Graham Glass Co.

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The Graham family became involved in the glass business, when Ziba Graham became a stockholder in the Lythgoe Bottle Co. The family eventually purchased the majority of the stock (probably all of it) and renamed the business as the Southern Indiana Glass Works in 1907. The Grahams reorganized the firm as the Graham Glass Co. in 1912 and became a major producer of soda bottles, especially Coca-Cola containers. The Owens Bottle Machine Co. gained control of the majority stock in 1916, retaining the Graham family as officers. The Grahams, meanwhile, became involved in the automotive industry, and the Graham Glass Co. lost its individual identity in 1929, when Owens merged with the Illinois Glass Co. to form the Owens-Illinois Glass Co. The Graham family initiated an intricate code system on bottle heels.

Company Histories

The Graham Glass Co. was the third company in a series, all in the same location. The first was the Lythgoe Bottle Co., operated by Charles Lythgoe who had previously owned a glass factory at Bowling Green, Ohio. The Graham family initially purchased the Lythgoe Bottle Co. and renamed it the Southern Indiana Glass Works. The business evolved into the Graham Glass Co. with four locations.

Lyghgoe Glass Co., Bowling Green, Ohio (1887-1892)

Charles Lythgoe was the son of a glassblower and one himself. He and his brother, John, had been glassmen in England prior to their immigration to the U.S. in 1880. Charles had two sons, Hugh and Joe, both of whom followed him into the glass trade. Both Charles and Hugh died in 1912, Charles in San Francisco, Hugh in Prescott, Arizona. John lived at least long enough to be listed in the 1930 census. Joe remained in his father's former firm, working for the Graham Glass Co. and continuing with Owens-Illinois (U.S. Census records 1880-1930).

At some point prior to 1887, Charles and John Lythgoe leased a closed glass plant at Cadiz, Ohio, and renamed it Lythgoe Brothers. The venture did not go well, and the plant was failing, when Henry H. Clough asked Charles Lygoe to manage a newly opend glass plant at Bowling Green, Ohio. Clough, along with H.W. Morganthaler, W.H. Morton and other minor investors incorporated the Cadiz Glass Co. at Bowling Gree, although none of them had any glassblowing experience. Clough was the president, with Morganthaler as vice president, Leander C. Cole as secretary, and John H. Hankey as treasurer. With Lythgoe as manager, they renamed the business the Lyghgoe Glass Co. (Keller 1998:19; Paquette 2002:134-136; 157-159; Roller 1997).

The firm began constrution of the plant and its ten-pot furnace in June 1887 and blew its first glass on October 13, making bottles, flasks, fruit jars, and druggists' ware (Paquette 2002:134-136). On December 31, 1887, *Commoner & Glassworker* noted that "the Lythgoe glass factory is at work on 144,000 apollinaris bottles and 15,000 gallon jars. When finished these 159,000 bottles would make a glass mountain 4,000 feet high" (Roller 1997). The firm also made Mason jars, beer bottles, and butter pails. The Lythgoes had a major disagreement with the major investors in the summer 1889 (although the subject was not recorded) and withdrew from the firm (Paquette 2002:137). *Commoner & Glassworker* noted that the Lythgoe brothers had gone to Greenfield, Indiana (Roller 1994:57; 1997). We have found no information on the brothers at Greenfield, although Charles managed a glass factory in 1900, according to the census of that year.

Clough and his fellow officers renamed the business the Bowling Green Glass Co. The plant burned in early March 1890 but was rebuilt and running again by the following January. By April, the factory was producing fruit jars for Hollweg & Reese, Indiana jobbers. Something apparently went awry. (Keller 1998:19; Paquette 2002:134-139; 157-159; Roller 1994:57; 1997). For more information on Clough and his involvement with the Giles-Clough Glass Co., see the section with that name.

Lythgoe Bottle Co.,[1] Loogootee, Indiana (1901-1907)

Charles Lythgoe. William Houghton. Patrick B. Larkln. John C. Sproull. Joseph Ackerman, James K. Hall, Magness J. Carnahan, and Ziba F. Graham incorporated the Lythgoe Glass Co. on May 15, 1901, with a capital of $20,000 (*Indianapolis Journal* 5/16/1901; Poor's Publishing Co. 1921:1157). Joseph Graham was the general superintendent and secretary of the firm by at least November 1901. A union operation, the plant produced prescription and medicine bottles, liquor flasks and fruit jars (Keller 1998:19, 28; State of Indiana 1903:98).

In 1902, the plant advised that it would make fruit jars exclusively for the Wm. Glenny Glass Co. from February to June. Henry F. Brookmann applied for a patent for a "Screw Cap" on June 19, 1899, and received Patent No. 638,317 on December 5 of that year (Figure 1). He assigned the patent to the Wm. Glenny Glass Co. The main difference between Glenny's invention and the other metal screw caps on the market was a knurled to edge to provide a good grip to aid in removal of the lid.

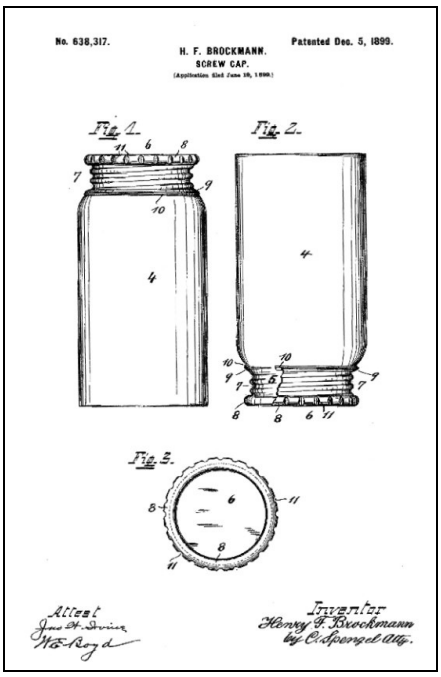

Figure 1 – Brookmann 1899 patent

William Glenny & Co. opened in 1851 as a jobber in window glass, plate glass, skylights, and ornamental glass. The firm incorporated in 1885 ass the William Glenny Glass Co. and briefly entered the fruit jar trade about the turn of the century. The business reorganized as the Glenny Glass Co. in 1989 and remains in business in 2015 (Bloomberg Business 2015; Curvier Press Club 1915).

The Lythgoe plant used gas for power in 1902 and had 65 male workers plus five boys, working under "sanitary" conditions. The firm installed a "patent gas producer" (to improve gas power), made by the Amsler Engineering Co. of Pittsburgh in late 1905 (*Engineering and*

[1] Roller (1994:57) noted that the factory was variously listed as the Lythgoe Bottle Co., Lythgoe Glass Co., and Lythgoe Fruit Jar Co. Since the "Bottle" variant was reported most often, we have selected that as our heading.

