

The Bottles and History of the Heye Family Glass Works

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The Heye family of Obernkirchen, Germany, was incredibly successful in the glass industry. From Hermann Heye’s initial investment as a German glass wholesaler in 1819, he built the business into one of the major glass houses of the world. With world-wide exports, Heye’s descendants – including Ferdinand Heye, who broke with his father’s company to form a rival business – continued to expand into today’s giant production units.

Histories

Johann Conrad Storm and Friedrich August Becker (1799-1843)

On July 17, 1799, the Electorate of Hesse granted Johann Conrad Storm permission to build a glass factory outside the gates of Obernkirchen, Germany, ca. 40-50 km (ca. 25-30 miles) west of Hannover. Storm immediately began building his plant with two furnaces, lehrs, and outbuildings to manufacture green bottles. His main sales venue was the town of Bremen, ca. 100 km (ca. 62 miles) away. A victim of Napoleon’s export restrictions, the factory was sold at auction in 1822. Friedrich August Becker acquired the plant for 5,000 Thaler and demolished it. Becker had built the Wendthöhe glass house at nearby Stradthagen in 1817 and rebuilt the former Storm plant at Obernkirchen as the Glashütte Schauenstein (Heye-Glas 1999:12-16; 2012; Reference for Business 2012).

Hermann Heye Glasfabrik, Obernkirchen (1843-present)

The Early Years

Born in 1792, Caspar Hermann Heye created the Hermann Heye company, a jobber (wholesaler) in glass products, at Bremen in 1819. By 1821, Heye was a major trading house

and was the primary sales agent for Becker's glass plant. Heye became a partner in the Obernkirchen glass factory, by then called F.A. Becker & Co., in 1823. A hurricane created so much damage in 1827 that the buildings had to be rebuilt (Heye-Glas 1999:13-16; 2012).

In 1840, Heye opened a subsidiary marketing center in Hamburg (Heye-Glas 1999:16-17). Both Bremen and Hamburg were international seaports near the North Sea coast along major rivers (the Weser and the Elbe) and were ideally suited for exports going to other European countries, the United States, and the rest of the world. The location of most Heye plants along the Weser River situated them to ship glass products by barge to Bremen (personal communication, Horst Klusmeier, 2/25/2008).

On December 10, 1843, Caspar Hermann Heye became the sole proprietor of the former Becker plant, newly renamed the Hermann Heye Glasfabrik. Heye instituted a beneficiary fund for his employees, widows, and orphans in 1847. He also established a policy that only one of his sons could hold the managing director position in the organization. Accordingly, his eldest son, Friedrich August Hermann Heye (also called Hermann), joined the firm in 1851 – almost certainly in training to succeed his father at a later date. Because he was barred from the family business, the youngest son, Ferdinand August Heye, established his own glass factory at Gerresheim (Genealogienetz 2011; Heye-Glas 1999:17; 2012; Kammermann 2007:22). The history of the Gerresheimer plant is recorded below.

Expansion and Export

H. Heye continued to expand, purchasing Becker's plant at Stradthagen in 1855 and the Steinkrug glass works near Hannover in 1859. By at least the 1860s, the company was exporting bottles to markets as far away as South America. One specialty was blue bottles with ground stoppers for chemical products – especially popular in South and Central America. Caspar Hermann Heye died in 1864, and his widow took control of the company (Heye-Glas 1999:18-19; 2012).

Since Caspar Hermann Heye's eldest son, Hermann, had died in 1858, another son, Friedrich Carl Theodore Heye, became the plant manager in 1871. Heye built a new plant at Nienburg in 1873 – the most modern of its type. Also on the Weser River, the plant was just a

barge-trip away from the port at Bremen. Soon, Heye installed a Seimens, continuous-tank furnace in addition to the initial pot furnace (Genealogienetz 2011; Heye-Glas 1999;; 2012).

The Anheuser-Busch Brewing Association, located at St. Louis, was the first to adapt the pasteurization process to bottled beer in 1872, and that led to a thriving export business from Missouri to the western territories of the U.S., South America, and other locations. Initially, two St. Louis glass houses opened, primarily to fill orders for export beer bottles to Anheuser-Busch. By 1880, the demand had outstripped the local market, and Adolphus Busch, the guiding force of Anheuser-Busch, used bottles made in Illinois, Pittsburgh, and other venues (Lockhart 2007).

Anheuser-Busch had filled 189,000 bottles of beer in 1880. The *Crockery and Glass Journal* (1881:24) noted that “this year they will go beyond that, and have been unable to find bottles enough in America. Consequently, they sent to Europe for an enormous quantity, now *en route*.” Since both Eberhard Anheuser and Adolphus Busch were of German extraction, the European factory was probably that of Hermann Heye in Germany. The large quantity of Heye bottles found in U.S. 1880s contexts brings that speculation to near certainty.

Clark (1949:499) noted that “German bottles were said to be used extensively about 1882 by Milwaukee brewers” – another group that exported large quantities of bottled beer to the western U.S. territories. By February 1886, the *American Glass Worker* (1886:2) noted that Anheuser-Busch “imports regularly from 110 to 150 crates of bottles per week from Germany” (again almost certainly from Heye) and inferred that “some six hundred American bottle blowers are in enforced idleness” because of the imports.

The Tariff Act of 1890, generally referred to as the McKinley Tariff, was passed on October 1 of that year. The Act increased import duties as much as 50% – effectively striking a death knell for German glass exports to the U.S. The Act was effectively repealed by the Wilson-Gorman Tariff Act of 1893 – at least for its effect on the glass industry (Wikipedia 2012a; 2012b). By this time, numerous American glass houses made export beer bottles – enough to fill the still-growing need of the breweries. We have found no evidence to indicate that Anheuser-Busch ever again ordered German bottles – probably because of the increased U.S. production. German beer bottles virtually disappeared from American archaeological contexts by the 1890s.

Heye expanded into the eastern part of Germany in 1884, taking control of the Glasfabrik Annahütte at Niederlausitz and branched into coal mining with the Heye Braunkohlenwerke Annahütte in 1888. The 1890s were apparently uneventful (Heye-Glass 1999:24; 2012).

The Machine Age

In 1901, Heye installed the first semiautomatic bottle machines at Nienburg and added similar technology to the Obernkirchen plant soon after. When the Owens European Bottle Machine Co. of Toledo – a subsidiary of the Owens Bottle Machine Co., manufacturer of the world’s first fully automatic bottle machine – began the licensing process in Europe, the firm’s representative set up a demonstration machine in England in 1907. The initial license went to the Rheinahr Glassworks, exclusively to make Apollinaris bottles (Biram 1958:21N-28N; Heye-Glas 1999:24-28, 92; Turner 1938:254).

The Option Agreement of August 5, 1907, would have allowed three German companies, the A.G. Gerresheimer Glashüttenwerke, under Ferdinand Heye; the A.G. Für Glasindustrie of Frederick Siemens; and the Handelsgesellschaft H. Heye Glasfabrik to manage the European license. Note that two of the three plants were establishments of the Heye family. However, a separate agreement was presented on November 15, 1907, (signed on November 28) between the Owens group and the Verband der Flaschenfabriken GmbH. (generally referred to as the “E.V.”) that included a much larger group of factory representatives. Heye almost certainly installed the first machines the following year (Biram 1958:21N-28N; Heye-Glas 1999:24-28, 92; Turner 1938:254).

On April 23, 1910, the *National Glass Budget* presented “Bottle Machine Statistics” that included “Machines in Foreign Countries” (*National Glass Budget* 1910:1). Germany had the most machines:

Gerresheim	2
Zinzig	6
Hamburg	1
Nienburg	1
Dresden	1
Straulau	1
Rinteln	1

The War Years

About 1910, Heye began producing glass balls (fischnetz-kugeln) for use as fishing net floats. These kept the top lines of nets afloat and open. Heye expanded again in 1913, purchasing a plant at Flensburg. Friedrich Carl Theodore Heye died in 1916, and his son, Fritz – a partner since 1898 – gained control of the firm. World War I was followed by a period of extreme inflation, leading in part to the world-wide depression in the early 1930s. As a result of the economic crisis, Fritz Heye closed the Nienburg plant in 1931, followed by Wendthöhe and Steinkrug in 1932. Fritz Heye died in 1937, and his son, Theodor, became the managing director (Heye-Glas 1999:24-27; 2012).

