Turning Blue: Charles Blue and the Early Jar Machines

Bill Lockhart and Barry Bernas

Charles Edwin Blue created the first really successful jar and wide-mouth bottle machine. Between 1894 and 1912, Blue patented ten such machines, corresponding to the rise of the Atlas Glass Co. – from 1896 to 1902. This study examines the earliest machines – made by Blue and others – the manufacturing characteristics they left on jars, and ramifications applied to identifying early jars made by the Atlas Glass Co.

Setting the Scene

The early machines for wide-mouth jars and bottles followed essentially the same pattern that had been used by pre-machine glass blowers. The mouth-blown operation was generally a two-part process. First, the blower gathered a gob of glass onto the end of his blowpipe, then blew and manipulated the glass into a parison or blank that was roughly shaped to fit into the next step and had an opening to allow more air. Next, the parison was inserted into a two-piece mold with a baseplate and blown by mouth into the molded shape (Barnett 1926:65-66; McKearin & Wilson 1978:14).

Unlike the machines that followed, mouth-blown jars and bottles required further steps. These involved one of two methods. For most bottles and some jars (e.g., wax-sealers), the container was removed from the mold, the body was held with a snap-case or similar device while the finish (the uppermost part of the jar or bottle) was completed by hand, using a special tool. The container then went to the annealing ovens to be "tempered" or hardened.

Mason jars and other continuous-thread containers were blown into the mold then blowing continued to form a blow over – a bulbous mass of glass above the top of the mold.[1] The jar was then cracked or burst off by the blower and sent to the annealing ovens. Once

[1] In some cases, the blow-over was part of the blow mold. Apparently, alternative methods were also used in place of the blow over. In later, small-mouth bottles, a blow-over-and-burst method was used to speed up the blowing process.

cooled, small help (i.e., child laborers) ground the lip down flat. Windmill, Rylands, Blue, and those who followed them all continued the two-stage blowing technique with their mechanized versions of the process.

Leading the Way

On August 11, 1881, Philip Arbogast applied for a patent for the "Manufacture of Glassware" and received Patent No. 260,819 on July 11 of the following year (Figure 1). Arbogast applied the basic two-step principle that governed mouth-blown bottles to machine production. What was brilliant was his complete innovation that created the "finish" first. Even though the Arbogast patent provided the basic model for the technique that *continues* to be used in the 21st century – 130 years later – the machine was largely unsuccessful (Bernas 2012:27).

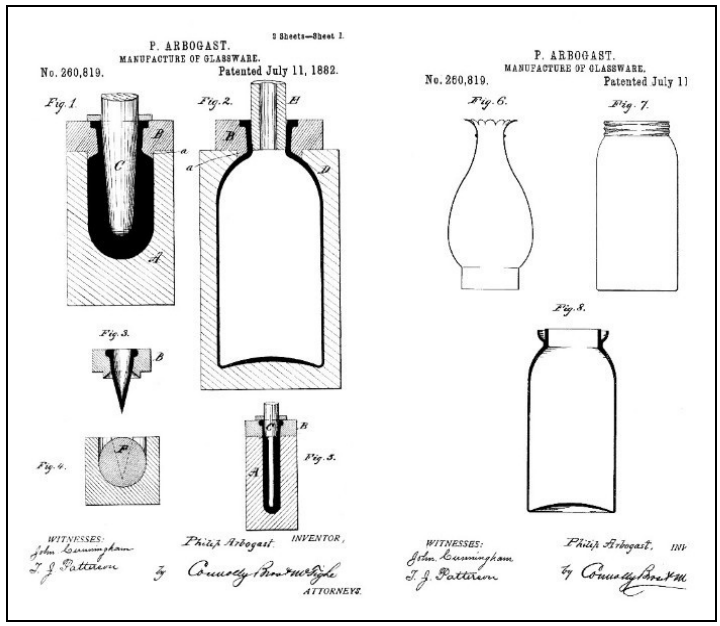

Figure 1 – Philip Arbogast 1882 patent

The *National Glass Budget* (1917:6) noted that

> the Arbogast process was not taken seriously, and in the course of a short time the patent was sold for a trifle to the late Daniel C. Ripley, then of Ripley & Co., local glass manufacturers. Although it had never been utilized, nor any serious attempt made to utilize it, it became the property of the United States Glass Co., when that company was organized in 1891.

The Mechanics of Tableware

On February 11, 1862, James S. and Thomas B. Atterburry received Patent No. 34,345 for a "Glass Mold" to make a "lamp 'peg' or bowl." This ushered in a series of press and press-and-blow devices for the manufacture of various forms of tableware by the Atterbury brothers, Daniel C. Ripley, Thomas C. Pears, William L. Libbey, and others (Bernas 2012:27-30). These devices set the stage for the development of machines that could be used for containers.

The Mold by Charles N. Brady

On April 20, 1888, Charles N. Brady applied for a patent for an "Apparatus for Making Glass Vessels." He received Patent No. 428,713 on May 27, 1890. Brady was primarily concerned that mouth-blown jars were "more or less imperfect at the threaded portion of the neck," especially the "so-called 'Mason Jars'" (Figure 2). Brady's device was apparently intended to be mounted on a standard side-lever press that used a plunger to press the continuous-thread finish onto the jar, followed by a blowing operation. Brady's device used a drop-down press mold.

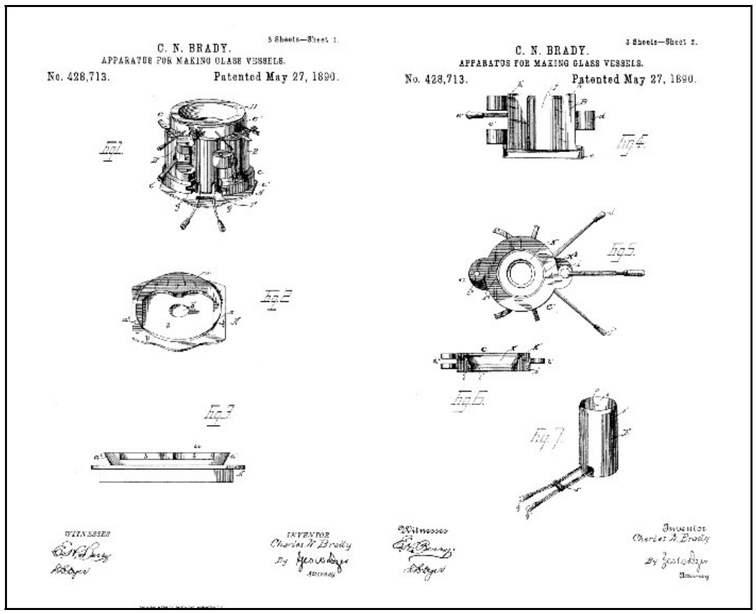

Figure 2 – Charles N. Brady 1890 patent

To place Brady's invention in perspective, there were a series of patents for drop-down press molds that began in 1873 and climaxed with the machines designed by Charles E. Blue – the focus of this study . James S. and Thomas B. Atterbury applied for a patent for an "Improvement in Methods and Molds for Manufacturing Glass-Ware" on March 17, 1873, and received Patent No. 139,993 just three months later – on June 17 of that year. The Atterburry duo were almost certainly the first to use the idea of pressing into a drop-down mold as the first stage of manufacture and blowing the final product into the full mold that was opened once the press mold had descended. Their machine was intended to make pitchers, although it could certainly have been used for other types of tableware.

Charles Brady's 1888 patent application (received in 1890) for a jar mold with a drop-down press mold (see above) was mirrored by an almost identical British patent granted to James Windmill two years earlier – in 1886. Although eerily similar, these appear to have been inspired completely separately. We have found no evidence that either inventor was familiar with the earlier Atterbury patent or that Blue was inspired by Windmill. These were followed by patents granted to Evan and John A. Jones, George Beatty, and Thomas B. Atterbury between 1889 and 1892 – all for wide-mouth container production. Charles E. Blue followed with his first patent in 1894 – creating by far the most successful and significant machine of the sequence. See Table 1 for a series of drop-down mold patents.

Ripley's Machines – And Vaseline Jars

Although Daniel C. Ripley was primarily a manufacturer of tableware, at least two of his machines may have been used to manufacture product jars. On April 22, 1891, Ripley applied for a patent for a "Pneumatic Machine for Forming Glassware." He received Patent No. 461,489 on October 20, 1891. His drawing showed a two-stage machine, where a gob of glass was dropped into a one-piece parson mold with a two-piece neck ring on top of it (Figure 3). A plunger forced the glass into the parison shape, including the finish. The neck ring and parison then transferred to a one-piece blow mold, where a puff of air blew the jar into its final shape. The parison was then raised, lifting the finished jar out of the mold, and the neck ring was opened to release the jar (Bernas 2012:32-33).

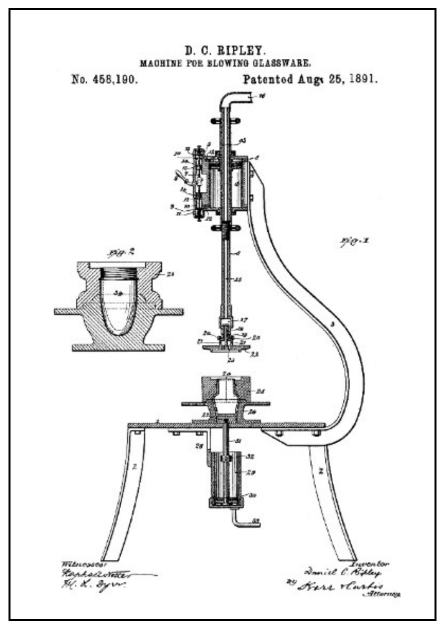

Figure 3 – Daniel C. Ripley first 1891 patent

Table 1 – Patent Sequence for Machines Using Drop-Down Press Molds & Rotary Tables

App. Date	Rec. Date	Pat. No.	Patentee (Country)
Drop-Down Press Mold Patents			
March 17, 1873	June 17, 1873	139,993	James S. and Thomas B. Atterbury*
April 20, 1888	May 27, 1890	428,713	Charles N. Brady
unknown	June 29, 1886	8,526**	James R. Windmill (British)
January 14, 1889	December 3, 1889	416,389	James R. Windmill (U.S.)
July 1, 1889	September 23, 1890	436,790	Evan and John A. Jones
October 14, 1891	February 16, 1892	469,053	George Beatty
March 24, 1892	October 11, 1892	484,131	Thomas B. Atterbury
June 27, 1894	December 25, 1894	531,609	Charles E.Blue
Rotary Table Patents			
unknown	March 3, 1888	3,268**	Dan Rylands (British)
January 23, 1889	December 3, 1889	416,376	Dan Rylands (U.S.)
January 18, 1896	September 1, 1896	567,071	Charles E.Blue

* The mold designed by the Atterburrys was for Tableware.
** British patent numbers began anew each year.

