The Howard Banta
Alarm Clock Chapter
Chapter 178 of the National Association of Watch and Clock Collectors
www.acc178.org 2011 Volume 2

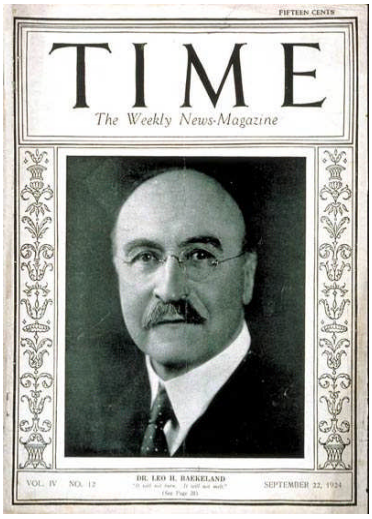
Bakelite and Celluloid
The Differences
By Julie Pelletier Robinson

People interested in plastics often wonder what the differences are between Bakelite and Celluloid. As a plastics historian, I can share those basic differences and the keys to telling them apart without getting overly technical. To begin, let's take a look at the early history of these two revolutionary materials that had such an immense impact on civilization.

John W. Hyatt – inventor of Celluloid, father of the modern plastics industry

Celluloid came on the scene during the 1860's when John Hyatt, an ambitious young inventor, was attempting to win a cash prize by creating a substitute for ivory in billiard balls. Hyatt's experiments began in 1861, and yielded success seven years later when he discovered the action of natural camphor on nitrocellulose (cellulose fiber chemically treated with nitric acid).

The result was an organic dough-like compound that, once cured until hard, could be molded into shape by the application of heat and pressure. Celluloid was the world's first successful semi-synthetic thermoplastic, but had one serious flaw. It was extremely flammable due to the high concentration of nitric acid used in its makeup.



Bakelite on the other hand, was the world's first completely synthetic thermo set plastic. It was introduced 40 years after celluloid in 1909, by Leo Baekeland, a career chemist who was initially trying to develop a durable varnish for bowling alleys. Baekeland combined carbolic acid (also called Phenol) with Formaldehyde and ended up with an amber-colored resin that, when heated, turned into a hard opaque mass.

This phenol-formaldehyde solid was ground into powder and then molded by heat and pressure into a material that was practically indestructible. Dubbed Bakelite plastic by the inventor, it was a chemical miracle and the 20th century's first genuine test tube baby.

Differences in appearance and applications play an important role in deciphering between these two plastics. Celluloid was clear in its original state and could be dyed in a variety of ways to imitate expensive natural materials. Eventually it came to mimic genuine Ivory, Tortoise shell, mother of pearl, amber, jet, coral, and even high grade linen in huge quantities.

Sheets of colorful celluloid were molded into a array of useful and beautiful things, including jewelry, ornamental hair combs, household and vanity items, billiard balls, dentures, fancy boxes, cuffs and collars. Celluloid was an affordable and convincing imitation for costly luxury materials.

Bakelite on the other hand, was a hard, durable molding material that had excellent insulating properties and thus found its earliest applications in the electrical industry. In its raw state Bakelite was a combination of ground phenol-formaldehyde and dense fiber, like asbestos or slate dust.

This made the material extremely hard, but also very dark, limiting its color range to black, brown, and maroon. Early Bakelite included electrical components, knobs, handles, and telephones

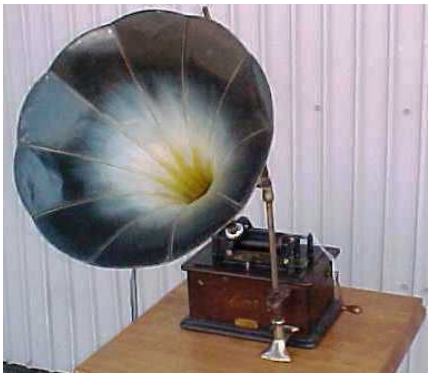
It wasn't until the 1920s that red, green, orange, white (now amber) Bakelite found its way into the home in the form of colorful and novel kitchen accessories. By 1928 catalin - a purified form of phenolic casting resin in a wide range of opaque and translucent colors was introduced. It was poured into lead molds and baked slowly to cure. When hardened, the plastic was removed from the molds, machined by hand, and then polished by tumbling and buffing.

Cast Catalin, which was more time consuming to produce and therefore more expensive than molded Bakelite, found uses from the mid-30s until just after World War II in jewelry, small personal accessories, kitchenware, and novel decorative containers. Stylish and colorful cast phenolic radio cases were produced in limited numbers up until the 1950s.

The properties of Celluloid and Bakelite differ greatly. Bakelite is a dense, durable thermo set plastic that resists heat and flame. Once molded, Bakelite and Catalin retain their shape forever. They cannot deteriorate under normal environmental conditions, and they cannot be recycled- they are here to stay.

Celluloid, on the other hand, is a thermoplastic and can easily be manipulated out of shape with the application of heat and pressure. It also burns violently if exposed to flame and will deteriorate under certain conditions due to its semi-organic nature.