Theodor Heye died in 1940 and was followed in succession by his younger brother, Friedrich – who acted as the representative for his mother, Elizabeth, the actual owner. In 1942, Elizabeth Heye instituted the Association of Support to provide pensions for retired workers and widows of the Heye operations. Elizabeth and Friedrich were able to continue production during World War II by using women as auxiliary workers. However, the plant closed from April 1945 to July 1946 (Haye-Glas 1999:28; 2012).

Production on a single furnace at Obernkirchen resumed in 1946, but the reorganization of Germany by the Allied Forces had removed the eastern plant from Heye's control. With the formation of the German Democratic Republic (East Germany) in 1945, Annahütte became a state-controlled factory and remained so until 1990. A large portion of the Obernkirchen production concentrated on dishes and chamber pots made of green glass to aid in the recovery of the post-war economy. By ca. 1948, the firm was using five tanks (Heye-Glas 1999:28-29; 2012; Wikipedia 2012c).

Recovery, Reorganization, and More Expansion

The Heye family expanded its product line in the 1950s, including tumblers, preserve and other jars, demijohns, tableware, and a large variety of bottles. The plants also instituted “non-fade coloured labels” – similar to the Applied Color Labels used in the U.S. since 1934. Friedrich Heye retired in 1956, leading to a reorganization of the firm, with Dr. Gerhard Rose as the managing partner – the first without the Heye name. Hans-Heinrich Baum and his wife,

Klara Freyja, purchased 60% of the Heye stock in 1958, modernizing the plant and installing the first Individual Section (IS) machines (Heye 1999:32-36; 2012).¹

Heye first produced non-returnable beer bottles in 1965 and light-weight beer bottles – nicknamed “snobby” – in 1968. The 0.33 liter bottle weighed only 135 grams. The container is listed in the Guinness Book of World Records as the lightest 0.33-liter beer bottle in the world. Also, under Baum’s management, the firm again expanded. By the mid-1960s, Baum had instituted the Heye-International division, spreading Heye technology – especially light-weight containers – globally (Heye-Glas 1999:38, 42; 2012).

Heye-Glas again expanded in 1971, with the opening of a new factory at Gemersheim / Pfalz. The following year, the firm completed a licensing agreement with the Kerr Glass Mfg. Corp., Los Angeles, for Heye lightweight glass technology. This led to the adoption of the lightweight Heye bottle by the Anheuser-Busch Corporation. Heye then provided the technology to construct a glass plant, Verrerie, for Source Perrier of Languedoc, France, in 1974 – to produce the distinctive bottles for the sparkling water (Heye-Glas 1999:39-43; 2012).

Heye-Glas installed a large flint tank at Obernkirchen in 1983 and acquired another plant at Niederlausitz in the following year. In 1982 and 1985, the H. Heye Glasfabrik had two factories, one at Oberbirnkirchen, the other at Germersheim. The plants made “one-way & returnable beer & beverage, food, juice, liquor, milk, mineral water, wine, chemical & pharmaceutical containers in flint, green & amber glass. Specialists in narrow neck press & blow process, waste heat recovery in furnaces, designing & building of complete glass plants” (*Glass Industry* 1982:34; Heye-Glas 1999:39; Perrine 1985:26).

Following a long-term relationship with Riardo Gallo, of Marinha Grande in Portugal, Heye acquired stock in the firm in 1985. Heye continued its expansion, instituting Heye America in 1987 with its headquarters in Marion, Indiana, and a merger with the American National Can Co. Although we have not discovered the exact nature of the relationship, Heye-Glas signed a contract with Anheuser-Busch in 1989. This may have been the actual adoption of the lightweight beer bottles discussed above (Heye-Glas 1999:46-49; 2012).

¹ This reorganization may have instituted the use of the term “Heye-Glas.” We have not discovered a reference to the name prior to the 1960s.

Heye-Polska opened at Poznan, Poland, in 1992. The firm next acquired an interest in Sotancro, a Portugese glass plant, two years later and became the majority stockholder in the factory – primarily a producer of food jars and pharmaceutical containers – in 1997. Heye-Glas joined with Heineken, the world’s second largest brewery, to create Heye-Glas Nederland at Moerdijk, Netherlands, in 1996. Initially, Heineken, owned 33% of the stock, with the remainder in possession of Heye-Glas. The plant was used almost exclusively to produce green beer bottles for Heineken. By 1999, Heye-Glas operated ten plants in Germany, Portugal, the Netherlands, Poland, and the United States (Heye-Glas 1999:50-53; 2012).

Bankruptcy and More Reorganization

The popularity of the plastic bottle combined with environmental taxes, an increase in energy prices, and a corresponding drop in glass container sales forced Hermann Heye KG into bankruptcy in 2001 – right after the celebration of the 200th anniversary of the Obernkirchen plant. Because of the bankruptcy, Heye divested itself of its Portugese, Dutch, and Polish holdings in 2002. Initially, the Dutch brewer only owned one-third of Heye Glas Nederland, but the brewing firm acquired the remaining stock in the factory during the divestment (Beverage Daily 2002; Heye-Glass 2012; Wikipedia 2012a).

The Heye firm sold its remaining assets – both Obernkirchen and Germersheim – to Ardagh Glass, Ltd., an Irish glass manufacturer, on January 1, 2003, and this business retained the Heye-Glas name. In 2009, Heye merged with Busch & Spreen with a plant at Nienburg. The firm continues to design and build glass factories under the name Heye International GmbH in 2016 (personal comm., Horst Klusmeier, 6/21/2012; Heye-Glass 2012; 2016; Wikipedia 2012).

Containers and Marks

The Hermann Heye Glasfabrik used a rich variety of marks. These often included location names, which helps a bit in dating. Currently, we do not know whether the large variation in these marks reflects mold makers’ whims or intentional design changes. If they are the latter, they may be closely datable. The former – and most likely explanation – however, would be entirely random. Even with the former possibility, however, the bottles are datable within the contexts of manufacturing changes.

ADLER CONSERVENGLAS (ca. 1890-late 1900s or later)

Toulouse (1969:14) noted a colorless, round, machine-made jar with “ADLER CONSERVENGLAS” embossed on the lid and “HEYE DRP 142521 DRP 261889” embossed on the base. Although this was certainly made by one of the Hermann Heye plants, Toulouse added no further information except that “adler” is German for “eagle.” Roller (1983:4) did not mention the Heye name on the lid and was uncertain about the manufacturer, but it was a “fairly modern German jar.” The glass lid was “hinged to [the] jar body by [a] wire clamping device.” Creswick (1987a; 1987b) did not list the jar, and Roller (2011:16) included a second lid embossed “ADLER / PROGRESS / {eagle with spread wings in a circle} / Adlerhütten / CONSERVENGLAS” and another with an unmarked lid but “ADLER PROGRESS DRP 261889” on the base. The Roller editors also placed the jar as German but did not know the maker.



Figure 1 – Adler Progress jar (Vershiedenes)

An eBay auction showed a jar embossed “D.R.P. 142521 (arch) / ¾ L / {unknown symbol – almost certainly meaning “patent”} 261889” on the base and “ADLER / PROGRESS / CONSERVENGLAS (inverted arch)” on the lid. The seller noted that the jar was from Germany but added no other information. Other Russian and German webpages (e.g., ReviewDetector.net 2016) show other slight variations of both lid and base – including one base with a date code of “08” (2008) (Figures 1 & 2). The initials D.R.P. indicate *Deutsches Reichspatent* – the German patent system. Thus 142521 and 261889 are patent numbers.