On July 1, 1891, Ripley's firm – Ripley & Co. – became Factory F in the United States Glass Co. U.S. Glass was a conglomerate of 13 glass houses – primarily manufacturing tableware – with Ripley as the first president. Ripley had purchased the 1882 Arbogast patent, and it now became the purview of U.S. Glass – along with Ripley's machines (Bernas 2012:32).

Ripley illustrated a pomade-style Vaseline jar in the drawings for his second 1891 patent (No. 461,489), and this was probably the machine, based on the Arbogast patent, that was eventually used to make the earliest machine-made Vaseline jars (Figure 4). When the American Flint Glass Workers Union discovered that Ripley was experimenting with machines, the president of the union announced rules that worked at negating any financial gains the use of machinery would entail. Ripley discontinued his experimentation – or at least kept them out of sight of the union (Bernas 2012:33-34).

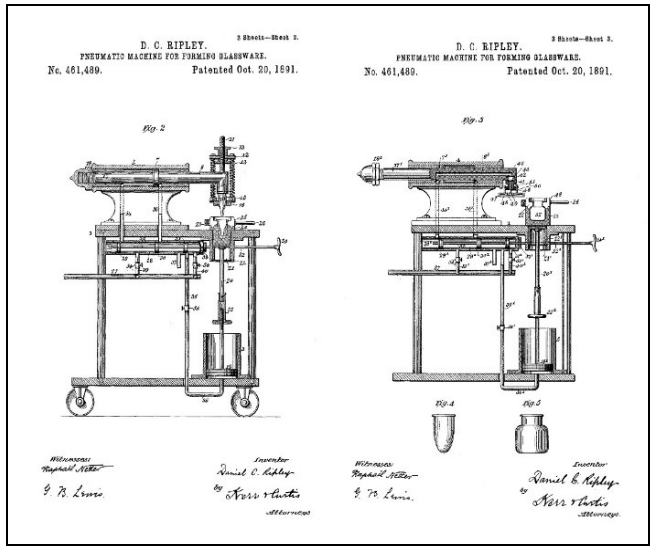

Figure 4 – Ripley's second 1891 patent

Ripley next began licensing other glass houses to use his machines to manufacture wide-mouth packer's ware – including the West Virginia Flint Bottle Co. at Central City, West Virginia. The firm laid off all of its union workers and acquired a one-year license for six Ripley machines (probably one of the 1891 patents) on November 22, 1892. Union president William J. Smith stated that he understood that "the firm at Huntington, West Va., are making vaseline bottles for the Chesebrough Manufacturing Co."[2] Smith added that he had "seen the bottles [him]self, and they are perfect in every particular." Apparently, however, the West Virginia plant only used the machine for a single year (Bernas 2012:34).

Scoville (1948:323-324) noted that "C.L. Flaccus, after securing a machine license from the United States Glass Company in 1893, began to produce vaseline jars in his nonunion Enterprise Glass Company at Beaver Falls, Pennsylvania." The May 24, 1893, issue of *China, Glass and Lamps* reported that the plant had been in operation about two weeks by that time. Eight shops were making salt-mouth bottles (wide-mouth druggists' bottles with internally ground throats and ground-glass stoppers). The article was unclear about whether these were made by machine or by hand (Bernas 2012:35).

The *National Glass Budget* (1917:6) explained that Flaccus used the Arbogast machine

> under a license from the U.S. company [and] Mr. Flaccus, in 1893, installed it in a factory in Beaver Falls, Pa., familiarly known as the "Yellow Cow," and developed it to a state of commercial success. It was first employed in the manufacture of 2-ounce vaselines, and it was not long until the worth of the patent became recognized.

[2] Central City, West Virginia, was adjacent to Huntington. The larger city annexed Central City in 1909, and it has been a suburb of Huntington ever since.

An October 1909 article in the *Spatula* stated that Flaccus produced jars "at Beaver Falls, Pa., during the year 1893" (quoted in Bernas 2012:35). This seems to indicate that Flaccus only made jars with the Ripley machine for a single year – although semiautomatic machines could have continued in use until Flaccus sold the plant to the Imperial Glass Co. in December 1900. William Smith noted that a single shop (a crew at one machine) at the Flaccus plant could make four thousand two-ounce bottles per day (Bernas 2012:35; Hawkins 2009:194). According to Algeo (1956:24), the Hazel Glass Co. received a license from U.S. Glass in 1892 (although late 1893 is more likely) and began production of machine-made Vaseline jars soon thereafter; therefore, production of Vaseline containers by Flaccus could have ceased at the end of 1893 without leaving a gap in the production sequence.

The October 20, 1898, issue of *China, Glass & Lamps* informed its readers that the C.L. Flaccus Glass Co. has been enjoined from using the jar making machines constructed by Jesse R. Johnston, the court having decided that they are an infringement on the patent of the Atlas Glass Co., Washington, Pa." Neither Dick Roller nor the authors of this work have discovered a patent for a Johnston machine. It is likely that Johnston did not obtain a patent.[3]

Flaccus *may* have used the Johnston machines to manufacture Vaseline jars until the 1898 suit. Although there is no historical evidence that Flaccus made fruit jars at this time, the suit was apparently brought by the Atlas Glass Co. – makers of fruit jars – rather than the Hazel Glass Co. – which made product jars. Thus, the Johnston machines *may* have made fruit jars. The suit likely centered around the Rylands patents (as did the Atlas Glass Co. v. Simonds Manufacturing Co. litigation in 1900), and the case may have been settled out of court. Again, it is likely that Flaccus ceased manufacturing Vaseline jars after 1893.

Although Davis (1949:206) and Scoville (1948:323-324) both assumed that Flaccus used machines made the Arbogast 1882 patent (owned by U.S. Glass), it is much more likely that Enterprise Glass was licensed to use the Ripley machine (Bernas 2012:35). Bernas (2012:35) further observed that four glass houses – West Virginia Flint Bottle Co., Hazel Glass Co.,

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[3] The patent office did not retain records of applications that failed to achieve patent status, and the Johnston machine may have been one of those. Conversely, the Jesse R. Johnston could have been a typographical error for Jesse O. Johnson who patented a machine (783,046) in 1905.

Enterprise Glass Co., and Factory F of the United States Glass Co. – were using machines to make wide-mouth packers' jars or bottles, likely the machines patented by Ripley.

As per the agreement with the West Virginia Flint Glass Co., the U.S. Glass Co. only licensed a firm to use the Arbogast principle and provided a machine or machines for the licensee to use to make products for a fee. The Hazel Glass Co. and the Ball Brothers also purchased licenses. Hazel got a Ripley machine and made pomades and Vaseline bottles on it. When Flaccus purchased a license, he undoubtedly also received a machine, owned by U.S. Glass. When each license expired and was not renewed, each firm surrendered its machines.

Charles E. Blue

Between 1894 and the early 20th century, Charles E. Blue became a prolific inventor – including his creation of the first really successful semiautomatic jar machine. Despite his incredible accomplishment, we have discovered no detailed history of the man, himself. However, Blue made the tunnel segments for the Pennsylvania Railroad tunnel under the Hudson River. He began and headed the Wheeling Mold & Foundry Co., Wheeling, West Virginia, and, later, the Penn Mold & Foundry Co. After his foray into the realm of bottle/jar machines, he became one of the designers of the Panama Canal and worked with munitions during World War I. Blue died at the age of 85 on October 4, 1947 (*Farmers Advocate* 1947:4).

Blue incorporated the Wheeling Mold and Foundry Co. on June 5, 1893, along with Conrad Rader, James R. More, Arthur G. Hubbard, Louis V. Blue, Louis C. Good, John H. Felmlee, William V. Hogue, and John McCrum. The firm began with a capital of $100,000, although only $6,500 of that had been subscribed (Legislature of West Virginia 1895:26).

Charles N. Brady, Hazel Glass Co., and Atlas Glass Co.

Inventing a machine is never sufficient in and of itself. In order to be successful, the inventor must team up with someone to make, sell, and/or use the product. In the case of Charles E. Blue, the counterpart was Charles N. Brady. Blue designed and manufactured the machines, while Brady provided the glass factories that used them (see Table 2 for a time line of significant events). Brady (1913) told the story:

> One day, about 1892, I met Charley Blue on the street in Wheeling and told him I had always wanted a machine to make glass, and that I seemed to get busier in Washington and it looked as though I would never get to it, but now that he was running the Wheeling Mold & Foundry Company and was making a business of building machines, I wanted him to build one for me, and I remember telling him what I wanted to accomplish and said to him: "You know, I am not a mechanic; but I want a machine to do so-and-so." He said he had been thinking along the same lines for a good while, and it ended by the Hazel Glass Company agreeing to supply him with money to build the machine.[4]

But the story began with the Hazel Glass Co.

Hazel Glass Co., Wellsburg, West Virginia (1885-1886)
Hazel Glass Co., Washington, Pennsylvania (1886-1902)

Charles N. Brady and Charles H. Tallman opened a factory in Wellsburg, West Virginia, making opal (milk glass) liners for Mason jars on September 3, 1885 (Roller 2011:668). Brady rented "an old abandoned flour mill" and built two small day tanks in it to make porcelain liners for fruit jars (Evans 1928:16; Florence & Florence 2004:5). Originally, the plant had only one customer: the Bellaire Stamping Co. Hazel made the liners to fit on the jars made by Bellaire (Caniff 2001:5).

In March 1886, the partners named their operation the Hazel Glass Co. Because the natural gas supply in Wellsburg had begun to decrease, and the town of Washington offered the company a factory site, they built a new plant at Washington, Pennsylvania,. The new plant first produced glass on January 10, 1887, at its four day tanks. Eventually called the Hazel No. 1 plant, the operation originally continued milk glass lid production but soon added milk glass jars and salve boxes to the inventory, all at a single day tank. The plant used a pot furnace for green glass and made fruit jars, oil cans, molasses cans, lamp bases and chimneys. Brady and Tallman

[4] This meeting likely took place in 1893. A probable sequence of events during that pivotal year included: Blue incorporates Wheeling Mold and Foundry Co. on June 5; Brady meets Blue and suggests machine in early fall; Hazel Glass Co. gets Ripley machine late in the year – probably for Blue to learn from.

registered the company as a corporation of the State of Pennsylvania on May 3, 1889 (Caniff 2001:5-6; Florence & Florence 2004:5; Toulouse 1969:361).