In a nut shell, these are the distinctive characteristics of each plastic:
Celluloid is semi organic and subject to decomposition. It is a thermoplastic, rendering it pliable with the application of heat. Celluloid was made primarily to imitate expensive natural materials that were dwindling in supply during the late 1880s. Celluloid was fabricated in a manner that leaves telltale mold lines on many items. Celluloid emits the menthol odor of camphor when subjected to hot water.
Bakelite and Catalin are synthetic plastics made totally from chemicals. Both are thermo set, meaning that their heat-molded shape is set forever. They are flame and heat resistant and will not decompose.



Durable molded Bakelite came in a limited range of dark colors. Cast Catalin was carved and polished and exhibits no mold lines. The distinctive odor of carbolic acid can be detected from these plastics by heating the surface either with friction (rubbing a thumb against it) or with hot water.

Handifold Tissue advertisement

In 1902, just one year after the Viscoloid Company produced their first sheet of pyroxylin plastic; another industry was born, the Handifold Toilet Paper Company; their first sheet of tissue paper measured 64 inches wide and 60 feet long. J.G. Jarvis, superintendent of Viscoloid, was quoted in the newspaper as saying, “this class of paper can be used as a basis for manufacturing the Viscoloid, instead of cotton yarn which is now being used, if it could be gotten just as cheaply.”

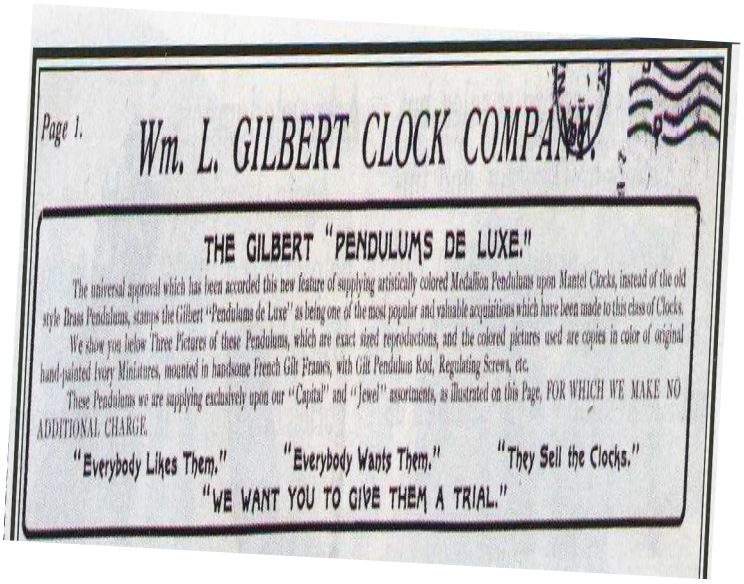
The Handifold management replied to Jarvis’s comment by stating they were indeed prepared to make tissue paper for the manufacture of cellulose nitrate by Viscoloid Company.

During the 1890s, the best supply of camphor came from Formosa, which is now known as Taiwan. Raw camphor had to be purified, so it was brought to Kobe, Japan, the camphor refining center of the world. The two camphor tins illustrated here were imported into the United States from Kobe. The plain embossed tin, valued at $15.00 – $22.00, still has a bit of the pungent smelling substance inside. The colored tin is valued between $25.00 – $30.00.

This 1-lb. DuPont camphor tin originally held 32-½ oz. tablets of refined camphor. It was manufactured by E.I. DuPont De Nemours and Co., Inc., Wilmington, Delaware. Note the DuPont oval trademark on the upper left front of the tin; it is the same mark seen on several of the DuPont/Viscoloid toys manufactured in Leominster, Mass., during the late 1920s.

History of Seth Thomas Adamantine Antique Mantel Clocks
In the 1860's, French clocks in slate, onyx or marble cases became popular in the United States. These cases were expensive, so the American clock manufacturers produced similar looking cases made of iron or wood. These clocks have become known to collectors as "Black Mantel Clocks", and were popular from 1880 to 1931.
Seth Thomas made clocks in marble cases for a short time, from 1887 to ca. 1895. They also made clocks in iron cases finished in black enamel, from 1892 to ca. 1895. Seth Thomas is well known for their "Adamantine" black mantel clocks, which were made starting in 1882. Adamantine is a celluloid veneer, glued to the wood case. Adamantine veneer was made in black and white, and in colored patterns such as wood grain, onyx and marble.

Adamantine veneer was developed by the Celluloid Manufacturing Company of New York City, and was covered by U.S. Patent number 232,037, dated September 7, 1880. Seth Thomas Clock Company purchased the right to use the Adamantine veneer in 1881.
Below are shown just a sampling of the many models of Adamantine clock made by Seth Thomas.



Page 1.

Wm. L. GILBERT CLOCK COMPANY

THE GILBERT "PENDULUMS DE LUXE."

The universal approval which has been accorded this new feature of supplying artistically colored Medallion Pendulums upon Mantel Clocks, instead of the old style Brass Pendulums, stamps the Gilbert "Pendulums de Luxe" as being one of the most popular and valuable acquisitions which have been made to this class of Clocks.