Figure 2 – Adler lid & base (Vershiedenes)

H

Toulouse (1971:238) noted that a simple “H” mark was used by Heye “possibly as early as 1880, until 1936. Currently, we have found no confirmation for this mark from any other

source, and we have not seen it on typical European bottles. Even if Toulouse were correct, it would be difficult to sort out Heye bottles from those made by a variety of other manufacturers in several countries. We have also discovered 19th century bottles, where an “H” basemark indicated the wholesaler. When Heye began making float balls, however, the firm used the “H” mark on those (Figure 3).

H. HEYE • / BREMEN • (ca. 1840s-1870s)

Bottles embossed “H. HEYE • (arch) / BREMEN • (inverted arch)” are fairly common on eBay auctions and in Civil War era U.S.



Figure 4 – Base of Heye Bremen bottle (eBay)

contexts (Figure 4). The mark, itself, is in what is almost certainly a Ricketts-style baseplate around a stepped kick-up with a small mamelon or dot in the center. All of these in our sample have been cylindrical spirits bottles blown into three-piece molds – a dip mold forming the base and body (flaring slightly from heel to shoulder), with two hinged pieces creating the shoulder. The neck was made by hand, and the applied finish had two parts. The lower part was a ring with a downwardly flaring sharp edge, but the upper part could be steeply tapered up – with sharp edges – or gently tapered up with rounded edges. The former finishes were probably the earliest (Figures 5-7).

This type of base was never (to our knowledge) found on beer bottles. Although these bottles are generally called “spirits” bottles, they and the other bottles with kick-ups described below were almost certainly

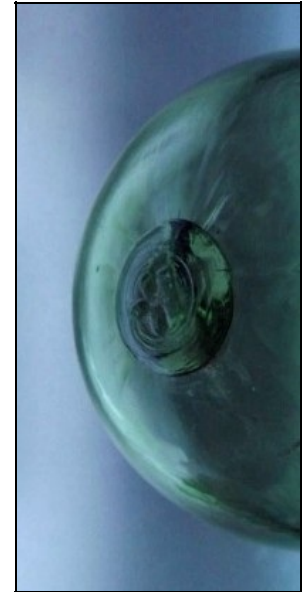


Figure 3 – H on float ball (eBay)



Figure 5 – Heye Bremen bottle (eBay)

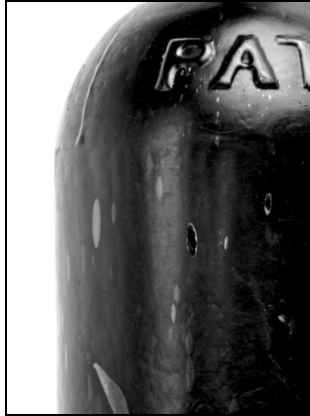


Figure 6 – Detail of 3-piece mold seam

used for wine, liquor, bitters and other liquids. One bottle offered on eBay had a paper label for “SUPERIOR / BAY / WATER / DISTRIBUTED BY / A.A. FRENCH / S^T Thomas, WI” (Figure 8) The “WI” almost certainly indicated “West India” – the term used in the 19th century for the islands we now call the West Indies. All but one bottle in our sample was embossed “PATENT.” – including the period – on the shoulder (Figure 9).



Figure 7– Neck and finish of Heye Bremen bottle (eBay)

Parks and Pasivantis (1978:97) illustrated a base with the “H. HEYE / BREMEN” logo from a Civil War context and showed the cylindrical bottle with a two-part finish that is in keeping with that time period. From the photo, the bottle appears to have been blown into a dip mold, again, quite in keeping with the period. Photos from David Bush (personal communication 10/16/2007) of a bottle from the Johnson’s Island Civil War Prison and our observation of a base at the California State Parks type collection show that the mark (with a



Figure 9 – PATENT – just above shoulder seam (eBay)

slightly different kick-up) was on the base of olive-green “spirits” bottles, typical of the 1840-1860s period, possibly extending into the early 1870s. Johnson’s Island was only in use between 1862 and 1865 (Bush 2007:68), and the Heye bottle was excavated from Feature 41, dated at 1863. This creates a tight context for that specific bottle.

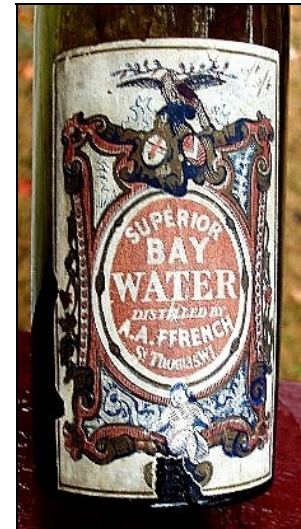


Figure 8 – SUPERIOR BAY WATER label (eBay)

Although the name is embossed on bottles for export, the Bremen facility – opened in 1840 – was a sales/shipping point rather than a glass factory. Located ca. 60 km (37 miles) south of the mouth of the Weser River, Bremen was a port city to the North Sea. The U.S. contexts place the bottles into the Civil War period (1860-1865), although at least one of the eBay

examples appears to have been manufactured earlier. These bottles were likely made throughout the ca. 1840-1870 period.

BREMEN • / H. HEYE • (ca. 1840s-1870s)

Jones (1968:11) illustrated this mark – with “BREMEN” in an arch and “H. HEYE” in an inverted arch – as “Ft. Union pre-1891” (Figure 10). Like the above example, the two words were separated by embossed dots. All of the bottles marked with both “H. HEYE” and “BREMEN” along with a kick up were probably made during the same period, ca. 1840s to 1870s. Jones illustrated this mark with a hand drawing, but we have not seen an actual example on a bottle.



Figure 10 – BREMEN / H. HEYE base (Jones 1968:11)

BREMEN • H. HEYE • (ca. 1840s-1870s)

Ayres et al. (1980) illustrated this slight variation with BREMEN • H. HEYE • in a continuous circle around the edge of the base (Figure 11). Although the base is shown with a dot in the center, the drawing does not contain the lines that are typically used to indicate plate molds and stepped kick-ups. Although the Ayres drawings of other bases have proven to be very accurate, we have not discovered an actual example of this mark.

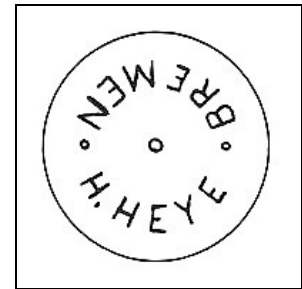


Figure 11 – BREMEN H. HEYE circle (Ayres et al. 1980)

HH (1870s-1880s)

Dale L. Wedel provided an Apollinaris bottle with the initials “HH” embossed on the base (Figures 12 & 13). The finish was an applied “blob-top” (Figure 14) – typical of the bottle type – and the bottle had distinctive horizontal striations, created by the turn-mold manufacturing method. We also discovered an identical base at the Fort Bowie, Arizona, trash dump.



Figure 12 – “HH” initials

In the turn-mold process, the mold was lubricated with a special paste (leading to the occasional use of the term “paste-mold”), then the blower turned the fully blown bottle inside the mold to erase the mold seams. The finish was applied last – as with any other mouth-blown bottle. The process not only removed the seams, it also eliminated the possibility of any embossing on the bottle (Lockhart 2007).

Along with the usual striations produced by the turn-mold method, there is a more distinct ring ca. 2/5 up the body. As noted above, the early Heye bottles appear to have been made in dip molds and three-piece molds. These molds were apparently also used for the turn-mold bottles. Not only will that explain the more prominent horizontal ring part-way up the body, it is also in context with the bottles described below

Because the turn-mold process erases *all* marks on bottles – yet the horizontal striations clearly show that these Apollinaris bottles were turned – we need an alternative explanation for the embossed “HH” on the base. Toulouse (1971:153), explained the logo by suggesting that the turn-mold process was used to create the bottle, then it was re-inserted into the mold to set the basemark into the glass. However, it seems logical that reinserting the bottle into the *same* mold would also recreate the mold lines.