Table 2 – Important Events Connected with the Early Jar Machines

Date	Event
1882	Philip Arbogast patent for 2-part machine process
1885	Hazel Glass Co. opens at Wellsburg, WV
1886	Hazel Glass Co. moves to Washington, PA
1888	James Windmill's British patent
1889	James Windmill and Dan Rylands U.S. patents
1890	Charles N. Brady patent
1891	Daniel C. Ripley patents two working jar machines
1892	West Virginia Flint Bottle Co. receives Arbogast/Ripley machine license – Vaseline jars
1893	Enterprise Glass Co. receives Arbogast/Ripley machine license – Vaseline jars
1893	Charles E. Blue incorporates the Wheeling Mold and Foundry Co.
1893	Brady suggests that Blue design a jar machine
1893	Hazel Glass Co. receives Arbogast/Ripley machine license – Vaseline and other jars
1894	Blue applies for his first mold patent
1896	Blue applies for his first full machine patent
1896	Brady and associates open the Atlas Glass Co.
1897	U.S. Glass Co. sues Atlas Glass Co. for infringement of the Arbogast patent
1898	Atlas wins U.S. Glass suit
1898	Atlas Glass Co. sues C.L. Flaccus Glass Co. for infringement; Flaccus stops using Johnston machine
1900	Atlas Glass Co. sues Simonds Manufacturing Co. for infringement and wins
1902	Hazel Glass Co. and Atlas Glass Co. merge to form Hazel-Atlas Glass Co.

The company purchased new property and built another building with a 12-pot furnace in 1888 (Figure 5). This site was called Hazel No. 2 and made its fruit and oil jars on June 12, 1888. By May 1889, all work had been transferred to Hazel No. 2, and the Jefferson Glass Co. utilized the initial factory to make cathedral glass. The plant added an eight-pot furnace in 1892 (Caniff 2001:6; Florence & Florence 2004:5).

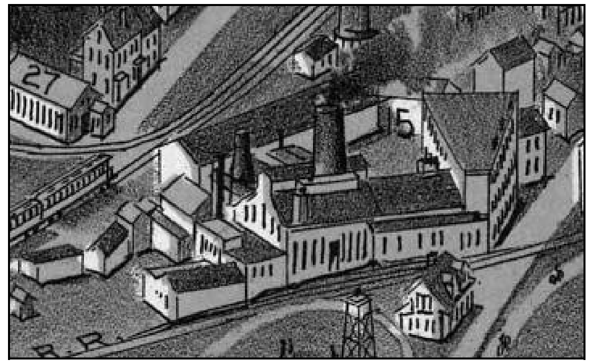

Figure 5 – Hazel Glass Co. (Fowler 1897)

The company built a second day tank in 1893, adding catsup, maple syrup, and chili sauce bottles to the production list, and began using semiautomatic machinery designed by Charles E. Blue at a continuous tank in 1895 (Creswick 1987a:267; Florence & Florence 2004:5-6; Roller 1983:458-459; 2011:669-670; Six 1993:12; Toulouse 1969:361; 1971:240-241). By 1900, Hazel was ready to expand again. The company moved machinery into the abandoned plant of the Griffith Tin Plate Co. and began making bottles and jars. The factory originally had a single tank but expanded to two tanks in 1902 when Hazel-Atlas was formed (see below) and added a third tank the following year (Caniff 2001:12; Florence & Florence 2004:6).

Blue and the Early Machines at the Hazel Glass Co.

Although Brady (1913) remembered approaching Blue in 1892, he stated that Blue had already founded the Wheeling Mold and Foundry Co. West Virginia state records, however, noted that the Wheeling firm incorporated on June 5, 1893. Although Blue *could* have begun as a personal business, then incorporated, it is more likely that Brady's memory was a year off.

About that same time (1892 or 1893), the Hazel Glass Co. tried another machine. Brady (1913) recalled that "the United States Glass Company had obtained the Arbogast patent through Ripley & Company, who owned that patent before going into the United States Glass Company, the Hazel was operating under that patent under license." Algeo (1956:24) added that the Hazel Glass Co. "used the U.S. Machine, sometimes called the Ripley, and made our first Chesebrough bottles on it about 1892."

The September 23, 1896, issue of *China, Glass & Lamps* (1896:13) confirmed the earlier machine use: "For several years, Hazel Glass Co., Washington, PA, have [*sic*] been experimenting with improved processes of manufacture under the patents of the United States Glass Co." As noted above, there were problems with the Ripley (or Arbogast) machine, and it seems likely that this deficiency may have driven Brady to seek out Blue about 1893. By that time, Brady may well have been thoroughly dissatisfied with the functioning of Ripley's machine. The American Flint Glass Workers Union was adamantly against the use of machines, so both the experimentation and actual production using Blue's device was conducted in non-union shops – almost certainly the Hazel and Atlas glass plants (Bernas 2012:37).

As Brady (1913) remembered, the development of Blue's first machine was a distinct process. The Hazel Glass Co. had agreed to supply Blue

> with money to build the machine. Some months afterward the machine was sent to the resent No. 1 Factory, but wouldn't work, so it was sent back to Wheeling a number of times but couldn't be made to go, and all of our people were very decided that it would not make glass, and my juniors did not want to spend any more money on it. Finally, Charley said to me. 'If you will give me $350 more, I am so sure I can make it go that I will pay it back to you (if I am ever able) if it doesn't go.' I finally gave him a check, and he had the machine sent to Wheeling, and the next time we tried it we made good, and the machine was afterward known as the Blue machine . . . the first step in blowing bottles by machinery.

While Blue had developmental issues with the machine, Brady had legal problems to deal with. Brady (1913) recollected:

> One day I showed Dan Ripley the Blue machines operating and he said we were infringing the Arbogast patent. I felt quite sure that if Hazel were to fight the patent we were in a bad position, operating under a license and infringing, if court decided we were doing so, and it would cost the Hazel Company a big lot of damages, so the Atlas Glass Company was formed.[5]

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[5] Brady probably showed Ripley the Blue machine towards the end of 1895 or early 1896 because the threat of infringement was one reason Brady and his associates formed the Atlas

Although we have not discovered the exact mechanism for Ripley's anger being deflected away from the Hazel Glass Co., the *Steubenville Herald* (5/11/1897) reported that the U.S. Glass Co. had, indeed, sued the Atlas Glass Co. rather than Hazel. In a firm decision, the court found that the Blue machine, with its sliding press mold (see description below) was distinctly different from the patents owned by U.S. Glass (*Federal Reporter* 1900:338-339).

Despite the patents belonging to Blue, Scoville (1946:324) claimed that Blue's inventions were often called the Atlas or Beatty-Brady machines. The *National Glass Budget* (1918:8) helped explain that

> the next step, the blowing of fruit jars by machine, came along in 1896, the process a combination of the Arbogast and the British Windmill and Rylands Kings Grants, having been developed in the non-union Atlas Glass Works, at Washington, Pa., under the direction of the late Robert J. Beatty, associated with inventor Chas. N. Blue, of Wheeling

It seems probable that the Blue patents owed at least some of their ancestry to Brady's 1890 patent.

Atlas Glass Co., Washington, Pennsylvania (1896-1902)

Brady, along with R.J. Beatty, George Beatty, and J.W. Paxton, next formed the Atlas Glass Co., also in Washington, Pennsylvania, specifically to produce fruit jars using Blue's machine (Figure 6). Atlas incorporated on April 8, 1896, at Washington, Pennsylvania, and began production in late July 1896, with the manufacture of green (aqua) canning jars. Brady transferred the rights to make fruit jars on the Blue machine to

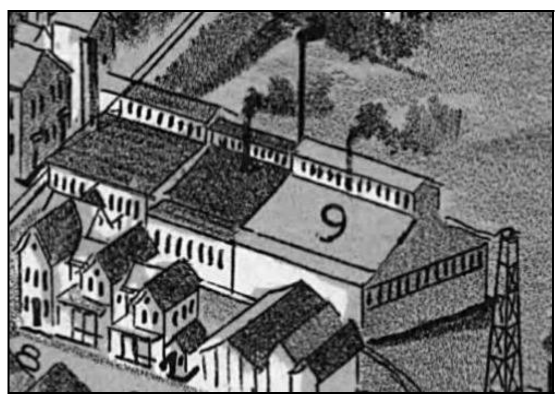

Figure 6 – Atlas Glass Co. (Fowler 1897)

Glass Co. – according to Brady. U.S. Glass Co. filed the suit in April 1897. The case was heard on May 30, 1897, and a ruling handed down on April 13 of the following year.

Atlas Glass, while continuing to produce packers' ware – including Vaseline, polish, jam, and pickle jars – at the Hazel plant (Bernas 2012:37). Atlas Glass merged with the Wheeling Metal Co. and the Republic Glass Co. in October 1901 to form the Atlas Glass & Metal Co. In 1902, Atlas and Hazel merged to form the Hazel-Atlas Glass Co. (Caniff 2001:11; Creswick 1987a:262; Florence & Florence 2004:6; Roller 1983:459; 2011:669-670; Toulouse 1969:362; 1971:55, 421).

The British Connection

In a serendipity that was apparently common in the glass industry, Blue may have unknowingly come up with a mold system that was very similar to the one invented in England by James Windmill in 1886 and a machine employing a revolving table system invented and patented by Dan Rylands two years later (see the discussion under "The Mold by Charles N. Brady" in the early part of this study). Brady may not have recognized the similarity and possible infringement issue until a few years later. It was then that Brady and his associates quickly rescued the situation. Brady remembered that "we sent J.W. Paxton and C.E. Blue to England. They bought the American rights under those patents, so we felt pretty strong" (Brady 1913). As it turns out, these actions were unnecessary because both of the U.S. patents had expired in 1896 as determined in the 1900 case Atlas Glass Co. v. Simonds Manufacturing Co.

Windmill's 1889 Patent

James Richard Windmill of Brierly Hill, Stafford, England, received British Patent No. 8,526 (of 1886) on June 29, 1886. Windmill applied for a United States patent for a "Mold for Glass Bottles, Jars, and Other Like Articles" on January 14, 1889, and received Patent No. 416,389, on December 3, 1889 (Figure 7). Windmill assigned the patent to Dan Rylands of Barnsley, England. He had received a British patent in 1888.