We show you below Three Pictures of these Pendulums, which are exact sized reproductions, and the colored pictures used are copies in color of original hand-painted Ivory Miniatures, mounted in handsome French Gilt Frames, with Gilt Pendulum Rod, Regulating Screws, etc.

These Pendulums we are supplying exclusively upon our "Capital" and "Jewel" assortments, as illustrated on this Page, FOR WHICH WE MAKE NO ADDITIONAL CHARGE.

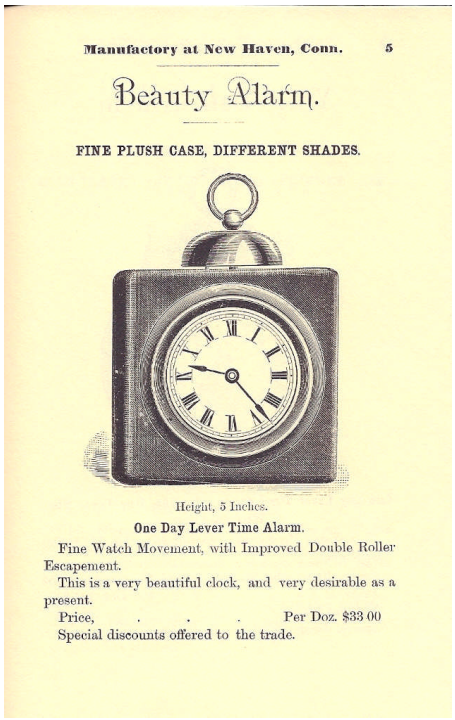
"Everybody Likes Them." "Everybody Wants Them." "They Sell the Clocks."

"WE WANT YOU TO GIVE THEM A TRIAL."

WANTED:

Any alarm clock made by THE YALE CLOCK COMPANY of New Haven Conn., ie: "SIGNAL", "BEAUTY", or "YALE BELL ALARM". Contact: Ray McGeary, 717-243 4111 or dahlia300@earthlink.net

Ray wrote: “The Yale clock Co. was in business only about 5 years in the early 1880's and information is accordingly very sparse. I have the sense that they produced mostly time-only novelty clocks and comparatively few alarms.”



Manufactory at New Haven, Conn. 5

Beauty Alarm.

FINE PLUSH CASE, DIFFERENT SHADES.

Height, 5 Inches.

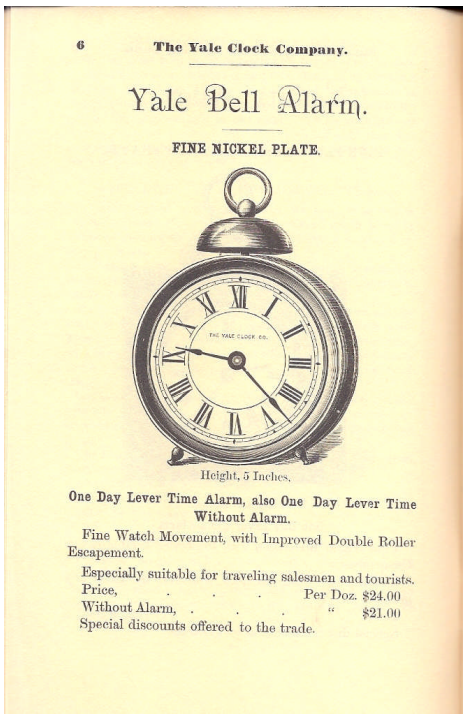
One Day Lever Time Alarm.

Fine Watch Movement, with Improved Double Roller Escapement.

This is a very beautiful clock, and very desirable as a present.

Price, . . . Per Doz. $33 00

Special discounts offered to the trade.



6 The Yale Clock Company.

Yale Bell Alarm.

FINE NICKEL PLATE.

Height, 5 Inches.

One Day Lever Time Alarm, also One Day Lever Time Without Alarm.

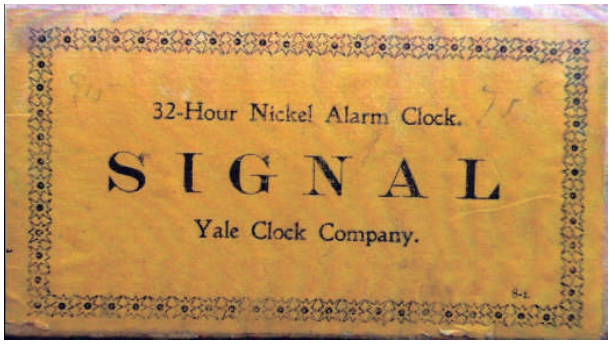
Fine Watch Movement, with Improved Double Roller Escapement.

Especially suitable for traveling salesmen and tourists.

Price, . . . Per Doz. $24.00

Without Alarm, ... " $21.00

Special discounts offered to the trade.



32-Hour Nickel Alarm Clock.

SIGNAL

Yale Clock Company.

Please send all articles, research material, items for sale or wanted, pictures of collections, repairs or questions to:

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