There are at least three other possible explanations. First, the base shape and “HH” may have been formed by reheating the base and inserting the bottle into a dip mold. The base has the same kind of polished bubbly appearance that we have seen on dip mold bottles. We consider both this and the Toulouse explanation unlikely.

A second alternative is an iron rod with the “HH” letters engraved in the end. This could easily have been pushed into the center of the base, creating the circular indentation, the embossed initials, and the push-up (concave area) all at the same time – with little extra effort



Figure 13 – Heye Apollinaris bottle



Figure 14 – Apollinaris “blob” finish

(Figure 15). We favor the “iron rod” explanation. The final possibility – a plate on the base that turned with the bottle – will be discussed in detail below, but these bottles were probably made too early for that level of technology.



Figure 15 – HH base showing contour

Even though it was Ferdinand Heye who convinced the mineral water producers to standardize their bottles in 1875, the H. Heye Glasfabrik certainly made many of the bottles. According to Switzer (1974:23-25) and Jones & Sullivan (1989:31), turn-mold bottles were made in Europe prior to 1865, and one of the H. Heye plants may have been the birthplace for “twister” blowing. It is unlikely, however, that the bottles were marked initially. Therefore, a practical date range for the HH logo is ca. 1870 to the 1880s.

Although we would have guessed that “HH” indicated Hermann Heye, Horst Klusmeier suggested that the initials were for “Heye Hamburg.” Klusmeier noted that collectors in northern Germany are the ones who generally find bottles with the “HH” logo. As noted above, Heye had no factory in Hamburg, although the city had one of Heye’s largest warehouses and export offices (personal communication, Horst Klusmeier, 6/21/2012).

GLASS WORKS / H. HEYE / HAMBURG (1870s-1890s)

Although we have never examined an actual example of these bottles, we have three photos – one of a base, two of entire bottles. The base of each example was embossed “GLASS WORKS (arch) / H. HEYE (horizontal) / HAMBURG (inverted arch)” (Figure 16). Kerri L. Puckett sent us a series of photos of a spirits bottle – very similar to the export beer bottle shape – that was probably made in a three-piece turn mold as described in the “HH” bottle mark section above. The bottle was made in the typical “Heye green” color with a slight downward taper from shoulder to heel. There appear to be faint striations on the body, and the container was topped by a one-part applied finish (Figure 17).



Figure 16 – GLASS WORKS H.HEYE HAMBURG (Kerri L. Puckett)

GLASS WORKS / H. HEYE / NIENBURG A/W (1870s-1890s)



Figure 17 – one-part finish (Kerri L. Puckett)

This embossing was found on the base of green or amber Apollinaris-style bottles, made in three-piece molds. Photos of several of these bottles were posted on eBay, Worthpoint, and other internet sites. These pictures give us a good overall view of the bottles. Each bottle was embossed “STEINIKE & WEINLIG / SHUTZ MARKE” (trade mark) on the front shoulder with each set of words in an arch above a drawing of a hand holding what appears to be a stick-figure

of a person drinking from a bottle (Figure 18). The back shoulder was only embossed with the word “SELTERS” horizontally (Figure 19).

The base of each bottle was embossed “GLASS WORKS (arch) / H. HEYE (horizontal) / NIENBURG A/W (inverted arch)” (Figure 20). The finish on each of these bottles was a typical Apollinaris applied “blob.” The bottles were probably made between ca. 1870 and the 1890s. A slight variation was embossed “GLAS FABRIK” instead of “GLASS WORKS.” The “GLAS



Figure 18 – Front of STEINKE & WEINLIG bottle (eBay)

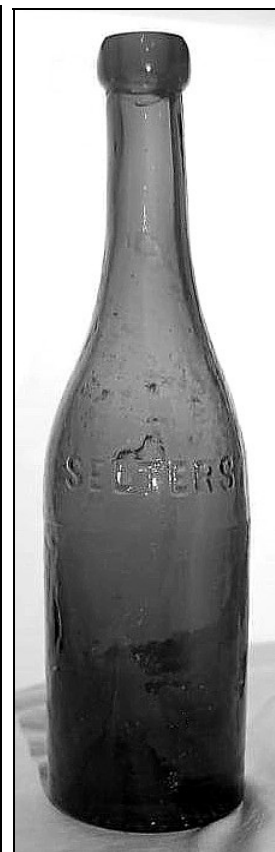


Figure 19 – Back with SELTERS (eBay) bottle (eBay)



Figure 20 – GLASS WORKS H. HEYE NIENBURG (eBay)

FABRIK” variation was almost certainly made for use inside Germany; whereas, the “GLASS WORKS” bottles were for export to the English-speaking world. Since Nienburg is on the Weser River, Nienburg A/W apparently means “Nienburg am Weser” or Nienburg on the Weser.

On August 15, 1853, Hermann Steinike and Edward Weinlig opened the mineral water factory Steinike & Weinlig. By 1854, the pair produced carbonated fruit juices and began shipping their products to North America two years later (Sagebrecht 1953). They called the fruit drink Frisco (fresh fruit) and had FRISCO embossed on some of their bottles. The firm remained in business in 2012.

BREMEN / H. HEYE / HAMBURG (ca. 1880-ca. 1890)



Figure 21 – BREMEN / H. HEYE / HAMBURG

Numerous archaeological references – including Jones (1968:11), Herskovitz (1978:8), Wilson (1981:118), Lockhart and Olszewski (1994:38-39), and Lockhart (2009; 2011) – attest to bases and bottles embossed “BREMEN (arch) / H. HEYE (horizontal) / HAMBURG (inverted arch)” at U.S. archaeological contexts dating from ca. 1880 to the mid-1890s. These are by far most prevalent during the 1881-1890 period at western U.S. military posts. Although a use into the 1890s cannot be positively eliminated, there is also no clear evidence for a post-1890 deposition. (Figure 21). This marking has been found on export beer bottle bases made of a distinctive shade of darker green from that of the typical U.S. aqua hue or other light green imports we have examined (Figure 22).

The mark appears to be in a plate in the center of the base. However, there are no visible mold lines leading from the plate (as in a typical post bottom), and the overall sheen and dimples in photos are similar to those made in dip molds. All of the bottles we have seen in person or in photographs were made in the U.S. export beer style – cylindrical with swelled necks.



Figure 22 – Heye export beer bottle with sharp lower ring (eBay)

Most of the finishes (probably all) had two parts – a broad, cylindrical upper part with rounded edges, and a ring lower part. On some of these bottles, the ring had a sharp edge; on others, it was rounded (Figure 23). Export beer bottles with two-part finishes and sharp lower rings were generally made in the U.S. from 1873 to 1882. Use of rounded lower rings began ca. 1878 and extended into the 20th century (see Lockhart 2007 for an in-depth discussion of this phenomenon). Heye bottles, found in U.S. archaeological contexts, appear to follow the same finish pattern as American-made bottles.



Figure 23 – Export beer bottle finishes with rounded and sharp lower rings

The sides of the bottle deserve special commentary, and it is very unfortunate that our sample of these is so small. In our examination of bottles with this mark in archeological collections (e.g., Fort Bowie, Arizona; Fort Laramie, Wyoming; the Tucson Urban Renewal collection), we have found two types of sides. One has no notable horizontal striations *or* side seams (see Figure 22). The second has distinct horizontal striations, definite indicators that the bottle was made by the turn-mold process (Figure 24). It is probable that the bottles with no striations were also made in turn-molds, but the paste was fresh and did not cause any striations. Striations were likely created by minute particles in the paste that accumulated during repeated uses of each mold.