Mining Journal 1905:1227; Keller 1998:19, 28; Paquette 2002:134-139; Roller 1994:57; 1998; State of Indiana 1903:98).[2]

Southern Indiana Glass Works, Loogootee, Indiana (1907-1912)

Ziba Graham had never intended to be seriously involved in the glass business. He intended to make an investment for his family when he became one of the original investors in the Lythgoe Bottle Co. in 1901. Ziba had three sons who were later to achieve fame in the glass business: Joseph Bolden Graham was born on September 12, 1882, followed by his brother, Robert Cabel Graham on August 21, 1885, and Ray Austin Graham, May 28, 1887 (Keller 1998:15-16, 21, 28).

The corporation reorganized on December 5, 1907, as the Southern Indiana Glass Works. Although many entries in the original literature used the term "Co." or "Company," "Works" was the actual corporate title (Poor's Publishing Co. 1921:1157; von Mechow 2015). The works was located on Mill St. at Elm St.[3] There is some controversy about the date of the name change. Both Toulouse and Keller placed the date of the Graham takeover at 1905, although Keller (1998:28) cited a "local hardware store's ledger [that] indicates a billing to the Southern Indiana Glass Company which appears to be dated 1903." However, the 1905 Thomas Register (Thomas Publishing Co. 1905:103) still listed the Lythgoe Bottle Co. under the "Bottles" category. It is likely that Keller's "1903" was actually 1908.

Ziba F. Graham was president of the corporation with Joeseph B. Graham as secretary. During the first few years, the vice president revolved on an annual basis (including William F. Modes in 1907), eventually settling with Ray Graham in that position. The plant had a single continuous tank making amber and green proprietary ware and fruit jars (*American Glass Review* 1934:155; Roller 1994:58). Spurred by Michael Owens' invention of the automatic bottle machine in 1903, and the subsequent demand for higher quality bottles, the Grahams

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[2] Keller (1998:19) suggested that Graham may have gained control of the operation in 1904. If so, they did not change the name, and we doubt that it happened.

[3] This was presumably the same address as the Lythgoe Bottle Co. We found no evidence that the Grahams had changed location.

adopted the "Johnny Bull" machines (these were variations of the older Ashley machines from England, now made by Pierpont-Morgan) about 1905. By at least 1906, Joe Graham was working on his own improvements to the Johnny Bull machine (Keller 1998:21-23; Toulouse 1971:215). For more information on the Ashley machine, see Lockhart et al. 2014.

Southern Indiana Glass Works was listed as making packers' and preservers' bottles from 1907, with one continuous tank and eight rings, and the *Coffeyville Daily Journal* announced on March 9, 1908, that the firm was about to install a new tank. In 1909, the company employed 150 men and eight women, who worked 54 hours per week and 300 days per year. The plant used steam power, and the general conditions were good (State of Indiana 1911:150).

In 1912, the listing included fruit jars (Thomas Publishing Co. 1907:158; 1912:479, 2726). Even though the listings for Southern Indiana Glass continued until 1912, Keller (1998:21-23) insisted that the Grahams adopted the family name for the business in 1907. However, a letter from Joseph Graham of the Southern Indiana Glass Co. was sent to F.C. Ball on February 17, 1912, asking about four Miller machines apparently sold to Southern Indiana Glass.[4] This suggests that the Graham name was not used until 1912, the year that name officially changed (Poor's Publishing Co. 1921:1157; Roller 1994:58).

Joe Graham's first innovation was the Graham Automatic Bottle-Making Machine in 1907 (developed under license from the Louis Proeger Co. – the actual machine shop). The machine was *almost* fully automatic by 1910, still needing one man to gather the gob of glass.[5] Joseph B. Graham and Frank R. Miller (inventor and manufacturer of the Miller machines) applied for a patent for a "Means for Producing Bottles" on June 2, 1910, and received Patent

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[4] The Graham machine made small-mouth bottles (specifically soda bottles); the Miller machines produced wide-mouth bottles and jars.

[5] Toulouse (1971:215) claimed that "by 1910 the hand-transfer was virtually automatic, and by 1912 the machine was fully automatic with Graham's own feeder." Keller (1998:29), however, stated that "the promise that the Graham machine held out for becoming truly automatic . . . did not come to fruition. . . . problems were never overcome. Eventually more sophisticated and efficient machines were developed by the industry and the Graham machine became obsolete."

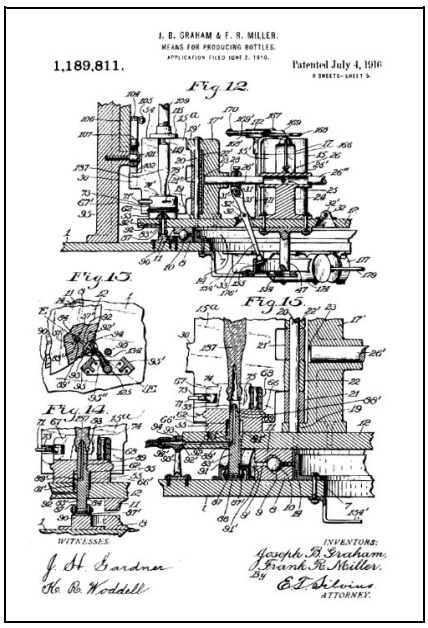

Figure 2 – Graham & Miller 1916 patent

No. 1,189,811 on July 4, 1916 (Figure 2). They assigned the patent to the Graham Glass Co. The machine was somewhat unique because of its "turn-over" design that blew the bottle in the finish-down position during the first stage of the manufacturing operation (as did the Ashley machine it grew from). The Graham company logo (1913) showed an upside down bottle superimposed over a "G" followed by the words "Blown Upside Down" (Keller 1998:23, 27-28; Toulouse 1971:215-216 – Figure 3).

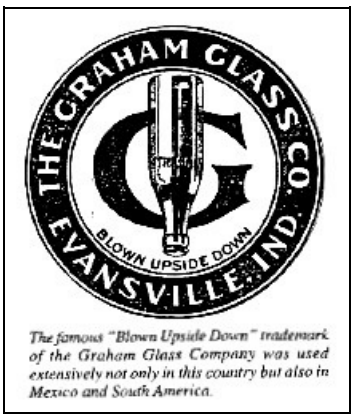

Figure 3 – Upside-down bottle logo (Keller 1998:25)

Graham Glass Co. (1912-1929)

The company again reorganized, this time as the Graham Glass Co. on April 9, 1912, with a capital of $50,000. By 1912, Joe Graham had created a functional feeder to make the machine fully automatic (Keller 1998:23, 27-28; Toulouse 1971:215-216). Although expansion into Oklahoma had begun near the end of the Southern Indiana Glass Co. period, it accelerated under the Graham era. The Grahams probably selected Oklahoma for the new plants because of an abundance of both glass-quality sands and natural gas.