Windmill's mold was a three-piece device plus a baseplate. An outer mold consisted of two pieces hinged together at one side, with a fastening device at the other side to hold the mold set closed. Inside this two-piece mold was a one-piece mold that slid down when it was no longer needed. With the inner mold removed, a baseplate slid into place, completing the final mold.

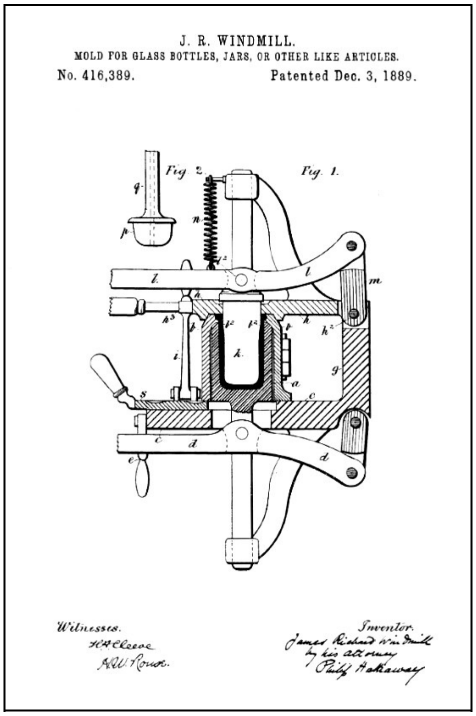

Figure 7 – James R. Windmill 1889 patent

The actual operation worked in two stages – similar to the way the Ripley machine operated.[6] First, with the two outer molds and the inner mold in place, the operator dropped a gob of glass into the inner mold – also called a blank mold or parison mold in the glass industry. A plunger entered the top of the blow mold and pressed the glass against the sides of the finish in the blow mold and the sides and bottom of the parison mold to create the basic shape, the finish, and a hollow to receive a puff of air in the second stage.

In the second stage, the parison mold slid down, leaving the parison (first stage of the jar) suspended from the finish within the final or blow mold. The baseplate then slid across the bottom of the open mold, sealing it off. A blow pipe lowered onto the top opening to introduce compressed air that then blew the glass into its final shape. The catch on the side was released, and the hinged mold swung open to release the completed jar.

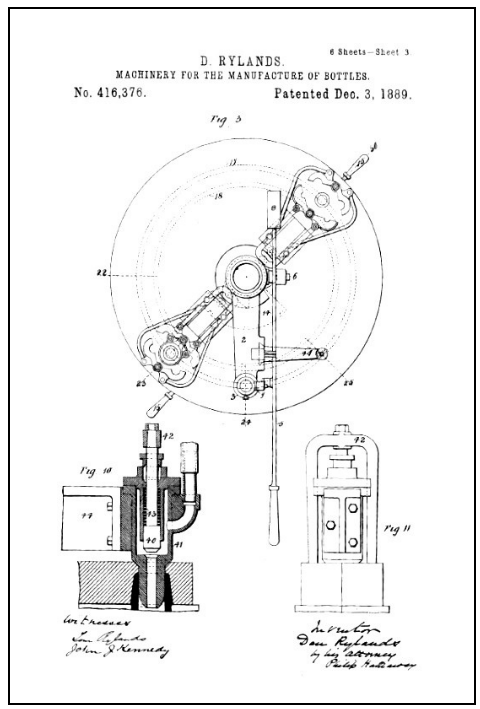

Figure 8 – Dan Rylands 1889 patent

Rylands 1889 Patent

Dan Rylands received British Patent No. 3,268 (of 1888) on March 3, 1888. On January 23, 1889, Dan Rylands applied for a patent for "Machinery for the Manufacture of Bottles." He received Patent No. 416,376 on December 3, 1889, the same date that Windmill was granted his mold patent (Figure 8). While of less importance for the scope of this work, Rylands invented

[6] Although the Ripley machine was developed slightly later, we have presented it earlier in this study.

the revolving table that created a practical environment for Windmill's mold to perform effectively. These two patents then paralleled Blue's first two inventions.

Table 3 – Summary of Jar-Related Blue Machine Patents Grouped by Application Dates

App. Date	Rec. Date	Pat. No.	Most Relevant Characteristics
June 27, 1894	December 25, 1894	531,609	V-shaped groove just below neck/shoulder joint; no base scars*
January 18, 1896	September 1, 1896	567,071	same
November 16, 1896	June 15, 1897	584,665	same
November 16, 1896	July 14, 1903	733,805	same
April 21, 1898	January 17, 1899	617,947	Distinct parting line at shoulder or neck/shoulder junction; no base scars
April 28, 1898	January 17, 1899	617,948	same
May 4, 1898	January 17, 1899	617,949	same
May 6, 1898	January 17, 1899	617,950	same
June 13, 1899*	July 14, 1903	733,806	Parting line at neck/shoulder joint; no base scars
July 17, 1900	September 17, 1901	682,906	V-shaped groove just below neck/shoulder joint; no base scars†
July 17, 1900	January 22, 1901	666,595	same

* These machines produced sharp edges on the mouth and finish seam of Vaseline jars.
** Patented in conjunction with William B. Jones
† These machines used double-cavity molds.

The Machines of Charles E. Blue

Although Blue patented a total of 23 glass machines, only 11 are of interest in this context. The others involved narrow-mouth bottles, glass gathering, or other glass-machine-related devices. Algeo (1956:24-25) described Blue's initial invention as "far ahead of the only other machine then making containers.”[7] He further noted that Blue’s machine was limited to the production of containers with a “wide mouth which had a pronounced and sharp shoulder at the junction of the neck and shoulder so that the top of the blank mold could make a tight joint with the shoulder of the blow mold.”

Blue’s machines fall into four categories, based on characteristics and the dates of patent application. Generally, researchers have focused on the dates when patents were assigned, even though these dates were often years (occasionally even a decade) after the inventor applied for the patent. We have divided the Blue machine patents according to the application dates because those are far more relevant to the actual characteristics of the machines. For a summary of the relevant Blue machines, see Table 3.

Although we will devote some discussion to the actual working of the machines and their patent history, the main focus of this study is on the finished product – the jars, themselves – and the marks that should have left by the machines – according to the patent drawings.

Blue’s First Machines

As noted above, Blue applied for his first jar-making patent on June 27, 1894 and received Patent No. 531,609 on December 25 of that same year (Figure 9). Blue assigned one-half of the rights to Arthur G. Hubbard and Louis V. Blue both also of

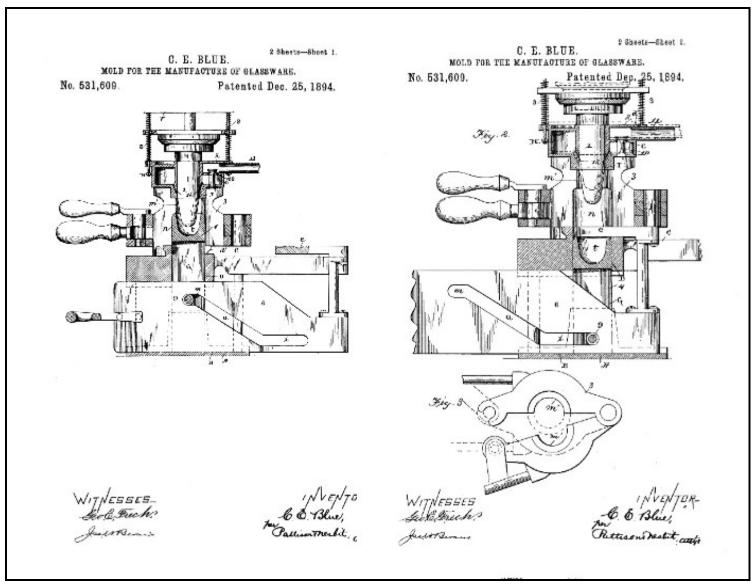

Figure 9 – Charles E. Blue 1894 patent (No. 531,609)

[7] Bernas (2010:37) made the assumption that the “only other machine” in Algeo’s description was the Ripley machine, and that is probably correct. However, the Ashley (Johnny Bull) machine was also manufacturing bottles (although narrow-mouth ones) at the time.

Wheeling.[8] As noted above, both of these men were among the original incorporators of the Wheeling Mold and Foundry Co.

This patent was very similar to the 1889 Windmill patent and worked on exactly the same principle. The parison mold slid in or out of the final (blow) mold, forming the finish with the top of the blow mold. Blue applied for three additional machines during 1896 but received the patents over a six-year period (1896-1903). Although there were some minor changes in each machine, the molds were virtually identical.

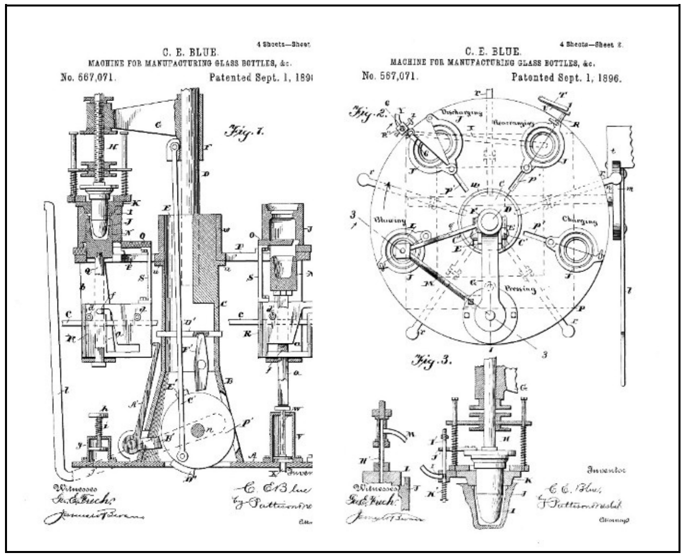

Figure 10 – Blue's 1896 patent (No. 567,071)

Just a year after receiving his first (mold) patent, Blue applied for his initial machine patent – on January 18, 1896. He received Patent No. 567,071 on September 1 of that year and assigned one-quarter of the rights to Arthur G. Hubbard (Figure 10). As noted above, Hubbard was one of the original principals in Blue's foundry.