Figure 24 – Striations on export beer bottle side (Fort Laramie)

As noted in the section above, there were at least four possible methods that could have created an embossed base on a turn-mold bottle. We consider the first three (discussed above) as unlikely for these export beer bottles. The likely explanation requires a bit of background information.

On January 31, 1887, William F. Modes applied for a U.S. patent for a “Mold for Blowing Turned Bottles.” He received Patent No. 364,840 on June 14 of that year (Figure 25). An important feature of his invention was:

a rotary bottom which has formed in relief on its top portion the characters or marks which are to be imprinted in the bottom of the bottle which is to be turned in the mold to give it an exterior finish. It is old to turn bottles in molds for polishing purposes, and it is old to imprint characters on the bottom of bottles which are not turned in the mold; but I claim to be the first one to employ a rotary bottom in the mold.

This statement was very likely correct in relation to bottles blown in the U.S. William Modes was the plant superintendent of the De Steiger Glass Co. of La Salle, Illinois – the firm that made the initial turn-mold or “twister” bottles in the U.S. in 1880. There is no evidence that the De Steiger factory ever used any embossing on turn-mold bottles (Lockhart et al. 2007).

When the De Steiger family became insolvent in 1883, Modes – along with most of the twister blowers – moved to the Streator Bottle & Glass Co. (Streator, Illinois) and continued the production of turn-mold bottles at that location (Lockhart et al. 2007). He was still with Streator when he received his turn-mold patent. His patent description almost certainly reflected his experience in Illinois. See the De Steiger section for a discussion of the development of turn-mold bottles in the U.S.

Heye apparently used at least two different techniques to place embossed initials or company names on the bases of turn-mold bottles and almost certainly used both of them prior to the U.S. patent received by William Modes. We discussed what we are calling the “iron rod” method in the “HH” section above.

Because Heye made these export beer bottles in large quantities, the plant *must* have devised a reasonably fast way to accomplish the task of creating the basal embossing. Unlike

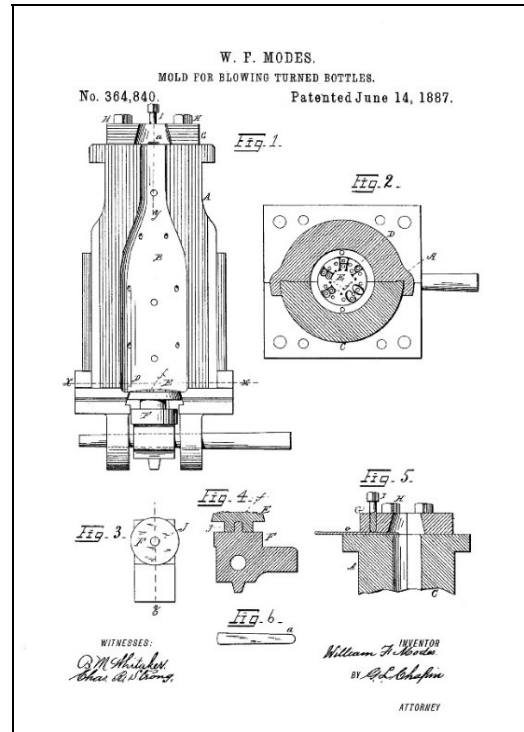


Figure 25 – Modes 1887 patent

the earlier turn-mold bottles made by Heye, these appear to have been manufactured in two-piece molds – with two mold halves and a baseplate. We feel that Heye probably used a system somewhat similar to the Modes patent by ca. 1880.

According to Toulouse (1971:238-239), the mark that included Hamburg was used by the Hermann Heye Glasfabrik “possibly as early as 1880, until 1936.” The mark could not have appeared on export beer bottles in the U.S. prior to 1873, the year that style of bottle was invented, and historical data suggest that the ca. 1880 date is probably correct. As discussed in the history section, a *Crockery and Glass Journal* (1881:24) article noted that Anheuser-Busch imported beer bottles from Europe in 1881.

It is equally certain that Anheuser-Busch imported export beer bottles from Europe again in 1885. It is also possible that the U.S. firm imported bottles at other times during the 1880s decade – and we have simply not found references. Since no other European logos appear on U.S. export beer bottles during that period, it is virtually certain that Anheuser-Busch imported its bottles from the Hermann Heye factory. The Hamburg mark was probably only used on these exported bottles. The bottles appear in U.S. archaeological contexts during the ca. 1880-ca. 1890 period.

The Toulouse end date of 1931, however, is too late. We have discovered no evidence of any kind for the Bremen and Hamburg mark being used on any container types aside from export beer bottles. The techniques involved were long discontinued by the 1930s, and we can find no evidence for the use of the mark later than the early 1890s.

H. HEYE NIENBURG A/D. W (1864-1880s)

A discussion on AntiqueBottles.net (2013), as well as online auctions centered around demijohns embossed “H. HEYE NIENBURG A/D. W” with a five-pointed star above the “N” in “NIENBURG” – stamped around the applied-collar finish (Figure 26). The bottles were the German-green color with a lip or rim that was broken off with no attempt to grind, fire polish, or tool it. A



Figure 26 – Demijohn
(Antique Bottles.net)

bead of glass was applied around the neck just below the mouth and was embossed with a stamp (Figure 27). One side of the applied ring was embossed “64.” On one bottle, the stamp was applied upside down. The stamp was probably made in 1864, although it was likely used for many years. Our best guess at an end date is ca. 1880s. Note that the “A/D” is embossed with the slash (A/D. W = am der Wesser).



Figure 27 – Demijohn finish (Antique Bottles.net)

• H. HEYE • / NIENBURG AW

Horst Klusmeier provided a photo of an amber bottle base embossed “• H. HEYE • (arch) / {clover logo} / NIENBURG AW (inverted arch)” (Figure 28). This is the only example we have ever seen, and it is likely that no Nienburg bottles were exported to the U.S. What is important about this base, however, is the inclusion of the clover logo. See more discussion in the “‘Clover’ design” section below.



Figure 28 – Nienburg base with clover logo (Horst Klusmeier)

HERMANN / HEYE / HAMBURG



Figure 29 – HERMANN / HEYE / HAMBURG on a decanter base (Dr. PRC)

It is very difficult to date this logo. In our sample, “HERMANN (arch) / HEYE (horizontal) / HAMBURG (inverted arch)” is embossed on the bases of three decanters and abbreviated (HERM [arch] / HEYE [horizontal] / HAMBURG [inverted arch]) on the bottom of the stopper on one wide-mouth apothecary bottle (Figures 29 & 30). Each of these was made in



Figure 30 – Apothecary jar base (Robert L. Stanton)

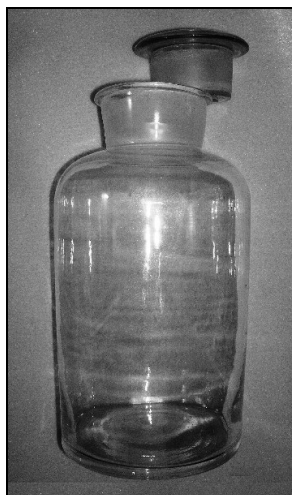


Figure 31 – Apothecary jar (Robert L. Stanton)

a two-piece mold with a tooled finish and each had a ground throat and ground shank on the stopper. The bottle was made of colorless glass with an upwardly flared neck and rim finish. The colorless closure resembled a fat club sauce-style stopper, with a rounded top that extended over the edges of the ground shank to make grasping easier (Figure 31).

One of the decanters was colorless; the other two were green, although all had the same basic shape – a bulbous body with a long, narrow neck, ending in a tooled, flared

finish. The colorless one had a simple design of 15 vertical panels encircling the bulbous body, with a ribbed neck between two rings (Figure 32). The ball stopper also had vertical panels on the finial. One green decanter had a rib and floral design on the bulbous body, with a ribbed shoulder and a ribbed finial on the ball stopper. The other green decanter had a ribbed body, twisted ribs at the shoulder/neck joint, and more ribs extending up the neck. The stopper for this decanter was missing (Figure 33).