The firm actually divided into two corporations: the Graham Glass Co. of Indiana and the Graham Glass Co. of Oklahoma. On December 16, 1912, the Okmulgee and Checotah plants became the Graham Glass Co. of Oklahoma (see the Discussion and Conclusion sections for more commentary). In June of 1914, the company increased its capital to $500,000. In 1916, the Owens Bottle Machine Co. acquired ownership of both corporations – full ownership of the $500,000 capital of the Indiana firm and half of the $100,000 of the Oklahoma group. The

ability of the Graham machines to make small order bottles greatly enhanced Owens production[6] (*Paint, Oil and Drug Review* 1914:8; Poor's Manual Co.1917:494; Toulouse 1971:216).

The Graham family remained involved after the Owens acquisition of the stock. Joseph B. Graham was the President under Owens, with Robert C. Graham as vice president and sales manager, and Ray A. Graham as secretary and treasurer (Poor's Publishing Co. 1921:1157). At the same time, the brothers switched focus and formed Graham Bros., Inc., designing trucks and later the Graham-Paige Motors Corp. (Curtis 1931:170). Our discussion below features the plants in the order of Graham acquisition (also see Table 1).

Table 1 – Graham Factories – Years of Operation

Factory	Open	Closed or Sold
Loogootee, Indiana	1907	1926
Okmulgee, Oklahoma	1910	1929
Chekotah, Oklahoma	1911	1923
Evansville, Indiana	1912	1929

Graham Glass Co., Loogootee, Indiana (1912-1926)

The Loogootee location, of course, was the oldest, beginning with the Lythgoe Bottle Co. and continuing with the Southern Indiana Glass Works. With the name change in 1912, the Loogootee plant remained the primary Graham location. When the Evansville location became the flagship factory in 1914, the Loogootee became less important. However, the Owens management installed one Owens machine and two Graham automatic machines to replace the two semiautomatics that the Graham brothers had operated (*National Glass Budget* 1917:8). The Owens Bottle Co. closed the plant in 1926 – after a quarter of a century in operation.

[6] Owens machines were notorious for their difficulty in changing molds. They were excellent for large orders of generic bottles or ones with embossed labels for very large operations. See Miller and Sullivan (1984) for a detailed study of the Owens machine and its limitations.

Graham Glass Co., Okmulgee, Oklahoma (1910-1929)

In 1910 – still during the Southern Indiana Glass Works days – Robert Graham established a new plant in the New Lake Park Addition at Okmulgee, Oklahoma, and began production on October 20, 1911. This location became the second largest Graham producer. When the Owens Bottle Machine Co. took over the plant in 1916, it continued to operate the same. By 1918, the Okmulgee plant used "four Graham one-man semi-automatic and one United machine on three shifts producing sodas" (Bristow 1918b:16). In 1920, Owens replaced the four semiautomatic machines previously in use with three Graham fully automatics. The Okmulgee factory became Plant No. 15 in the 1929 merger that created the Owens-Illinois Glass Co. The plant was idle in 1932, and the firm divested itself of the building in 1939 (Glass Bottle Blowers Assn. 1920:37; Keller 1998:27; Toulouse 1971:216).

Graham Glass Co., Chacotah, Oklahoma (1911-1923)

Shortly after the opening of the Okmulgee plant, the Grahams added a branch in Checotah, Oklahoma – again, still a part of the Southern Indiana Glass Works. As with the Okmulgee plant, this was initially under the auspices of the Southern Indiana Glass Works. By 1918, the Checotah plant was "being worked with five one-man O'Neill machines," making beer and soda bottles (Bristow 1918b:16). Owens sold the factory to the Illinois Glass Co. in 1923, and Illinois Glass, in turn, sold the factory to the Liberty Glass Co. in 1927 (Keller 1998:27; Toulouse 1971:216). Both of these firms are discussed in their respective sections.

Graham Glass Co., Evansville, Indiana (1912-1929)

The Graham brothers bought the former Citizen's Glass Co. in Evansville, Indiana, and reopened the plant on September 1, 1912, although the factory was not in production until October 13. The plant began its life as the Evansville Glass Co. sometime prior to 1904.[7] It was a large operation, using one1 furnace with 16 pots and three continuous tanks with 36 rings to make flint beer bottles, liquor containers, proprietary ware, packers ware, and general tableware. A.M. Weil was the president, with A.D. Booth as vice president, M.L. Mayer as secretary, S.P.

[7] Neither Citizens Glass nor Evansville Glass appear to have used manufacturer's marks, so they are of little interest to this study.

Gillett as treasurer, and W.T. Williams as general manager. The firm reorganized as the Citizens Glass Co. in 1909 and was out of business in 1911 (Roller 1996).

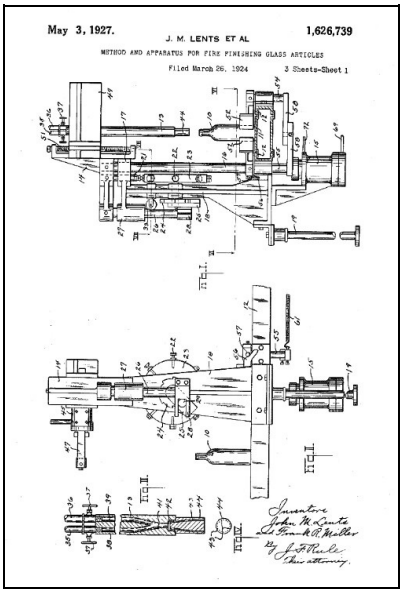
May 3, 1927. J. M. LENTS ET AL 1,626,739
METHOD AND APPARATUS FOR FIRE FINISHING GLASS ARTICLES
Filed March 26, 1924 3 Sheets-Sheet 1

Figure 4 – Lents & Miller 1927 patent

The plant became the central office for the firm by 1914. It was fully equipped with the new Graham Automatic Bottle Blowing Machines. Business grew to the point where the Evansville plant had the greatest production of any single factory in the U.S. for beer, ginger ale, soda, and general-purpose bottles. The Grahams increased the space and machinery in Evansville and exported large quantities of glass to Mexico and South America. At some point, the Grahams advertised fire polishing of the finishes, although the earliest patent we can find for the process (Patent No. 1,626,739) was issued on May 3, 1927, to John Murl Lents and Frank R. Miller (Figure 4).[8] The pair had applied for the patent on March 26, 1924 (Keller 1998:23-26, 28; Toulouse 1971:215-216). For more information about the technique, see the Discussion and Conclusions section.