Blue's 1896 patent was for a five-stage machine – very similar to the one patented by Dan Rylands – with his same 1894 mold. Although the machine turned in a circular motion through all five stages, it produced a jar with every press of the lever. The machine probably required two skilled operators and a "discharging-boy" to remove the finished container.

On November 16, 1896, Blue applied for two improvements. He received Patent No. 584,665 on June 15, 1897, and Patent No. 733,805 on July 14, 1903. The first of these further mechanized the operation of the machine. This may well have been the first Blue machine actually placed into operation at the Hazel and Atlas plants. The latter patent replaced the single rotating table with a two-table rotating and sequenced process with five blow molds affixed to

[8] The patent actually stated the first name as Arthur E. Hubbard, but the incorporation papers used Arthur G. Hubbard.

the primary table and five pressing molds mounted on the second or lower table. Again, the mold configuration remained essentially the same.

Blue's Second Set

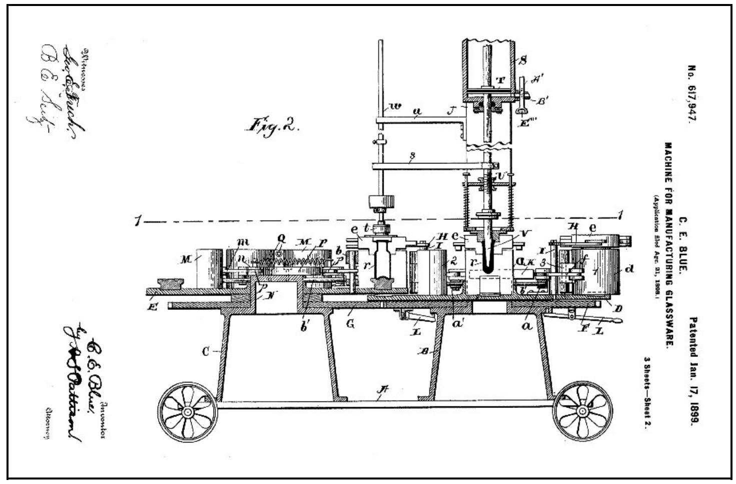

Figure 11 – Blue's 1899 patent (No. 617,947)

In 1898, Blue applied for a series of four patents (on April 21, April 28, May 4, and May 6 that essentially used the same mold configuration. The molds applied the same system that was originally devised by Philip Arbogast in 1881 (patented 1882) – a neck ring that formed the finish of the container, separate from either the parison mold or the blow mold but fitting into the tops of both. Blue received all four patents on January 17, 1899.

On April 21, 1898, Blue applied for the first of this second series of patents. He received Patent No. 617,947 on January 17, 1899 (Figure 11). As noted above, the primary purpose of this invention was to separate the parison and blow molds. The parison (press mold) opened after the gob of glass was pressed into shape, and a mechanism transferred the parison – now supported by the neck ring – to an open set of blow molds, which then closed around it. The patent used a two-table system.

Blue's April 28 (1898) application (No. 617,948) made only slight revisions to the April 21 idea, but his May 4 application (No. 617,949) returned to a single table. The final application, May 6, (No. 617,950), however, returned to the two-table system used by the first machine of this set. All four patents used the separate parison and blow mold system, using the neck ring as a transfer device after it had formed the finish.

A Slight Alteration

On June 13, 1899, Blue applied for Patent No. 733,806, although he did not receive the actual patent until July 14, 1903 – four years later (Figure 12). The primary changes in this system revolved around the use of an extra blow mold, although the same basic system of mold sequencing remained.

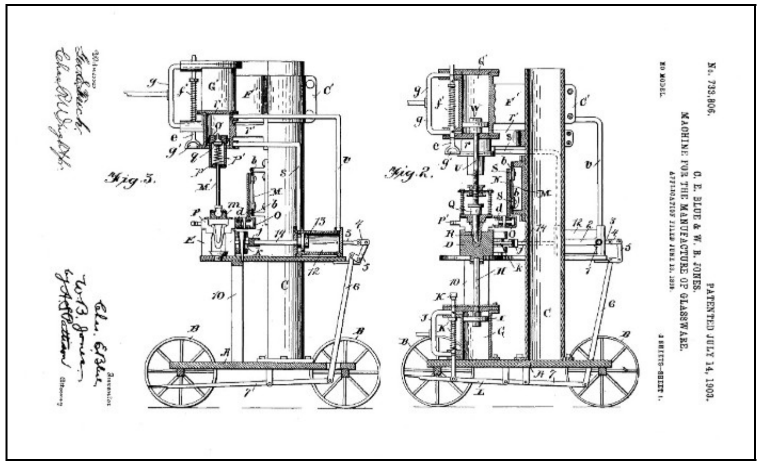

Figure 12 – Blue’s 1903 patent (No. 733,806)

The Final Changes

Blue applied for both patents in this final set on July 17, 1900, and both were concerned with using two-cavity molds. He received Patent No. 666,595 on January 22, 1901. His primary drawings for this machine reverted to his original idea of using a drop-down press or parison mold that resided inside the blow mold. However, he also allowed for separate parison and blow molds that utilized the neck ring to move the parison (Figure 13).

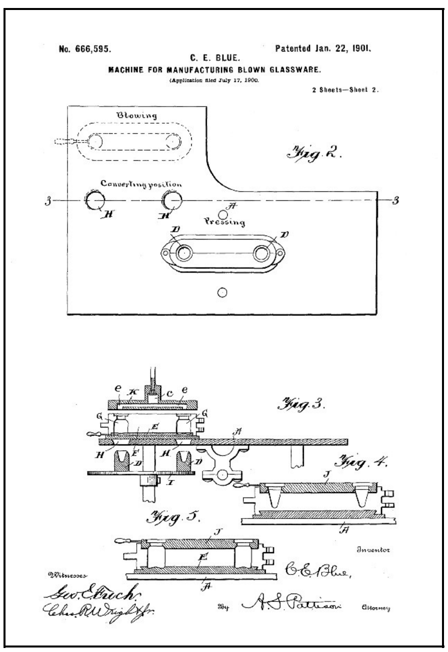

Figure 13 – Blue’s 1901 patent (No. 666,595)

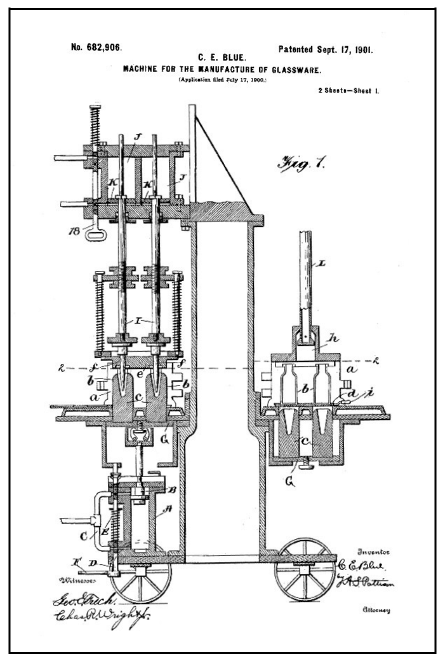

Figure 14 – Another Blue 1901 patent (No. 682,906)

Although the application was filed on the same day, Blue received Patent No. 682,906 on September 14, 1901 – almost nine months later. This machine, too, centered around the idea of the double-cavity mold, producing two jars with every press. This design, however, only allowed for the drop-down parison mold (Figure 14).

Evidence Preserved in Glass

The primary purpose of this study is to address the probable marks – primarily seams or parting lines of various sorts – that could identify jars made on each of these machines – or the lack of expected marks, especially basal scars. The typical 20th century machine-made jar has a predictable set of markings – although there are some variations. The markings may be divided into three categories: parting lines, side seams, and basal scars. These need to be addressed separately.

Parting Lines (Horizontal Seams)

Parting lines are horizontal mold seams created where different mold parts joined. Starting from the top, a typical machine mold consisted of four parts: the top plate (sometimes built into the press head and blow head); the neck ring or ring mold, the body mold (always two parts), and the baseplate (Figure 15).

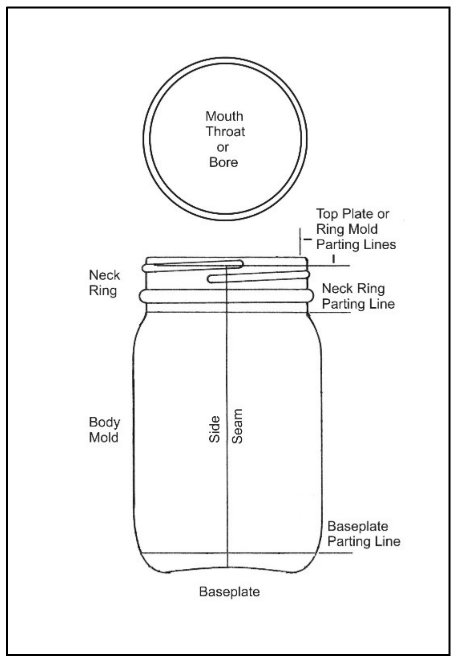

Figure 15 – Types of parting lines and seams on a jar

The top plate actually created two seams. The first is of little importance to this study because it was present on virtually all (probably *all*) machine-made jar or wide-mouth bottle finishes. This seam encircles the throat or mouth of the container, where the top plate was brushed by the plunger that formed the parison. The second seam or parting line is around the outside of widest part of the top of the finish. It must always be at that level because the top plate lifted straight up from the top of the finish. Both the plunger (in the parison stage) and the blow head (in the blow-mold stage) rested atop the container, and each had its own top plate that fit into the same indent in the ring mold *or* each fit onto a top plate.

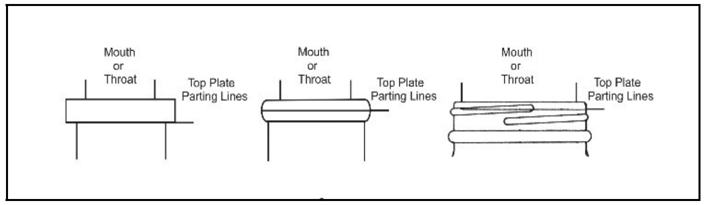

Figure 16 – Parting lines around finishes

The top parting line may be at the very top edge or bottom edge of squared finishes. In this case, it may be virtually invisible because it is at a corner. On rounded finishes, this line may be halfway down the top ring. On threaded finishes, the top parting line is usually at the very top (Figure 16).