Although these could have been made later, the manufacturing technique and flared finish suggests a 19th century production.

However, these could have been made almost anytime after mid-century. Because of the two-piece molds, they were probably not made earlier. Although it is less likely, the technique could have extended into the 20th century. We have not seen this specific mark on bottles or jars.

H. HEYE

Typically, demijohns – very large glass bottles – were completely covered by woven wicker, leaving only the finish exposed (Figures 34 & 35). Each of the examples we have seen



Figure 32 – Colorless decanter (Dr. PRC)



Figure 33 – Green decanter (eBay)



Figure 34 – Demijohn (Antique Bottles.net)

were stamped “H. HEYE” or “H. HEYE / HAMBURG” – into a thin strip of wood – possibly cedar – on the base (Figure 36). These are virtually impossible to date. They could have been made almost any time prior to World War II.

HEYE (ca. 1940s-1960s)

Toulouse (1971:238) noted that the “HEYE” mark was used by Hermann Heye “possibly as early as 1880, until 1936.” He stated that the

mark was “known on a machine-made fruit jar, probably dated just before World War II.” Such jars were produced by Heye-Glas on press-and-blow automatic machines during the post-World War II period, i.e., shortly after 1940 (Heye-Glas 1999:32), although we have been unable to trace how recently production was discontinued. We have found no evidence for the Toulouse assertion that “HEYE” – with no other accompanying words – was used earlier than ca. 1940. Also see “clover” design below.



Figure 35 – Demijohn neck & finish (Antique Bottles.net)



Figure 36 – H. HEYE / HAMBURG (Antique Bottles.net)

“Clover” design (ca. 1900-present)

This is our term for the logo; we have not found it named in the Heye literature or any other source. The design is formed with a base extending upward into three “petals” with rounded ends. This design was used in conjunction with the HEYE mark described above – or with “HEYE-GLAS” – in numerous advertisements and on jar lids along with the word “RILLINGLAS” (Figure 37). Toulouse (1971:579) noted that the design alone was used



Figure 37 – RILLINGLAS / {clover logo} / HEYE jar lid (eBay)



Figure 38 – Jar with RILLINGLAS lid

by the Obernkirchen plant between 1965 and 1969, and the design with “HEYE” at the base was used on “preserving jars” in 1965. These were almost certainly the jars with the “RILLINGLAS” lids (Figure 38). Although not shown with the word “HEYE,” the “clover” design was still used by Heye factories in Germersheim and Obernkirchen in 1982 and 1996 (Emhart 1982:25; 1996:16). The logo also appears in current ads.



Figure 38 Figure 39 – Codd-stoppered bottle with clover logo on base (Russ Smith)

According to Horst Klusmeier (personal communication, 2/25/2008), the “clover” design was used by all the Hermann Heye glass plants, except the ones under Ferdinand Heye. Russ Smith (personal communication, 5/2/2012) sent two photos, one of the



Figure 40 – Base with clover logo (Russ Smith)

“clover” design on the base of a Codd-stopper bottle (Figures 39 & 40), the other (courtesy of Horst Klusmeier) on a base embossed “• H. HEYE • NIENBURG AW” around the “clover” design (see Figure 28). The latter base was double stamped. Smith noted that “the clover logo must have been introduced in the early 20th century as I have good reason to believe that my particular bottle was made before 1918.”

Klusmeier (personal communication, 6/21/2012) recently polled other German collectors and suggested that the mark began use about the turn of the century and remained in use until at least the 1970s.

Gerresheimer Glas, Gerresheim (1864-present)

Because of Hermann Heye’s policy that only one male heir could follow him into the business, his son, Ferdinand, separated from the rest of the family in 1864 and founded the Ferdinand Heye Glass Factory at Gerresheim near Düsseldorf. The factory began production a

year later with only twelve glass blowers but was using six pots by 1871. The vineyards along the Rhine River were some of Gerresheimer's earliest customers. Prior to the adoption of glass containers, these companies had sold their wine in ceramic pitchers and casks (Answers 2012; Heye-Glas 1999:17; Reference for Business 2012).

In 1875, Ferdinand Heye was instrumental in convincing the mineral water industry in Germany to standardize their bottles – including the use of paper labels. Prior to this time, German mineral water firms bottled their waters in ceramic containers. These had been stamped with the names or logos of the individual companies. The standardization of *glass* bottles allowed the reuse of any mineral water container by any firm (Answers 2012; Reference for Business 2012). Although not specified in any of our sources, the bottles may have been what became known as the Apollinaris style.

Quinn (1998:xi) noted that Gerresheimer developed the “Vichy” bottle, although he failed to specify a date or details. Vichy almost certainly referred to the series of mineral springs in the Vichy area of France.² The water was bottled as early as 1716 and remains available today. We have been unable to determine the exact style of bottle referred to by Quinn. Vichy bottles sold in the U.S. were fairly wide in relationship to their heights, with rounded shoulders and upwardly tapered, one-part applied finishes (Figure 41).

The plant installed continuous tanks in 1881, and this created the need for more blowers. Because glass blowers were itinerant (albeit skilled) laborers at that time, Heye began offering incentives to both attract and retain them. Heye had instituted health insurance for the workers by 1867, and added a large “Volksgarten” with a music pavilion. He later included a swimming pool, gymnasium, and rooms that could be used for educational events. In 1882, he added accident insurance and a pension fund. All these benefits were virtually unheard of at the time (Answers 2012; Reference for Business 2012).



Figure 41 – Vichy bottle from Hanbury Smith – New York (Antique Bottles.net)

² See Ricks Bottle Room (2012) for a good historical sketch of the Vichy springs.

Export

Citing a history of Gerresheimer,³ Quinn (1998:x-xi) claimed that Ferdinand Heye began exporting almost as soon as the factory opened. He noted that Heye exported 20% of its line in the 1860s and 1870s, but increased that to 50% during the following two decades. According to Quinn, one of Heye's early importers was the Abramson-Heunisch Glass Co. of San Francisco, California. Many wine, mineral water, and "non-handled chestnut flasks" found in the American West were apparently made by Gerresheimer and imported by Abramson-Heunisch during the late 19th century (Quinn 1998:x-ix).

In contrast, Answers (2012) and Reference for Business (2012) stated that Gerresheimer did not begin exporting bottles until 1882. By 1887, half of the plant's output was exported via the Rhine River. According to these sources, "only twenty years after it was founded [i.e., 1884], the Gerresheimer Glas factory was the world's biggest manufacturer of glass bottles." We have currently found no way to resolve the conflict of when Gerresheimer began exporting.

Incorporation and the Machine Age

Until 1888, the firm had been operated as a family business. That year, Ferdinand Heye transformed the company into a corporation: Actien-Gesellschaft der Gerresheimer Glashüttenwerke, vorm. Ferd. Heye – always known as Gerresheimer Glas. Remaining in complete control, Heye retained 80% of the stock. Ironically, Ferdinand Heye died only seven months later – on July 26, 1889 – at the age of 51. Hermann Heye, Ferdinand's eldest son – who grew up in the business – gained control of the corporation upon his father's death (Answers 2012; Reference for Business 2012).

The younger Heye had learned well. By the early 1890s, the export business increased dramatically. New trade areas included more of Latin America, especially Cuba, Puerto Rico, and other "West India" islands for use by the rum distilleries. Gerresheimer Glas acquired ten additional factories during the decade between 1894 and 1904. Johsua Horne, an employee of

³ Der Glaspäckung im Spiegel der Geschichte von Gerresheimer Glas – which he translated as the Glass-packing in the Mirror of the History of Gerresheimer Glass. He gave no further bibliographic details, although this was almost certainly the 1964 book by Herbert Gross.

the Ashley Bottle Co., designed and patented his own machine in 1901. Gerresheimer Glas was one of the first to adopt the Horne machine. To address the growing markets, Heye also instituted three shifts at the factories by 1902 (Answers 2012; Reference for Business 2012; Turner 1938:254).