By 1913, the Graham factories operated 17 semiautomatic machines (probably mostly Graham machines), making beer and soda bottles (*Journal of Industrial and Engineering Chemistry* 1913:952). On June 28, 1916, the Owens Bottle Co. bought the entire Graham Glass operation but continued to run it under the Graham Glass Co. name. Owens installed five fully automatic Graham machines in 1920 to replace the older semiautomatics (Glass Bottle Blowers Assn. 1920:37).

Along with the 1916 machine patent (see Figure 2), Joseph G. Graham applied for a patent for a "Means for, and Method of Flowing Glass" on June 14, 1917, and received Patent No. 1,353,907 on September 28, 1920 and assigned the patent to the Owens Bottle Machine Co.

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[8] This was almost certainly the same machine that Joe Graham had been working on since ca. 1905. Versions of it had certainly been in used long before it was patented. This Frank Miller was the same man who invented the Miller machines. As of this writing, we have not researched the Miller machines.

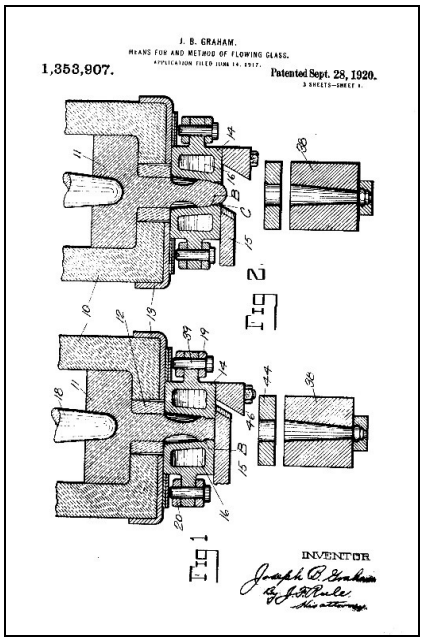

Figure 5 – Graham 1920 patent

(Figure 5). This was a delivery device for feeding the glass from the tank into the mold. A year later (April 17, 1918), Joseph G. Graham and Richard La France applied for a patent for an "Apparatus for Conveying Molten Glass" and received Patent No. 1,350,448 on August 24, 1920. This patent, too, was assigned to Owens (Figure 6). This patent was for a trough that transferred the gob of glass to the parison mold. This seems to be the type of conveyance that was used much later in the individual section machines that remain the industry standard in 2015.

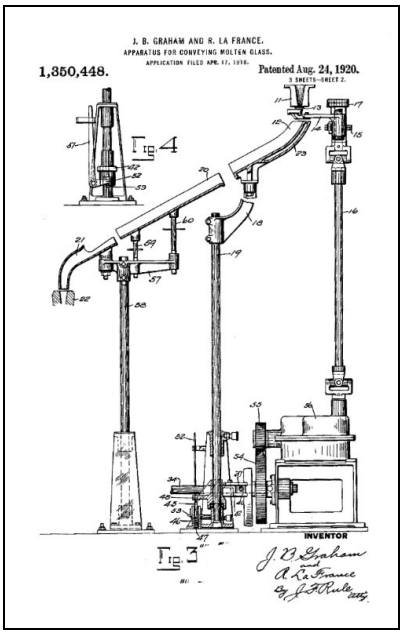

Figure 6 – Graham & La France 1920 patent

The combined factories at Evansville, Loogootee, and Okmulgee, operated four continuous tanks, making "flint and green soft drink and beverages" by machine in 1927. In 1929, the product list was modified to "soft drink and beverage bottles in standard colors" (*American Glass Review* 1927:133; 1929:97). The factory retained the Graham identity until the merger of Owens with Illinois Glass in 1929; the plant ceased production in 1932. Owens-Illinois sold the property in 1939 (Keller 1998:29; Kelly Publishing Co. 1923:1931; Owens-Illinois 1940).

Containers and Marks

We have not discovered any evidence for a mark used by the Lythego Bottle Co. If the Grahams actually had control of the firm, they had not adopted any logos by that time. The family began using marks with the reorganization that created the Southern Indiana Glass Co., and Graham products bore some kind of logo or code from that point until the firm lost its identity in 1929.

S.I.G.W. (1907-1912)

Von Mechow (2015) discussed the S.I.G.W. mark and identified the Southern Indiana Glass Works as the user. He noted two Hutchinson soda bottles with the logo embossed on the reverse heel. Hutchbook (Fowler 2015) brought the number up to five, all with the reverse heelmarks (Figure 7). Whitten (2015) also identified the mark as being used by Southern Indiana Glass. Head (2013) also noted the logo on a Koca-Nola bottle (Figure 8). Our sample is small; the mark may have been used on other types of bottles.

Figure 8 – S.I.G.W. logo (Head 2013)

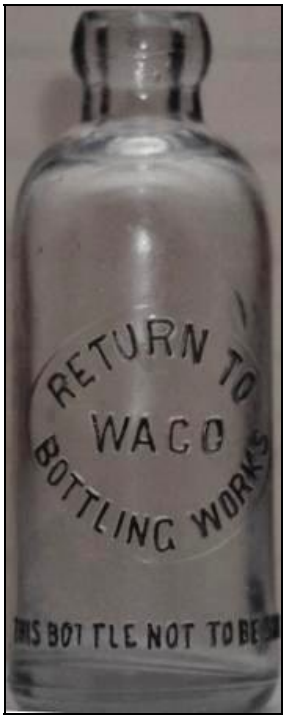

Figure 7 – Hutchinson bottle (Fowler 2015)

Upside down bottle superimposed over a "G" (ca. 1916-1918)

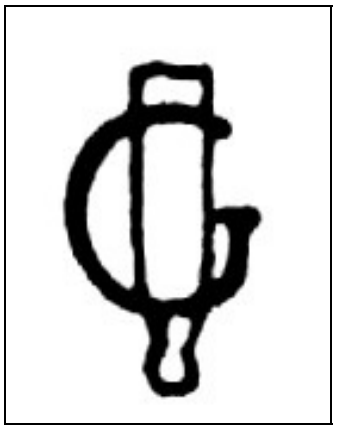
Figure 9 – Upside-down bottle (Toulouse 1971:213)