Figure 17 – Post-bottom base

The neck ring also created a parting line at some point below the finish, where the neck ring joined the body molds. This parting line was almost always immediately at the base of the finish or just below it. Depending on the type of machine, however, this joint *could* be part-way down the neck, at the shoulder/neck joint, or slightly below the shoulder.

The early Blue machine, because of its drop-down parison, should have left a unique type of parting line near the neck/shoulder junction. We expected this line to be either very faint or very sloppy. Because this was a unique design, there is no parallel to this characteristic on jars made in other types of machinery.


Figure 18 – Cup-bottom base

The final parting line is located at the juncture of the body mold and baseplate. This type of base is called a cup-bottom baseplate because it is made in the shape of a cup. The earliest bases (including a few machine designs) used post-bottom baseplates, defined by a round seam generally near the edge of the bottle or jar base (Figure 17). However, almost all machine-made jars and bottles used some form of cup-bottom base. Although the profile shapes of the bases varied – with different configurations for different jars – the important definition for identification is the cup-bottom (Figure 18).

Side Seams (Vertical Seams)

Side seams are vertical seams on the sides of a jar caused by the intersection of two mold halves. On machine-made jars, these almost always occur on the body and neck. On most machines, the finish is also created by two mold halves, so a vertical seam also extends upward through the finish to the top parting line. Depending on the type of machine and the quality, the side seam of the finish may be slightly offset from the side seam of the body, although this is atypical. Some of these seams may be somewhat indistinct or even sunken, although most are raised above the level of the molded glass.

Ghost Seams

Ghost seams are secondary side seams that run roughly parallel to the side seams but are usually fainter. They may be straight, slightly curved, and/or slightly distorted. Ghost seams are made by machines that use two-part molds for both the parison and blowing operations. Each process leaves a vertical seam on the container. Ideally, the two molds are aligned so that the seam from the blow mold sets exactly atop the parison-mold seam and obscures any difference. However, if the parison is slightly turned as it is moved from the parison mold to the blow mold, a ghost seam will be formed slightly offset from the final seam (Figure 19).

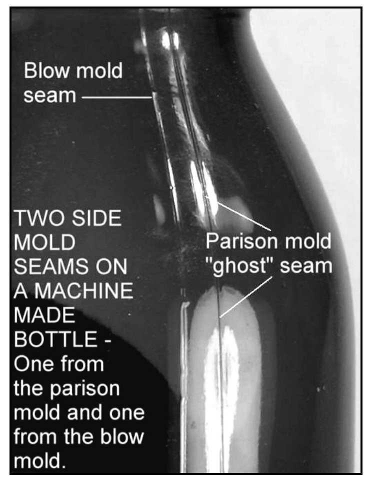

Figure 19 – Ghost seam on beer bottle (Lindsey 2013)

In extreme cases, this offset can be somewhat bizarre. Although very unusual, a vertical seam can extend downward from the neck ring parting line more than halfway to the base. A second vertical seam, offset by an inch or more can extend upward from the basal parting line to a point more than halfway up the body (Figure 20). Such extreme cases are rare, but they *do* occur.

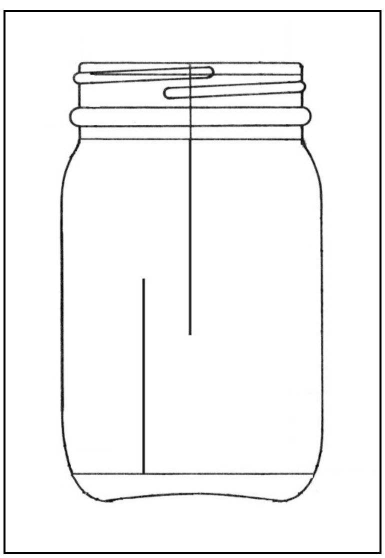

Figure 20 – Radically offset ghost seams

Basal Scars

Several markings can occur on a base that are generally of no diagnostic value. These include concentric striations that only show that the base was turned on a lathe, probably the most common practice. In other cases, the lathe marks are polished off. Bases generally have concave centers and various types of circular resting points (the point where the jar actually sits on the table). Since these can be machined into almost any individual base, they are of little use for identifying the type of machine.

Figure 21 – Ejection or valve scar

Machine scars of one type or another are almost always diagnostic and occur on the vast majority of containers. These generally fall into four types. One of the most common was created by typical press-and-blow machines and the other appeared on typical blow-and-blow devices.

Figure 22 – Typical blow-and-blow machine scar

In typical press-and-blow machines, the parison was ejected from the one-piece parison mold by a rod or valve. The ejection device left a pronounced circular scar on or near the center of the container's base. Because the parison did not always settle evenly into the base of the blow mold, the scar can be somewhat off center (Figure 21). In at least one patent (*not* one of the Blue patents), these valve scars were caused by a valve that vented the base of the mold.

Typical blow-and-blow machines leave an uneven, thin-line scar on the base that is usually off center. This scar is created by the base of the parison mold. It is then distorted by the transfer to the blow mold and the subsequent uneven settling (Figure 22).

Figure 23 – "Feathered" Owens machine scar

The early Owens Automatic Bottle Machines created a variation of the blow-and-blow scar because they used a unique method of sucking the glass into the parison mold and cutting it off with a “knife.” Since the knife slid along the bottom of the sides of the mold, the edges of the scar were usually jagged or “feathered.” In later Owens machines, however, the scars became more like typical machine marking due to improvements in glass formulae, increased maintenance, and advancements in machine design (Figure 23).

The final and much more unusual category identifies bases with no scars (Figure 24). These lack any of the three characteristics described above. According to patent drawings, both the Ripley and Blue machines appear to have left no basal scars. Although the study of early machines is in its infancy (or maybe its adolescence), it appears that very few machines fit into this scarless group, and all of them were probably early.

Figure 24 – Base with no scars

The Mark of the Machine

We now turn to the heart of this study. Can we determine what types of markings were made by each of the early machines? The first step is a close look at the patent drawings for the Arbogast mold, the Ripley mold, and molds in each of the four categories of Blue machines. What we want to discover is whether the seams and/or scars left by these machines were different from each other and whether the early machines left different characteristics from the later ones.

The Arbogast 1882 Patent (No. 260,819)

As noted above, the Arbogast machine was far ahead of its time, but it was unsuccessful. Although the following characteristics are based on the patent drawing, there are probably no actual jars or wide-mouth bottles that were made on an Arbogast machine.

Parting Lines

The top plate sat atop the neck ring, so the top seam would have been at the top of a squared finish. Since the neck ring extended part-way down the shoulder the second parting line would have been visible at that point. Because the drawing showed no baseplate, there would have been no parting line at the base/heel juncture (Figure 25).

Side Seam and Base

The neck ring, parison mold, and blow mold were all two-part, side-hinged molds, so a single side seam would have extended from the top of the finish on one side, all the way down and across the base, to the top of the finish on the other side. Since all three parts were hinged molds, ghost seams may have been present on virtually any segment of the container, and the seam made by the neck ring could have been offset from the body seam.

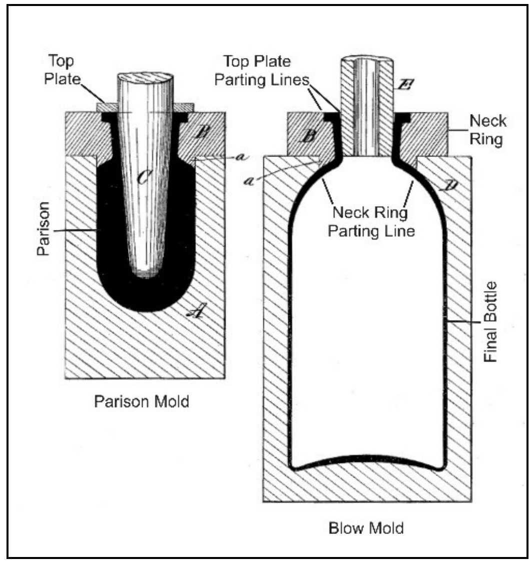

Figure 25 – Detail of molds from the Arbogast patent

Daniel C. Ripley's First 1891 Patent (No. 458,190)

On January 13, 1891, Daniel C. Ripley filed for a patent for a "Machine for Blowing Glassware." He received Patent No. 458,190 on August 25 of that year. The machine consisted of a single press section that also received the blowing operation. Ripley's drawings showed a hinged, two-piece neck-ring mold with an indent to take a top plate, above a two-part parison mold. The blow mold was also formed in two parts; however, Ripley noted that "the bottom of the mold is preferably a removable plug or disk." This was the only illustration in any of the oldest machines that showed a continuous-thread finish in the drawings of what appeared to be a

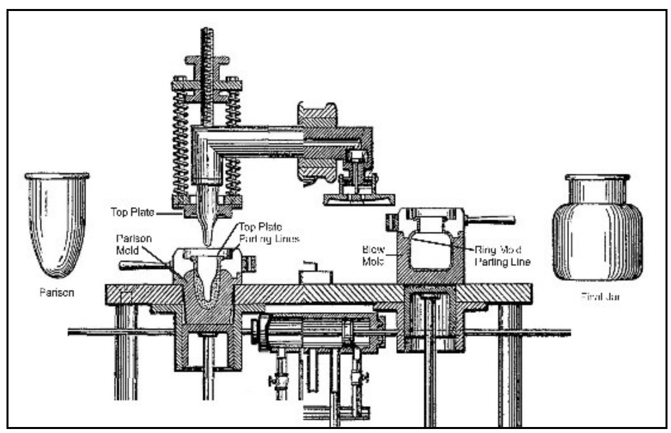

Figure 26 – Detail of molds from the Ripley's first jar machine patent, plus parison and finished jar

mustard jar (Figure 26). The single-part parison and blow molds produced marks that were unique compared to other early jar characteristics.

Parting Lines

Ripley's drawings of this machine illustrated a mustard-style jar with a continuous-thread finish. The top plate on this mold sat atop the finish, creating a parting line around the outside circumference of the rim. The neck ring was very thick, so the parting line created by the junction of the neck ring and body mold was significantly below the shoulder. Because the base had a post-bottom, there was no heel/base parting line.

Side Seams and Base

Because both the ring mold and body mold were made with two parts, the side seams on these jars should only extend from the top of the finish (or just below that point) down the sides, under the edge of the base to connect with the circular seam just within the circumference of the base. The circular seam would have been created by the plug or disk shown in the drawing and described in the text that effectively created a post-bottom base.

