 1920s and 1930s were square or rectangular. The shingles were installed to overlap the course below. They could be straight laid, abutting adjacent shingles, or Dutch lap, overlapping adjacent shingles.

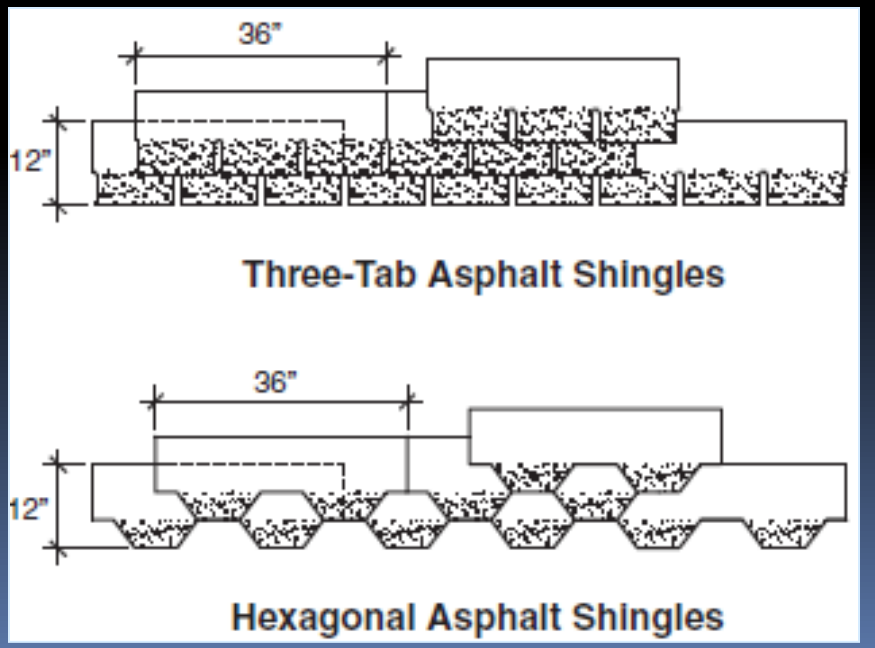


French method shingles are shaped like diamonds or hexagons in an attempt to imitate slate roofs of French chateaux. Historically, they were so large (12 by 12 inches and 16 by 16 inches were standard sizes) that they required storm anchors (hooks to hold the edges down during high winds). Because they had little overlap on their edges, French method shingles provided only one layer of roofing. This was acceptable when they were installed over existing roofing, but not in new construction as the French method provided only minimal protection of the roof deck.

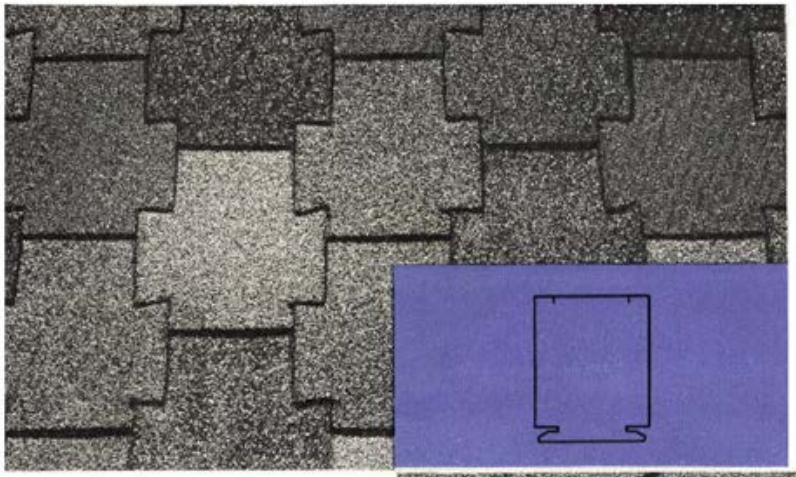


Interlocking shingles, whether installed in strips or as individual shingles, have high wind resistance and protect the roof decking better than other types. They were available by the late 1920s and were popular during the 1930s and 1940s. The complex shapes had ears, catches, and slits that interconnected with the shingle course below to create a basket weave pattern. Interlocking shingles worked well on the rolled eaves of cottage style houses (1930s and 1940s), where they evoked thatched roofs. By 1935, most major manufacturers were producing 12- by 36-inch tab shingles that looked similar to those manufactured today.