As noted in the Hermann Heye Glasfabrik section above, the A.G. Gerresheimer Glashüttenwerke would have been one of the only three German glass houses to receive an Owens Automatic Bottle Machine under the Option Agreement of August 5, 1907, although the November 15, 1907, contract included a much larger group of factory representatives. Both sets of Heye factories installed the Owens machines in 1908. Of the 18 Owens machines operating in Europe in 1910, 13 were in Germany. Many of them were in Heye-affiliated factories: Gerresheim - 2; Zinzig - 6; Hamburg - 1; Nienburg - 1; Dresden - 1; Straulau - 1; Rinteln - 1 (Biram 1958:21N-28N; Heye-Glas 1999:24-28, 92; *National Glass Review* 1910:1; Reference for Business 2012).

In accordance with Heye's agreement to install machines gradually – to avoid massive layoffs of glass blowers – it was not until 1925 that all the Gerresheimer factories had moved to exclusive machine production. Meanwhile, the firm survived World War I and the 1920s depression. Gerresheimer Glas gained control of Glashütte Achern at Burgheim in 1932. The new plant was located near the vineyards of southern Germany. (Answers 2012; Turner 1938:254; Reference for Business 2012).

World War II and Owens-Illinois

Hermann Heye, grandson of the founder, died in 1939. A year later, Gerresheimer Glas bought a 50-percent share in Glashütte Budenheim, located near Mainz (in the wine country) and bought another firm in Bavarian Amberg in 1941. As with the rest of Germany, manufacturing halted at the end of World War II, but Gerresheimer remodeled in 1946 and resumed production with many new gob-feeder machines. By 1958, the older Owens machines were all replaced with “new rotating R7-machines and IS-multiple-section-machines.” Owens-Illinois acquired control of Gerresheimer (by 50.1% of the stock) in 1959, but continued to operate under the Gerresheimer Glas name (Answers 2012; Reference for Business 2012).

Owens-Illinois increased its share of Gerresheimer Glas to 75.7% in 1962 and expanded production to include baby food jars, plastic containers, and corrugated cardboard. Continued growth included taking over Spessarter Hohlglaswerke in 1971, Glashüttenwerke Holzminden GmbH & Co. in 1987, and Fritz GmbH & Co. in 1989. German energy conglomerate VIAG acquired 51% of the Gerresheimer Glas stock in 1990 and, again, retained the Gerresheimer name.

More Changes

Gerresheimer took over the Kimble glass factory from the Owens-Illinois Glass Co. in the U.S. in 1994. The following year, the Gebrüder Stoevesandt AG purchased Gerresheimer Glas. Next was the acquisition of 60% of the stock in Nouvelles Verreries de Momignies S.A., a Belgian manufacturer of glass containers for perfume and cosmetics, followed by a 61.5% share of Boleslawiek Fabryka Materałów Medycznych Polfa Spolka Akcyjna – a manufacturer of glass and plastic containers in Poland (Answers 2012; Reference for Business 2012).

Gerresheimer Glas sold off its food and beverage container business in 1999 to concentrate on packaging for pharmaceutical, laboratory, and cosmetic uses. When VIAG and VEBA, Germany's two major power conglomerates, merged in 2000, they placed Gerresheimer Glas up for sale again. Investcorp, based in Bahrain, purchased 79% of the stock. The firm remains in business in 2016 (Answers 2012; Gerresheimer 2016; Reference for Business 2012).

Containers and Marks

We have found very few marks from Gerresheimer Glas, although our research has been heavily biased in the direction of H. Heye – the more common bottles in American historical and archaeological contexts. The Gerresheimer bottles, however, may be much more common within Germany and some other export venues.

FH in a Hexagon

According to Horst Klusmeier, Gerresheimer Glas used a logo that consisted of a stylized “FH” (Ferdinand Heye) in a Hexagon prior to 1939 (personal communication, 6/21/2012).

Unfortunately, we have been unable to discover when the mark was first used. The logo was probably embossed on bottle bases (Figure 42).

G-Under-Crown



Figure 43 – Gerresheimer G-under-crown logo (Horst Klusmeier)

Gerresheimer Glas used the “G-under-crown” (G mit Krone) trade mark, with a three-pronged crown sitting atop a “G” – the serif extending to the left until it connected or almost connected with the curve of the letter (Figure 43). A Professor Deffke designed the logo in 1937, and Gerresheimer Glas registered it as a trademark (No. 503,225) on June 20, 1939 (personal communication, Horst Klusmeier, 2/25/2008; 6/21/2012;

Helmut Thomsen 6/2/2012; Kammann 2007:185). Currently, we have no information that will help us date the use of the mark, and we have only seen one photograph of the logo on an actual base (Figure 44).

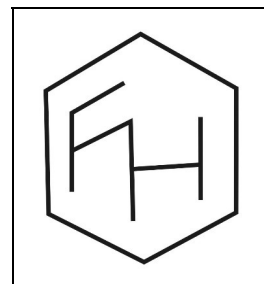


Figure 42 – FH in a hexagon mark (Horst Klusmeier)



Figure 43 Figure 44 – Gerresheimer logo on bottle base

Da and Dc

According to Horst Klusmeier, the German Bottle Cartel was founded at Düsseldorf in 1904 and remained in effect until July 5, 1939. The cartel assigned “Da” to Gerresheimer Glas and “Dc” to Hermann Heye. These logos are sometimes found on bottle bases (personal communication, 6/21/2012). This was likely the cartel formed to control distribution of the Owens Automatic Bottle Machines in Europe (see “The Machine Age” in the Hermann Heye Glasfabrik section for more on the cartel and the early machines). If so, the “Da” and “Dc” marks would only be found on bottles with the distinctive “feathered” Owens machine scars on the bases and probably only on bottles distributed in Germany.

Discussion and Conclusion

The rich histories of the Hermann Heye Glasfabrik and Gerresheimer Glas offer a look at two of the world's most successful glass manufacturers. Both have withstood the test of time – in a market now dominated by plastics and other materials. Each was international in sales during the 19th century and has expanded into multinational production in the 20th and 21st centuries.

Hermann Heye Glas was especially rich in its manufacturer's marks. This study – being conducted in the United States – is distinctly biased in favor of bottles exported to the Americas by the German firm. To the best of our knowledge, this is the first attempt to seriously date those bottles discovered on archaeological sites in North America. Both the dating and the explanation offered above for the presence of so many German-made export beer bottles on 19th century U.S. military sites should be useful to everyone interested in the U.S. west during the ca. 1880-1890 period.

Heye also appears to have been the pioneer of embossing manufacturer's marks on turn-mold bottles. Although the process has previously been reported in U.S. studies (e.g. Toulouse 1971:153), we have never seen examples made by any manufacturer other than the Hermann Heye Glasfabrik. Since William Modes patented a machine to make embossed bases on turn-mold bottles in 1887, we could expect such bottles in the U.S. to have been made by the Streator Bottle & Glass Co. after that date – but we have not yet discovered an example. Turn-mold export beer bottles with the “GLASS WORKS / H.HEYE / HAMBURG” mark, however, are fairly common in western U.S. military post contexts.

As of this writing, certain mysteries remain. Although it is certain that the use of the “clover” logo began prior to 1931 and probably before 1920, we have been unable to trace its beginning beyond those dates. Similarly, we are almost completely ignorant about the G-under-crown logo of Gerresheimer Glas. We are certain (from a photo) that the logo was used on at least one bottle, but we have no clue as to when the use of the mark commenced or how it was used. Although we have not discovered reports of the logo on bottles at U.S. sites, it may have been merely reported as a “G” on the base. Hopefully, we will learn more in the future.