Daniel C. Ripley's Second 1891 Patent (No. 461,489)

Ripley applied for another patent on April 29, 1891, and received Patent No. 461,489 on October 20 or that year. This machine was almost certainly adapted from Ripley's earlier designs for machine-made tableware. This device used a one-part mold for both the parison and blow molds – again creating unique marks (Figure 27).

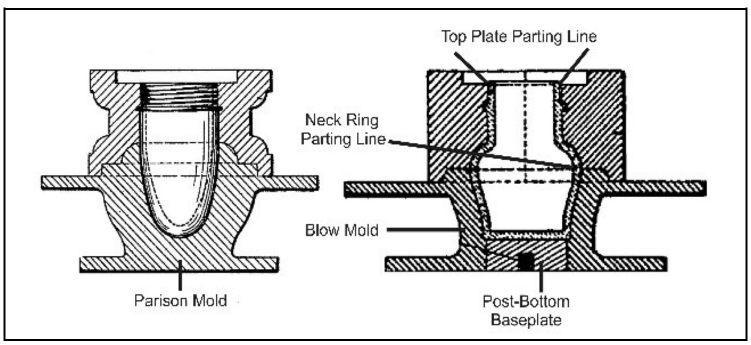

Figure 27 – Detail of molds from the Ripley's second jar machine patent

Parting Lines

Ripley's drawing showed a pomade-style Vaseline jar with a rounded single-ring finish. The top plate was machined to create the top half of the ring, leaving a parting line around the outside circumference of the ring. The neck ring extended downward to the bottom of the shoulder. Since the body mold was constructed as a single piece, the parting line could *not* have been on any part of the shoulder. The sides of the body had to be either be parallel to each other or slightly flared from bottom to top to facilitate removal from the blow mold. Again, since the body mold was a single piece, there could be no parting line at the heel/base juncture.

Side Seams and Base

Because the neck ring was the only two-part mold in the set, the side seams should extend only from the mid-section of the single-ring finish to the bottom of the shoulder. Again, because of the one-part parison mold and one-part blow mold, there can be no seams of any kind below the shoulder and no ghost seams anywhere on the jar. There should also be no diagnostic scars on the base, although the base could be any shape in profile.

The Initial Patents of Charles E. Blue (No. 567,071)

Although we selected the drawing from Blue's first *machine* patent (No. 567,071) applied for in 1896, the characteristics described below also apply to his initial mold patent (No. 531,609), applied for in 1894, and Patents No. 584,665 and 733,805, from applications made in 1896. As noted above, the parison mold for this set was nestled *inside* the blow mold – then it slid down and a baseplate slid into place for the final blowing operation. Blue's first 1896 patent illustrated a pomade-style Vaseline jar.

Parting Lines

Like most of the early machines, the top plate on this one was flat, so the top parting line would have been at the very edge of the rim (top) of the jar. The drawing showed a rounded single-ring finish, but, unlike the Ripley machine, the line would have been at the top rather than the center of the finish. Because the single-piece parison nestled against the shoulder of the blow mold, it should have left some form of mark. However, the horizontal line may be distinct, or it may be very faint. Conversely, however, the line could have been very sloppy. The base/heel parting line would have reflected the cup-bottom baseplate. Although the drawing we chose does not illustrate a cup bottom, *all* of the drawings in the other patents shows the cup-bottom baseplate (Figure 28). It is interesting to note that the top plate/plunger guide is virtually identical with the one on the 1890 Brady patent – a possible indicator that Blue based some of his ideas on Brady's mold. The two certainly collaborated on design features and development.

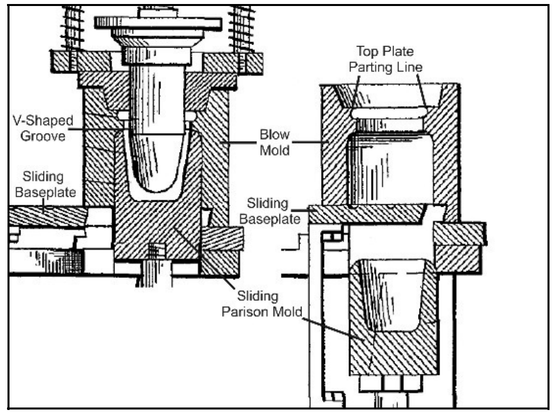

Figure 28 – Detail of molds from one of Blue's early patents (No. 567,071)

Side Seams and Base

Side seams on this set of patents would extend from the top of the finish (edge of the rim) to the parting line at the base/heel juncture. Because of the single-piece parison mold, there is no possible way that this machine could have produced ghost seams. There was no ejection system in place, so the parison was pulled from the mold, leaving no valve or machine scars.

Blue's Second Set of Patents (No. 617,947)

Blue applied for four patents (No. 917,947, 917,948, 917,949, 917,950) in April and May of 1898 and received them all on January 17 of the following year. This design used a two-part ring mold atop the two-part parison mold and two-part blow mold. The top plate fit within the ring mold, and the baseplate was located inside the blow mold – very unlike the sliding baseplate of the earlier set of patents (Figure 29).

Parting Lines

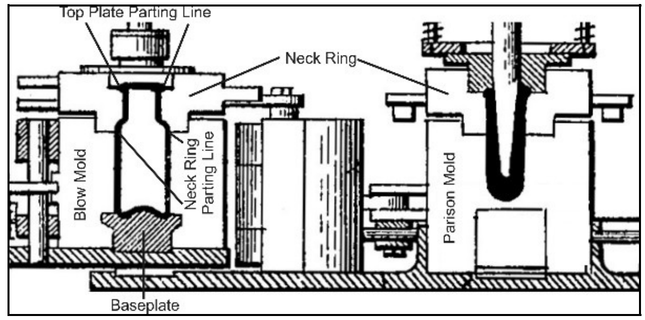

Figure 29 – Detail of molds from one of Blue's second set of patents (No. 917,947)

Because the top plate fit inside the ring mold, the parting line was around the center of the single-ring finish in the drawing. On a squared finish, this would probably have been at the outer edge of the base of the finish. The parting line at bottom of the ring mold was at or just below the shoulder. The parting line at the base was in the typical base/heel juncture.

Side Seams and Base

Side seams should extend from the center of the finish to the basal parting line. Due to the construction of the machine, ghost seams may be present but should not be drastically offset between the ring mold and the body mold. As with the other early machines, there is no ejection mechanism, so none of the basal scars should be present.

Blue's Third Design (Patent No. 733,806)

Although this patent application was submitted on June 13, 1899, it was not received until July 14, 1903. The mold design on this patent is only slightly different from previous set, and all the parting lines, side seams, and basal characteristics should be identical with Blue's second set of patents – with one exception. The patent drawing illustrated the parting line at the bottom of the ring mold should be at the neck/shoulder joint or just above it – rather than at the base of the shoulder in the 1898 series (Figure 30).

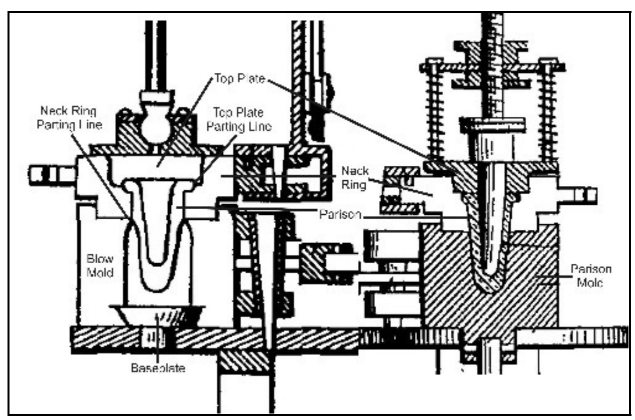

Figure 30 – Detail of Blue's 1903 patent (No. 733,806)

Blue's Final Set of Jar Patents (No. 682,906)

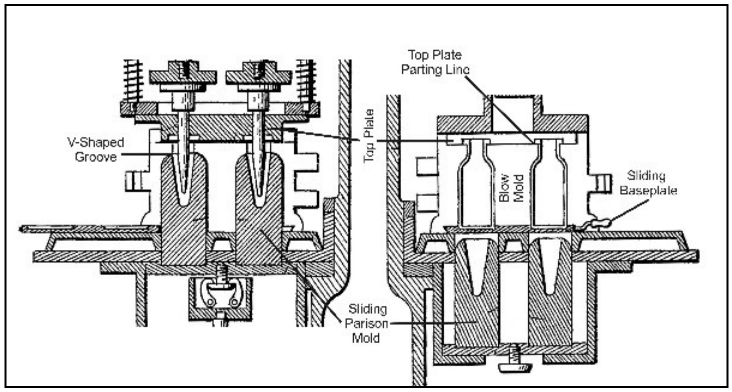

Figure 31 – Detail of one of Blue's double-mold patents (No. 682,906)

The final two patents are 666,595 and 682,906. Blue applied for each on July 17, 1900, and received Patent No. 666,595 on January 22, 1901 and Patent No. 682,906 on September 17, 1901. These constituted a return to Blue's initial design, with a sliding parison mold nestled within the blow mold. The top plate, however, fit into the blow mold instead of atop it. Thus, the parting line at the lip or rim is at the bottom of the squared ring rather than the top. The parting line caused by the top of the parison mold connecting with the blow mold was again at the joint of the neck and shoulder. The baseplate once again slid under the blow mold and created a parting line at the heel but no basal scars. The unique characteristic of each of these machines is that the molds were double cavity – making two bottles at a time in each mold set (Figure 31).

Examples of Actual Jars Made by the Early Blue Machine

We are fortunate to have discovered examples of two kinds of jars made in early Blue machines. One of these – Vaseline jars – will be discussed in detail in another venue, although we present relevant details here.[9] The other is a Mason jar. Even though our sample is small, it is sufficient to demonstrate the characteristics of the early Blue machines on actual jars.

Vaseline Jars

We have a sample of nine machine-made, pomade-style Vaseline jars. Most of these are embossed "CHESEBROUGH (horseshoe-shaped arch) / VASELINE (horizontal) (Figure 32).

[9] One of the authors is planning a major study Vaseline jars at some point in the future.

Two of these have a later embossing that was used at some point after 1900, just before Chesebrough adopted jars with continuous-thread finishes and screw-top lids. These were embossed "VASELINE (slight arch) / CHESEBROUGH (horizontal) / NEW - YORK (slight inverted arch)."