Shingle shapes manufactured by the Flintkote Company during the 1940s

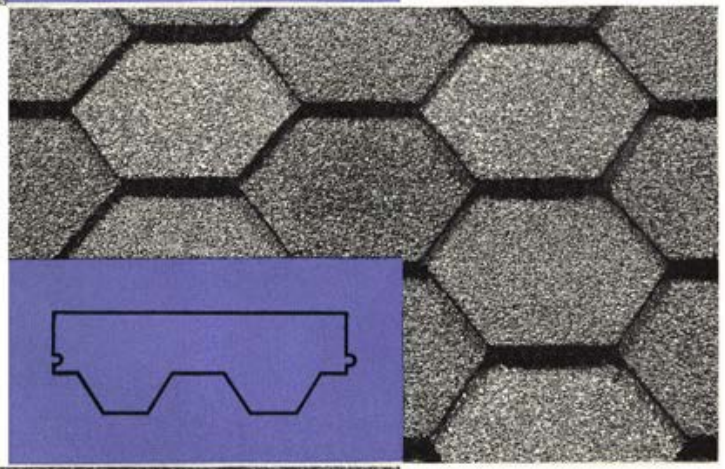


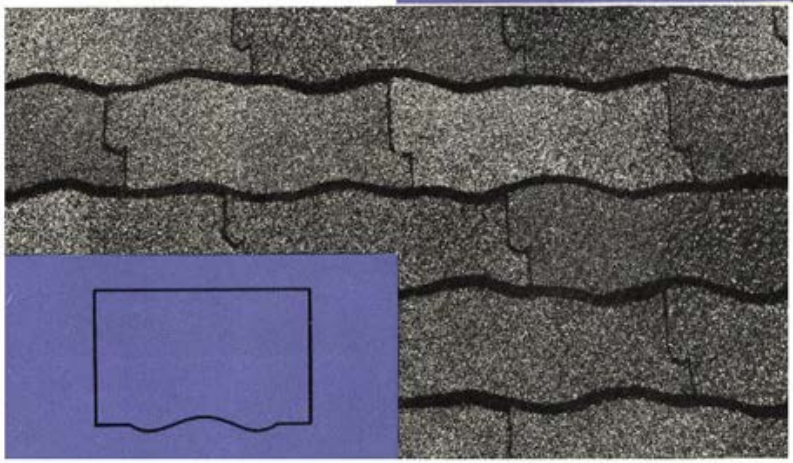
← SHURLOK

For long wear, weather-tightness, and good looks, all at a low price, these shingles are winners. They interlock to present a solid front to the attacks of weather. No place for rain or wind or snow to enter. Gives a uniform color to your roof, or a blend of individual shingles to suit your taste, in solid tones and blends such as BLUE-BLACK, CLOVER GREEN, TILE RED, KOOL-BLEND, WARMBLEND.

HEXAGON →

One of our most popular shingles . . . easy to lay, each shingle securely interlocking with its neighbor to lie flat . . . the design presents short-line edges to the weather, keeping out the rain. Hexagon Shingles make a solid, substantial, good-looking roof at a modest cost. Representative colors are . . . BUFFSIDE-GREEN, BLUE-BLACK, TILE RED, CLOVER GREEN, WARMTONE, KOOLTONE . . . See page 5.





← THATCH

Its mellow-color blends have been inspired by real, old-world thatched roofs of reeds, palm fibres and grasses. Ideal for the cottage home and budget when laid with standard exposure . . . a distinguished roof for the finest home when the exposure is decreased to give double or triple the usual thickness over the roof . . . typical colors are CLOVER GREEN, TILE RED, REED BLEND, PALM BLEND.

Asphalt shingle plus ridge-line tile; 1950s home in Phoenix, AZ



Deterioration of Asphalt Shingles

- Mineral/ceramic granules highly resistant to exposure
- Asphalt & fiberglass elements degrade → warping, buckling, blistering when granule covering is lost
- Valleys of lapped shingles fail first; use valley linings
- Failure typically with system components, not the shingles themselves. Flashing required!
- Fallen tree branches, walking on roof on a hot day can damage shingles

Conservation of Asphalt Shingles

- Regular maintenance
  - Cleaning gutters, downspouts can prevent problems
- Algae discoloration appears as dark streaks, esp. in South and East coastal regions
  - Light washing with bleach or trisodium phosphate and water
- Never scrub
- No high-pressure water treatments
- Life of asphalt shingles between 10-30 years; will eventually have to be replaced

GYPSUM BOARD (Drywall)



Gypsum Board (Drywall)

- Panel with noncombustible gypsum core encased in paper
- Lightweight, fire resistant, conducts little heat or sound, vermin-proof, easy to install
- Preferable to plaster, which takes several weeks for its three coats to dry
- Gypsum board, or drywall interior walls can be installed in hours