Although Toulouse (1971:213) illustrated an upside down bottle superimposed over a "G" as used by Graham, the logo was rarely embossed on bottles (Figure 9). Bill Porter has discovered nine examples – from five states, all in the South – where the mark appeared on the bases of a straight-sided Coke bottles (Figure 10). Three examples had embossed heelmarks, including"18" and "LP" on one example; "48" and "LP2" on another; and "LS" on a final one. It is likely that the "L" indicated the Loogootee plant, the "P" was the 1916 date code; and the "S" was a code for 1918. It is also possible that "P" indicated proprietary, and "S" stood for

Figure 10 – Upside-down bottle (Bill Porter)

standard. Based on bottle characteristics, Porter estimated the dates of manufacture as ca. 1914-1916. Keller (1998:25) illustrated the logo as used in company advertisements (see Figure 2). The mark was probably more often used in ads and promotional items like paperweights (Figure 11).

Figure 11 – Paperweight (Antiques Navigator)

The timing of the "P" date code (1916) is interesting. Graham began producing hobble-skirt Coke bottles in 1917. In addition, 1916 is the year that Joe Graham and Frank Miller received their patent for a bottle machine – blowing the parison stage upside down. The company apparently moved to the more complex codes discussed below later that same year.

The Graham Codes (1912-1931)

Keller (1998:28) made the first attempt at unraveling Graham's complex set of heelcodes:

> Bottles produced in Loogootee carried a "model" or order number on the bottom edge followed by a suffix such as LP, LS, or LG (e.g. 513 LS). Bottles produced at the Evansville plant employed a similar coding system. The model or order number was followed with the letters EG and the date (year), e.g. 2436 EG-29. The last two digits indicate the year of the original order (2436 EG-29 would refer to Evansville, 1929), not necessarily the date of manufacture.[9]

Our analysis showed that the complex codes used on Graham soda bottles generally consisted of four parts: Plant Codes; Bottle Type Codes (later replaced by a simple "G" for Graham); Mold Codes; and Date Codes. Plant codes consisted of a single letter that identified the plant:

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[9] This does not fit with our empirical observations. For example, Southwestern Coca-Cola Bottling Co. used the exact same bottle with codes of OS 249 G 20 and OS 249 G 23. This indicates that the "20" and "23" are date codes for the year of manufacture rather than the original order. Further, Porter (2009) has identified numerous instances where the second number of the code has been oversrtuck. For example, a "22" date code will have been changed to "23," although the "3" remains visible if carefully examined.

L = Loogootee, Indiana (1907-1926)
O = Okmulgee, Oklahoma (1910-1929)
CH = Checotah, Oklahoma (1911-1923)
E = Evansville, Indiana (1912-1929)

The second letter (usually following immediately after the plant code but occasionally separated by a space) initially described two bottle types: P = Private Mold (or Proprietary); or S = Specialty (or Standard). Often, a single "G" for "Graham" (or possibly General) was added somewhere within the code or replaced the bottle-type letter.

The third code was a model, catalog, or order number that consisted of one to five numerals. Finally, a date code was used on virtually all bottles. These date codes followed two different patterns discussed below.

Figure 12 – Evansville heel code

The vast majority of the codes were embossed on bottle heels and were always in very thin-lined fonts. In 1930, some of the date and plant codes migrated to the bases, although the other codes remained on the heels (Figures 12 & 13). A few other glass houses, such as the Root Glass Co., also used these thin-lined fonts. It is virtually certain that Owens-Illinois continued to use the Graham codes until the molds wore out. As the plant phased in new molds, they were certainly embossed with the Owens-Illinois logos and codes.

Figure 13 – Evansville base code

The earlier codes used a variety of patterns, usually the form described above. The patterns for the later codes, however, varied by location, with the Oklahoma plants using one format and the Indiana factories using another:

Plant Code Type Code {space} Model Code {space} Numerical Date Code – Oklahoma
Model Code Plant Code {space} Type Code (or "G") Numerical Date Code – Indiana

Figure 14 – Okmulgee heel code

Figure 15 – Evansville letter heel code

Note that the spacing generally followed the above model but could vary. For example, a typical Oklahoma mark was OS 1413 R (Okmulgee, Specialty, model number, letter date code for 1917 – Figure 14) and a typical example from Indiana was 576ESR (model number, Evansville, Specialty, letter date code for 1917 – Figure 15) or 1865 EG 25 (model number, Evansville, General or Graham, 1925 – Figure 16). However, there could be a space between the plant and type codes, and any two codes could also be immediately adjacent to each other.

Figure 16 – Evansville number heel code

Figure 17 – Chacotah heel code

Chacotah used a CH code to identify the factory followed by a model number then the date code. We have not seen an example with a model code. Often, the plant appended a two-digit date code at the end of an earlier letter date code (Figure 17).

Date Codes (1916-1930)

Although there may be occasional exceptions, the Graham code system almost always included date codes. Graham apparently went through three phases:

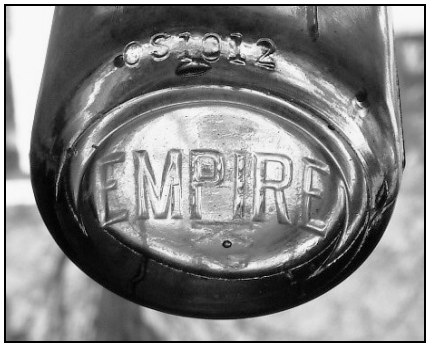

Figure 18 – Heelcodes with no date code

Plant, type, model code (1912-1915 – Figure 18)
Plant, type, model and letter date codes (1916-1919 – e.g. see Figure 14)
Plant, type, model and two-digit numerical date codes (1920-1930 – e.g. see Figure 17)

Bill Porter first discovered that the final letter in the code sequences could be a date code, since "P" was the 16th letter of the alphabet. Thus:

P = 1916
Q = 1917
R = 1918
S = 1919

Heelcodes with all of these letters have been found, and comparisons with known factory dates for soda bottlers in Arizona, Southern New Mexico, and El Paso, Texas, match perfectly with the letter date code system (e.g., see Lockhart & Miller 2008:84). Hypothetically, there could be a "T" in the system (for 1920), but we have been unable to find an example in literally more than 100 bottles. Graham almost certainly began the next phase (numerical codes) in January of 1920.