Acknowledgments

Thanks to Dale L. Wedel for finding the Apollinaris bottle at a flea market, recognizing its value, and sending it to us. Thanks also to Horst Klusmeier, Russ Smith, and Helmut Thomsen for additional information and photos and to all eBay sellers and curious folks – including but not limited to Kerri L. Puckett, Dr. PRC, Robert L. Stanton, David Bush, Willie Van Stoden, and Madeline Persson – who sent us photos, questions, and information.

Sources

American Glass Worker

1886 “Trade Notes.” *American Glass Worker* 1(19):2.

Answers

2012 “Gerresheimer Glas GmbH: Company History.” Answers.

<http://www.answers.com/topic/gerresheimer-glas-ag?cat=biz-fin>

Antique Bottles.net

2013 “Huge! Heye Nienburg Demijohn, Olive.” Antique Bottles.net.

<http://www.antique-bottles.net/showthread.php?603678-Huge!-Heye-Nienburg-Demijohn-Olive>

Ayres, James E., William Liesenbien, Lee Fratt, and Linda Eure

1980 “Beer Bottles from the Tucson Urban Renewal Project, Tucson, AZ.” Unpublished manuscript, Arizona State Museum Archives, RG5, Sg3, Series 2, Folder 220.

Beverage Daily.com

2002 “Heineken Takes Control of Glass Maker.” December 19.

<http://www.beveragedaily.com/Financial/Heineken-takes-control-of-glass-maker>

Biram, R. S.

1958 “The Introduction of the Owens Machine into Europe.” *Journal of the Society of Glass Technology* 42:19N-45N.

Bush, David H.

2007 "Interpreting the Latrines of the Johnson's Island Civil War Military Prison."
Historical Archaeology 34(1):62-78.

Clark, Victor S.

1949 *History of Manufactures in the United States*. Vol. II. Peter Smith, New York.

Creswick, Alice

1987a *The Fruit Jar Works, Vol. I, Listing Jars Made Circa 1820 to 1920's*. Privately printed, Grand Rapids, Michigan.

1987b *The Fruit Jar Works, Volume II, Listing Jars Made Circa 1900 to Modern*. Privately printed, Grand Rapids, Michigan.

Crockery and Glass Journal

1881 "Glass Factories." *Crockery and Glass Journal* 13(21):24.

Emhart Glass

1982 *Emhart Punt Marks*. Emhart, Zurich, Switzerland.

1996 *The Emhart Book of Punt Marks*. Emhart, Zurich, Switzerland.

Glass Industry

1982 "Glass Manufacturers, Primary." *Glass Industry* 62(10):9-64.

Genealogienetz.de

2011 "Local Heritage Book Bremen Vegesack, Ramily Report: Geheimer Commerzienrat Frederick Carl Theodor Heye."

<http://www.ortsfamilienbuecher.de/famreport.php?ofb=vegesack&ID=I29148&nachname=HEYE&lang=en>

Gerresheimer

2016 :Gerresheimer." <http://www.gerresheimer.com/en/company/profile.html>

Herskovitz, Robert M.

1978 *Fort Bowie Material Culture*. University of Arizona Press, Tucson.

Heye-Glas

1999 *200 Years Heye-Glas, 1799-1999*. Heye-Glass, Obernkirchen, Germany.

2012 “Meilensteine der Firmengeschichte Heye-Glas.”

http://www.obernkirchen-info.de/bergstadt/geschichte_hey_e.htm

2016 “Heye-Glas.” https://www.hey_e-international.com/

Jones, May

1968 *The Bottle Trail, Volume 9*. Nara Vista, New Mexico.

Jones, Olive and Catherine Sullivan

1989 *The Parks Canada Glass Glossary for the Description of Containers, Tableware, Flat Glass, and Closures*. Parks Canada, Ottawa.

Kamman, Bruno

2007 *Gerresheimer Glas: Geschichte Einer Weltfirma (1864-2000): Ein Beitrag Zur Wirtschafts-, Sozial- und Stadtgeschichte Düsseldorf*. Druck und Bindung, Groftsburgwedel.

Lockhart, Bill

2007 “The Origins and Life of the Export Beer Bottle.” *Bottles and Extras* 18(2):49-57, 59.

2009 “Ten Wagon Loads of Beer Bottles: A Study of Fort Stanton Trash Deposition.” In *Quince: Papers from the 15th Biennial Jornada Mogollon Conference*, pp. 212-143.

2011 “Ten Wagonloads of Beer Bottles: A Study of Fort Stanton Trash Deposition.” In *The Beer Bottles and Breweries of Fort Stanton, New Mexico*, edited by Bill Lockhart. Privately published, Alamogordo, New Mexico. First section.

Lockhart, Bill and Wanda Olszewski

1993 *The El Paso Coliseum Collection: A Study of 20th Century Bottles*. The County of El Paso, Texas and the University of Texas at El Paso.

Lockhart, Bill, Carol Serr, and Bill Lindsey

2007 "The Dating Game: De Steiger Glass Co." *Bottles and Extras* 18(5):31-37.

2008 "The Dating Game: Hermann Heye Glassfabrik." *Bottles and Extras* 19(1):57-59, 62.

National Glass Budget

1910 "Bottle Warehouse for Louisville." *National Glass Budget* 25(50):1.

National Glass Review

1910 "Bottle Machine Statistics." *National Glass Review* 25(50):1.

Parks, Ken and Ken Pasavantis

1978 *Civil War Bottles: Over One Hundred Civil War Bottles Representing a Cross Section of Glass Containers used between 1861 and 1865*. Ken Parks Associates, Jackson, Mississippi.

Perrine, Lowell E.

1985 "Directory Issue 1985." *Glass Industry* 66(3):1-170.

Quinn, Tom

1998 "The German Connection." In *Whiskey and Liquor Containers from the State of Oregon* by John L. Thomas, pp. x-xiv. Privately published, Soquel, California.

Reference for Business

2012 "Gerresheimer Glas AG - Company Profile, Information, Business Description, History, Background Information on Gerresheimer Glas AG."

<http://www.referenceforbusiness.com/history2/7/Gerresheimer-Glas-AG.html>

ReviewDetector.net

2016 “Немецкие стеклянные крышки для консервации (Conservenglas).”

<http://www.reviewdetector.net/index.php/topic/5635-nemetckie-stekliannye-kryshki-dlia-konservatcii-conservenglas/>

Ricks Bottle Room.com

2012 “Carl H. Shultz, Rare Green Blob.” Ricks Bottle Room.com.

<http://www.ricksbottleroom.com/someblobtops.htm>

Roller, Dick

1983 *Standard Fruit Jar Reference*. Acorn Press, Paris, Illinois.

2011 *Standard Fruit Jar Reference: 2011 Update*. Edited by Jerome McCann and Barry Bernas. Fruit Jar Annual/Phoenix Press, Chicago.

Segebrecht, Reinhold

1953 *100 Jahre Steinike & Weinlig, Verlag Hamburgische Bücherei, 1953*. Hamburg Library.

Switzer, Ronald R.

1974 *The Bertrand Bottles: A Study of 19th-Century Glass and Ceramic Containers*. U. S. Dept. of Interior, National Park Service, Washington.

Toulouse, Julian Harrison

1969 *Fruit Jars*. Thomas Nelson & Sons, Camden, New Jersey.

1971 *Bottle Makers and Their Marks*. Thomas Nelson, New York.

Turner, W. E. S.

1938 “The Early Development of Bottle Making Machines in Europe.” *Journal of the Society for Glass Technology* 22(92):250-258.

Wikipedia

2012a “McKinley Tariff. http://en.wikipedia.org/wiki/McKinley_Tariff

2012b “Wilson-Gorman Tariff Act” http://en.wikipedia.org/wiki/Wilson-Gorman_Tariff

2012c “Heye International.” http://de.wikipedia.org/wiki/Heye_International

Wilson, Rex

1981 *Bottles on the Western Frontier*. University of Arizona Press, Tucson.

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