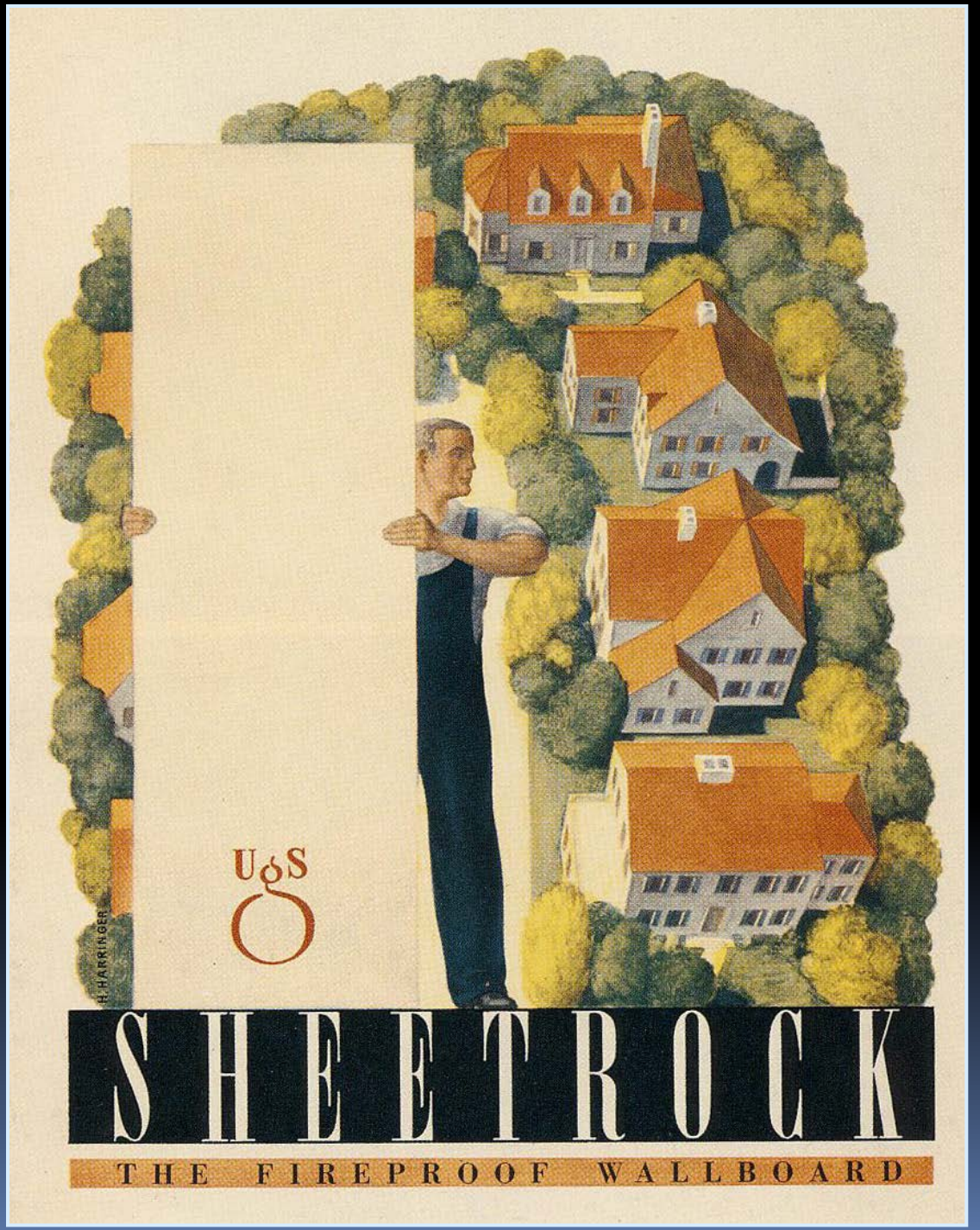
Gypsum Board continued

- 1894: First U.S. patent to A. Sackett, whose company made a 5-layer, felt paper plasterboard used as a backing for plaster applications
- 1907: Samson Plaster Board Co. produced 2-ply boards using paper instead of felt
- 1909: The two companies combined to form the US Gypsum Company
- World War I: Gypsum board used to replace flammable fiberboards in military barracks

Gypsum Board continued

- 1920s: U.S. Gypsum introduced Sheetrock — a finished wallboard surface
- World War II: Increased use due to need to conserve metal and lumber, which were used as lath for plaster walls and ceilings
- 1940s: Asbestos and glass wool added to gypsum board to increase fire-retardance

1937 advertisement by the US Gypsum Company



WHITE ROCK GYPSUM WALL BOARD

Builds Beautiful Walls Quickly, Easily, Economically!



See the smooth, unbroken beauty of White Rock Wall Board as used in this handsome living room!

WITH the rapid increase in popularity of "dry-built" construction for homes, new thousands of owners every year are making use of White Rock Gypsum Wall Board for interior finish throughout the house.

White Rock Wall Board has a core of fireproof gypsum rock, with a beautifully finished surface ready for decoration—or it can be left in its natural state for walls of distinction, attractiveness and dignity.

Or you may let White Rock Wall Board do its own decorating, by selecting one of the new grain finishes which give your room the beauty of wood paneling!



White Rock Wall Board hastens the occupancy date of a home—there's no delay waiting for plaster to dry!

• • •

You can hold a blow torch flame right against the surface of White Rock Wall Board without danger of setting it afire. Gypsum rock doesn't burn!



Page from 1940 Celotex catalog advertising gypsum wall board. Unfortunately, it contained asbestos.

Modern Italian Drywall Designs