Because the letters are small and sometimes indistinct, mis-recording is common. For example, we originally recorded a code of "OP5 37-0" that did not quite fit into this dating scheme. Closer inspection, however, revealed that the "0" was really a "Q" – the date code for 1917. Mistaking the "Q" of a zero is quite common. Similarly, several recordings of "O5" are probably "OS."

The codes were often divided. This could include "EG576" on one mold half and "G23" on the other. Even with codes on the same mold half, parts of the code could be spread quite a distance from another part. Toward the end of the company, the Evansville plant sometimes used an even greater divided code system. One code included "4059E" on the heel with "G29" on the base. These are still the typical late Graham code sequences, but the date segment of the code (plus a letter) was moved to the base. Occasionally, the entire code migrated to the base. One example was embossed "G1145S / 30E" (see Figures 12 & 13). In all cases we have recorded, the use of a basal mark occurred after the merger that created the Owens-Illinois Glass Co. As noted above, this reflects the use of old molds. The company, however, was incredibly inconsistent in the sequencing of the codes.

There was also a transitional period, where Graham used old molds but added the new, two-digit, system, e.g., "OS 215 S / 21" and "CH 243S G21" (see Figure 17). In the first case,

the “21” was added below the original code; in the second, “G21” was appended to the end of the code. The “OS 215 S / 21” is of particular interest. It was on an El Paso, Texas, Triangle-brand soda bottle made by Graham for the Tri-State Beverage Co. Tri-State ordered several bottles from Graham, and one of them was marked “OS 215 S” (indicating 1919). A later bottle had the same code with the “21” appended below it. This leaves no question that the two-digit code was added later. Graham seems to have rarely (if ever) obliterated an old, letter date code when a new, numerical date code was added.

The Evansville plant apparently sent some of its molds over to the Okmulgee factory in 1925 and 1926. Porter (2009) discovered several hobble-skirt Coca-Cola bottles where the Evansville “E” had been overstamped with the Okmulgee “O” on the heelmark. Each had a date code of either “25” or “26” on the heel. Possibly, the Okmulgee plant had too many orders and needed help. The Evansville factory continued making hobble-skirt bottles until at least 1927, when Coca-Cola required a different mark system.

Because Graham was an important manufacturer of Coke bottles, there is one more important aspect of the code system to address. While we do not have a sufficient sample for most bottles types, we know the model codes for two styles. Mike Elling contributed codes from Chero-Cola bottles that were consistently made by the Evansville plant and used “46” as the model code.

Porter (1996:4; 2009) provided information about hobble-skirt Coke bottles, where the numbers were more complex. Prior to 1919, the Okmulgee plant used the number “105” to indicate the hobble-skirt bottle (shortening that to “5” in 1919), while the Chacotah factory used “9.” Meanwhile, the Evansville unit used “576.” Probably because Evansville was the home office after 1912, “576” became the universal number for Graham plants ca. 1925.

It is also of interest that Graham only used these complex codes only on the first style of Coke bottle, embossed on the side with “PAT’D NOV. 16, 1915.” When the Coca-Cola company demanded a change in logo style in 1928, Graham simultaneously made the switch to the second style of hobble-skirt bottle (See GRAHAM section below).

Codes, such as "30E G11439," are also important. This was the year *after* the plants had become part of the Owens-Illinois group. Thus, Owens-Illinois continued to use the Graham code system for at least part of 1929 and 1930. It was likely that Owens-Illinois filled existing Graham orders and/or continued to use the molds until they wore out. We have noted both empirical and historical evidence for each of these types of extensions several places in this Encyclopedia.

LP, LS, or LG (1912-1926)

Keller (1998:28) noted that these marks were used by the Loogootee factory, Graham's original plant. Porter (1996:4) added an "LSQ" mark for Loogootee – found on hobble-skirt Coca-Cola bottles. The "Q," of course, was a date code for 1917. In notes on his unpublished database, Porter (2009) made a good case that "Q" was a "frozen date." In other words, he found no Coke bottles with "LSR" or "LSS," although some had the later addition of "G 20" in addition to the "LSQ" to indicate a manufacture in 1920 (and dates up to 1922). It is also interesting that the Loogootee plant used the "S" designation for Coke bottles (e.g., "LSQ"), where the Okmulgee factory used the letter "P" (e.g., "OP 5 G 20"). That seems to indicate that Loogootee considered the bottles as "Specialty," where Okmulgee saw them as "Private mold" (assuming that is what the letters meant).

Because Loogootee was Graham's initial plant, a beginning date for the mark could occur earlier than at the other factories. However, the earliest date code we have discovered is "P" (1916), although a very few bottles exist with no dated codes. The last heelcode recorded by Porter (2009) for Loogootee was for 1920, and he only found a single example. This suggests that Loogootee ceased production of Coke bottles in early 1920. We have found few examples of Loogootee codes on soft drink bottles (or any other kind).

OP, OS, or OG (1912-1930)

The Okmulgee plant opened in 1910, and bottles with these codes were almost certainly used shortly after the opening. We have found a number of soda bottles with OP codes that had no date codes of any kind. There are too many of these to explain them away as errors. It is thus probable that the Okmulgee factory began using the plant codes and model codes at some point

prior to 1916. One bottle from El Paso, Texas – embossed OS 1012 on the heel – was probably made in 1913 based on the context of the bottle within a sequence (see Figure 18). An unusual early Okmulgee code was OP 37 A (Figure 19). We have no idea what the "A" was meant to indicate.

Figure 19 – Unusual Okmulgee code

As with the other plants, numerical date code use began in 1920. At least one bottle from this plant had a 1930 date code. Lockhart (2006:23) recorded a bottle used by the Magnolia Coca-Cola Bottling Co. of El Paso, Texas, with a code of "30E G11439" embossed on its heel. As noted above, it was common practice for companies to continue using the marks of plants they had purchased until existing orders had been filled or molds wore out. Thus, date codes are common a year after a company no longer exists. Graham lost its individual identity in the September 29 Owens-Illinois merger, so a 1930 date code is not unexpected.

CH (1916-1923)

Graham opened the Checotah plant in 1911, but the use of date codes probably did not begin until 1916 – as with the other factories. Our only examples of Checotah date codes include "S" and/or "21" codes only (e.g., "CH 243S G 21" embossed on the heel of an El Paso soda bottle). The "S" indicated 1919, and the "21" equaled 1921. The Owens Bottle Co. sold the plant to the Illinois Glass Co. in 1923, the latest date we can expect.

EP, ES, or EG (1916-1930)

The Evansville factory was the last of the Graham plants, purchased by the family in 1912. As with the other factories, date codes began use in 1916, with numerical codes starting in 1920. Like Okmulgee, the Evansville plant survived the Owens-Illinois merger, although it lost its individual identity in the process. Porter (2009) only recorded Evansville marks on hobble-skirt Coke bottles until 1927, when the Coca-Cola company required a change in mark styles (see next entry). Evansville marks continued to be used in other venues (e.g., El Paso soda bottles) until 1930, and the plant continued to make Coke bottles, even though the next mark did not include factory designators.

GRAHAM (1928-1929)

Figure 20 – G.G.CO. Hutchinson (Fowler 2015)

In 1928, following the Coca-Cola edict, Graham made a change in logo style to "GRAHAM" embossed in larger letters on the heels of hobble-skirt Coke bottles. Simultaneously, Graham moved to the second style of hobble-skirt bottle embossed with "PAT'D DEC. 25, 1923" on the central labeling area. The new method no longer indicated which plant made the bottle. A single bottle in the Porter collection was embossed "31 GRAHAM G29." The mold was probably originally used in 1929, almost certainly prior to the September merger that created the Owens-Illinois Glass Co. The mold was likely used again in 1931 with the new date code added; the old date probably remained as an oversight.

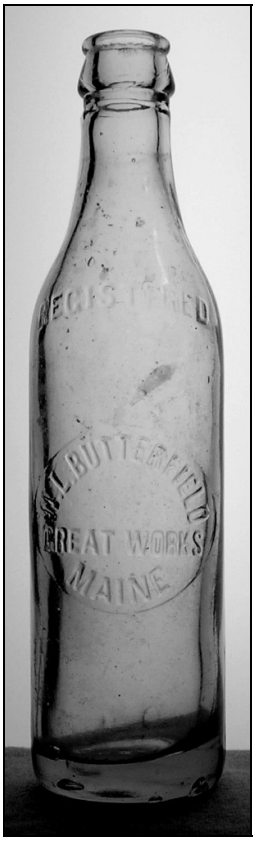

Figure 21 – G.G.CO. bottle

Porter (2009) only recorded date codes for 1928 and 1929 with this logo style. Bottles made in 1930 by the Evansville plant were identified by the Diamond-OI logo and a return to the small, thin lettering for a date code of "30E."

G.G.Co. (1912-1914)

Figure 22 – G.G.CO. logo

According to Hawkins (2009:239), the G.G.Co. mark was applied to the heels of Hutchinson-style sodas and other bottles by the Glenshaw Glass Co. Hutchbook (Fowler 2015) recorded a single bottle embossed "G.G.CO.12" on reverse heel – also an example in the Zang Wood collection – and "G.G.CO.25" on the back heel of a champagne-style soda bottle (Figures 20-22). Both bottles were machine made.

Seams on the bottle suggest that it was made by either an Ashley or a Graham machine. Both Glenshaw (1908) and Graham (1905) adopted the Ashley machines. Although either firm *could* have used the logo, we consider Graham the more likely choice. The marks were relatively scarce, so they were probably only used for a short period. The four-year 1912-1916 period fits perfectly into the Graham sequence, immediately prior to the adoption of the more complex Graham codes. In view of the Graham codes with no dates (discussed above), it is likely that Graham only used the GGCo logo during the first year or two (ca. 192-1913) then switched to the code system. Glenshaw, on the other hand, is documented as using the G-Square mark from 1904 to the end of the company in 2004. There is no intuitive reason to assume that Glenshaw used another logo. For more discussion, see the Glenshaw Glass Co. section.

Hobble-Skirt Coca-Cola Bottles

The Graham hobble-skirt Coca-Cola bottles are a study unto themselves. Each of the four Graham plants (Chacotah, Evansville, Loogootee, and Okmulgee) produced hobble-skirt bottles, and each marked them with the typical plant codes (CH, E, L, and O, respectively).

The sales territories for the four plants are revealing, and these may be generalizable to the full production of the plants. Checotah only made bottles for Oklahoma and Texas Coca-Cola franchises. Okmulgee engulfed the Chacotah territory, spreading west as far as central Arizona (with two outliers at Los Angeles and Bakersfield, California), north to Southern Nebraska, and east along Missouri, Arkansas, and Louisiana. The Loogootee territory only went as far west as St. Louis, South to Sumpter, South Carolina, north to upper New York and Detroit, Michigan. Evansville, however, covered most of the country, from Key West, Florida up to Maine on the East Coast, through upper Michigan, South Dakotah, and Montana to Spokane, Washington. The line meandered down from Spokane through northern Utah, northwestern New Mexico and into southeastern Texas (Figure 23).

The Evansville plant may have actually made a few molds for hobble-skirt bottles in 1916. Porter (2009) noted a single bottle from Evansville with a code of "ER" – with the "R" modified from a letter "P" (P = 1916). There is no indication, however, that any hobble-skirt bottles were actually made during 1916. Also see Lockhart & Porter (2010) for more about the chronology of hobble-skirt Coca-Cola bottles.

The Graham company seems to have entered into Coke bottle production slowly. Loogootee seems to have been Graham's main producer of hobble-skirt bottles (with the "Q" date code) in 1917. Porter's 2009 database only noted a single "Q" code from Evansville and only a few from Okmulgee. However, the entire 1918 production (signified by the "R" code) was very small and had shifted to Evansville.

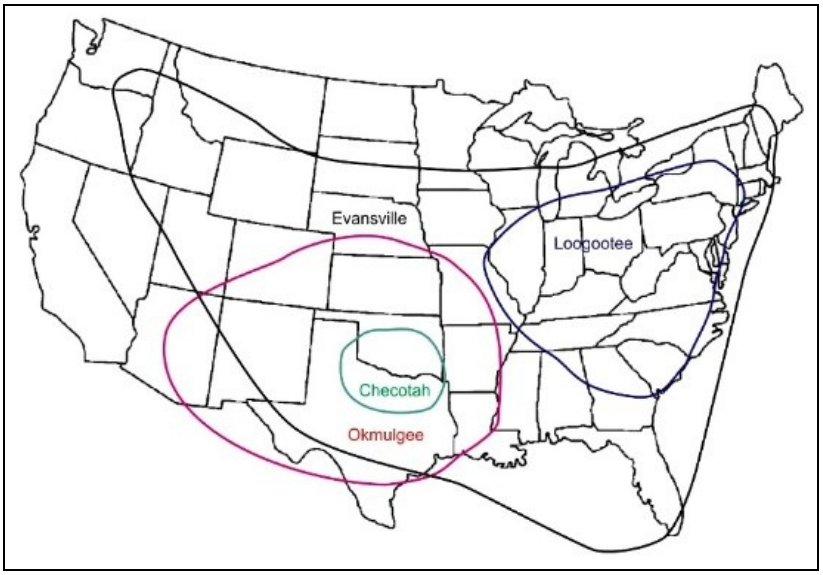

Figure 23 – Graham territories

Similarly, the company made another shift in 1919, with the very short run of Coke bottles made at Okmulgee ("S" code). Production increased slightly in 1920 (with the introduction of two-digit, numerical date codes), with hobble-skirt bottles made at both Okmulgee and Evansville – along with a few at Loogootee. In 1921, Evansville only made hobble-skirt bottles for three franchises, but the western production (specifically Oklahoma and Texas) shifted from Okmulgee (making no Coke bottles that year) to Checotah with a few bottles made at Loogootee. This was the last year for hobble-skirt manufacture at Checotah.

From 1922 to 1926, Evansville Coke bottle production skyrocketed. Okmulgee also made numerous bottles during the period, but Loogootee only made bottles for a single franchise. This was the end of Coca-Cola bottle production at Loogootee. Toward the end – 1925 and 1926 – Evansville was apparently unable to keep up with the demand and shifted some production to Okmulgee. Some of the Okmulgee bottles during those two years had the Okmulgee "O" stamped over the "E" from Evansville. The final year of hobble-skirt production (prior to the shift to the GRAHAM logo) was 1927, and all bottles that year were made in Evansville.

An Unusual Coke Bottle

One Coca-Cola bottle, marked "PAT'D DEC. 25, 1923," was embossed "G899 31 <0> 30E" around the heel (with plenty of space between the embossings)[10]. This bottle is an illustration of the reuse of old molds. The Graham codes were already on the bottle, so the engraver left those alone, peened out or otherwise removed an apparent "29E" (under and slightly behind the "31), added the <0>, and added "30E" to the right of the OI symbol. The following year, an engraver added "31" almost on top of the erased "29E." Thus, this set of molds was used for three years in a row, with minor alterations (1929-1931).

The 29E almost certainly represents late 1929, after the merger created Owens-Illinois, and Graham Glass lost its individual identity. Graham had switched to the "GRAHAM" logo on the heel, followed by a two-digit date code in 1928 and continued to use the system into 1929. This bottle must have been made by Graham engravers, now Owens-Illinois employees, who reverted to the old Graham code style.

Discussion and Conclusions

Toulouse (1971:215) and Keller (1998:15-28) were both confused about the transition dates between the Lythoe Bottle Co. and the Southern Indiana Glass Co. as well as the next change to the Graham Glass Co. The incorporation data tell the story, with dates of 1907 and 1912, respectively. All the sources understood the Owens 1916 takeover and the end of the Graham name with the formation of Owens-Illinois in 1929.

The Graham family branched out into a total of four locations, beginning with Loogootee, Indiana, the home of the Lythgoe Glass Co. After the reorganization of 1907 that formed the Southern Indiana Glass Works, the family built a branch at Okmulgee, Oklahoma, in 1910 and another at Checotah, Oklahoma, the following year. The family purchased a plant at Evansville, Indiana, in 1912, concurrently with the name change to the Graham Glass Co.

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[10] We use "<0>" to indicate the Owens-Illinois Glass Co. mark of I in an elongated diamond superimposed over an "I" in an oval.

Although the use of the GGCo logo (possibly 1912-1914) is controversial, there is little question that the Grahams began developing their complex code system on bottle heels about 1913 and adopted their first date code in 1916, using a single letter, ranging from "P" (1916) to "S" (1919). At the beginning of 1920, the Grahams adopted two-digit, numerical date codes. The plant codes are synonymous with the first letter of each plant's name, except Checotah which used a "CH" code.

Hobble-skirt Coke bottles followed the same pattern, with occasional oddities (e.g., the frozen "LSQ" date that was apparently used from 1917 to at least 1920 at Loogootee). Graham also followed the Coca-Cola edict of 1928 and adopted the "GRAHAM" logo for two years.

Fire Polishing

As noted above, the Graham Glass Co. adopted fire polishing the finishes of its soda bottles at some point. Fire polishing used a flame to slightly melt the finish of a bottle to "erase" the seams or fins at the rim and upper part of the side of the finish. The idea of fire polishing began in the early days of machine manufacture, when the molds were comparatively crude. These often produced horizontal seams that interfered with the sealing of crowns or continuous-thread finishes. Fire polishing of crown finishes supposedly created a much better seal.

In conjunction with the use of the Graham machine (or the Ashley machine), this has the potential to confuse the dating of some bottles. Since these machines blew the parison stage upside down, they left no machine scars on the bases – one of the major indicators of machine manufacture. A casual researcher could look only at the base and upper finish of a bottle and conclude that it was mouth blown, when, in fact, it was made on a Graham machine with a fire-polished finish. However, the most important single indicator of machine manufacture is a horizontal seam encircling the base of the finish (or, occasionally, lower on the neck or shoulder). With the exception of press-and-blow milk bottles (where the horizontal seam encircles the center of the finish), this horizontal seam below the finish appears on all machine-made bottles.

Future Research

One intriguing idea should be examined more closely by future researchers. Three items do not seem to fit together very well – at least with currently available sources. The Graham brothers opened the factory at Okmulgee, Oklahoma, in 1910, followed by the plant at Checotah in 1911. Both Toulouse (1971) and Keller (1998) furnished these dates, although we have been unable to verify them by primary sources. Keller's footnotes, however, suggest local sources for his information. Therefore, it is likely that these dates are valid, suggesting that the Oklahoma plants were opened during the last two years of Southern Indiana Glass Works operations.

Next, the Graham Glass Co. incorporated on April 9, 1912, two years after the opening of the Okmulgee plant; Okmulgee and Loogootee were specifically listed in the incorporation announcement – although Checotah and Evansville were not. Every mention we have found for the Okmulgee factory – no matter how small – has attached the location to the Graham Glass Co., *not* the Southern Indiana Glass Works.

Finally, there were two corporations, one for Indiana and another for Oklahoma. Oklahoma on Company Archive.com stated that the Graham Glass Co. of Oklahoma, incorporated on December 16, 1912. The big remaining question is: Why did the Graham brothers create two corporations? Numerous glass firms historically have had branches in other states while remaining only a single corporation. In addition, did the Grahams incorporate a second segment of the Southern Indiana Glass Works as an Oklahoma corporation in 1910? Even more intriguing, did the family actually incorporate as an Oklahoma firm under the Graham Glass Co. name in 1910? Although some of these questions are likely red herrings, we hope that some future researcher will be intrigued sufficiently to check them out.

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