Figure 32 – Pomade-style Vaseline jar – old embossing

The jars had three types of finishes. Probably the earliest was a rounded ring with the parting line just below halfway down the ring. This fits the need for this top horizontal seam to be at the base of the lowest part of the finish, itself on the earliest four Blue patents (531,609; 567,071; 584,665; 733,805). The second type was squared, with distinct, right-angled corners. The third was similar to the second, but the sides of the finish had a slight upward taper (Figure 33).

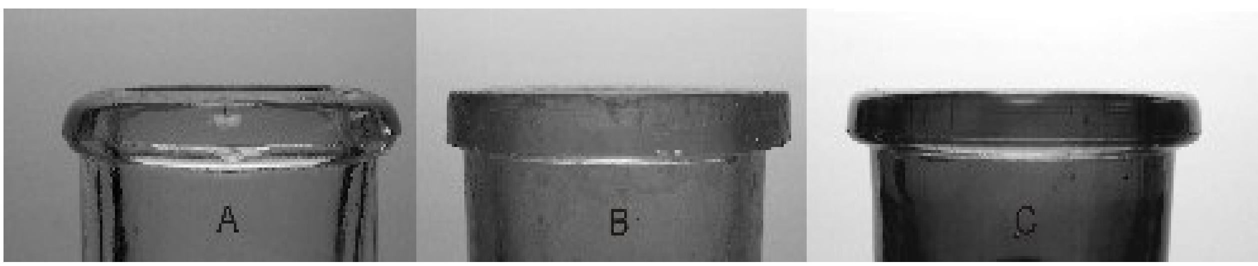

Figure 33 – Finishes on pomade-style Vaseline jars: A – Rounded; B – Squared; C – Tapered

The parting line on both of these latter finishes was at the lower edge. This was a departure from the patent drawings, which showed both the press head and blow head sitting atop the blow mold – creating a parting line on the *upper* edge. Such departures from the drawing to actual models, however, were quite common.

A common characteristic of all these Vaseline jars is sharp edges at the mouth of the jar and at the lower edge of the finish (or the horizontal seam or parting line encircling the rounded ring). In both cases, the glass comes to a 90-degree angle and frequently has tiny projections of glass (see Figure 33b). The sharp edge at the mouth seems to have been caused by the shape of the plunger during the parison stage, although it could have been exacerbated by blow head. In his early machine, Blue used a plunger that was tapered at the end but was cylindrical for most of its length. In each of his later machines, Blue used a plunger that tapered for its entire length.

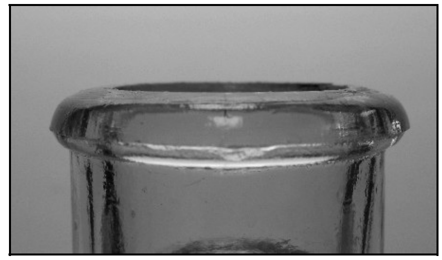

Figure 34 – Rounded finish on Vaseline jar

The seam at the lower edge of the finish was also at a 90-degrees angle on the squared finishes. However, the rounded finish also had a sharp, sloppy seam (Figure 34). Although the 90-degree angle almost certainly contributed to the sharpness, it is likely that a seam at that angle will simply not function well. We have yet to examine a machine-made bottle or jar – produced after the Blue machines – that had a seam at a right-angle juncture. On later jars, when a finish or other jar/bottle part was made with a 90-degree angle, the seam was elsewhere.

Figure 35 – V-shaped grooves just below neck/shoulder joint

In addition, Blue's plunger and blow head each had its own top plate. Thus, the juncture between the top plate and the rest of the bottle was in effect produced twice. Unless each top plate was molded perfectly, the system was virtually guaranteed to create imperfections at that point. Once again, later machines left the top plate in place and set both the plunger and the blow head inside it. Interestingly, the jars with slightly tapered, squared finishes seem to be less sharp in both places. These were certainly the latest of the pomade-style jars. They were replaced by jars with continuous-thread finishes but with the same three-line embossing on the front.

The most distinctive feature on these Vaseline jars was exactly where we expected a parting line of some sort, caused by the intersection of the drop-down press mold and the blow mold. This was in the form of a V-shaped groove that extended around the upper shoulder of the jar, just below (generally within 1/16th to 1/8th of an inch) the neck/shoulder joint. These are very distinct, and you can insert a fingernail and trace the ring completely around the jar (Figure 35 & 36).

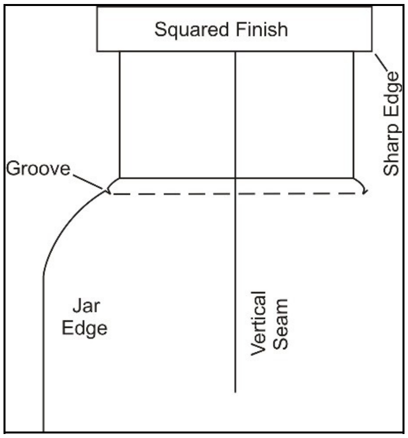

Figure 36 – Drawing of V-shaped groove


Figure 37 – Offset Vaseline base

Although the Vaseline jars had at least three basal variations (all involving *shape* – rather than any diagnostic characteristics), all had one feature in common. They all had no valve (ejection) marks or other machine scars (see Figure 24). All had cup-bottom bases, with vertical seams extending from the heel parting line to the lower edge of the finish. Occasionally, a base would be slightly offset from the body of the jar (Figure 37).

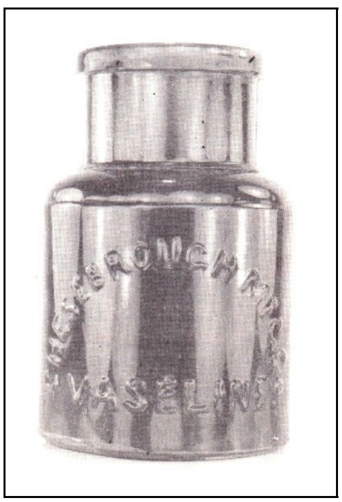
Figure 38 – Vaseline jar made on second set of Blue patents (Wilson & Wilson 1971:28)

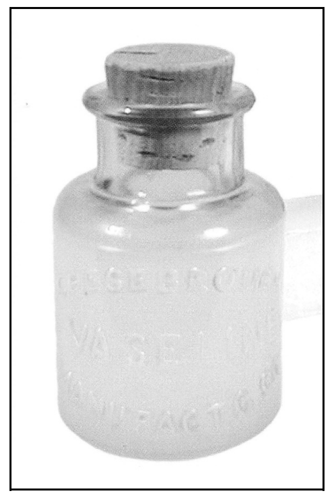
Figure 39 – Vaseline jar made on second set of Blue patents (Taylor 2006:13)

Vaseline jars were also made on machines based on the second set of Blue machine patents (applied 1897). Unfortunately, we have not located any examples, but both Wilson and Wilson (1971:28) and Taylor (2006:13) included photographs of the jars. The Wilsons illustrated a jar with a distinct parting line (horizontal seam) encircling the jar just below the shoulder and a finish ring with a rounded top and square bottom (Figure 38). The embossing is the earlier "horseshoe" style. Taylor, however, illustrated a jar with a distinct shoulder seam, a rounded finish, and the later three-line embossing (Figure 39). In both cases, there also appears to be a parting line at the neck/shoulder joint.

In summary, notable characteristics of pomade-style Vaseline jars made on one of the first sets Blue machine include sharp edges at the mouth, finish parting line (on rounded ring finishes), or lower edge of the squared finish. Each had cup-bottom bases with no machine scars and vertical seams from heel to finish. The most diagnostic characteristic was the V-shaped groove – caused by the intersection of the drop-down press mold and the blow mold – encircling the jar just below the neck/shoulder joint. Machines from the second set of patents (1897) had distinct parting lines just below the shoulder.

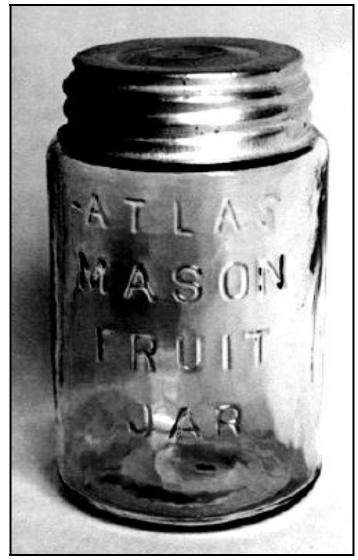

Figure 40 – -ATLAS- / MASON / FRUIT / JAR

Mason Jars

Our sample of Mason jars with early Blue machine characteristics is limited to seven actual specimens and at least forty photographs from the Internet. Just after aqua-colored fruit jars started to be made at the Atlas Glass Co. plant, trade journal reports indicated that the earliest vessels were a Mason style that used a zinc screw cap screwed down against a rubber ring on the vessel's shoulder to seal it (*Glass and Pottery World* 1896:09; *China, Glass and Lamps* 1896:9; *National Glass Budget* 1896:10). The shoulder seal examples are limited to jars embossed on the front with:

ATLAS / MASON'S (arched) / PATENT / NOV. 30TH / 1858
-ATLAS- / MASON'S (arched) / PATENT / NOV. 30TH / 1858

-ATLAS- (arched or straight) / MASON / FRUIT / JAR (Figure 40)

ATLAS. / MASON'S (arched) / PATENT
ATLAS / MASON'S (arched) / PATENT
-ATLAS- / MASON'S (arched) / PATENT (Figure 41)

The Atlas shoulder seal jars had only one type of finish, a raised continuous thread that coiled around the outer topmost part of the container's mouth. On the inner throat of the mouth, the above examples may or may not have a raised ring generated by the combined press/blow plunger as previously discussed. Some versions show this feature deteriorated into a coarse chipped surface.

Figure 41 – -ATLAS- / MASON'S / PATENT

Just above the thread and below the lip is a horizontal parting line encircling the outer finish. This feature does not appear at the corresponding location on the inner mouth because the plunging press head obliterated it, making a smooth inner surface on the inside of the finish. The region above the horizontal parting line or lip was formed inside the top plate of the press head. This action caused the formation of a seamless area of glass around the top of the jar's mouth. If formed properly, this characteristic will appear as a line all the way around the near top of the outer finish. However, if the top plate is off-center, one side of the finish will show a line while the other will have an initial flat surface before the contour of the lip begins. This trait is seen on the 1896 Blue patents (531,609, 567,071, 584,665; 733,805) and the 1898 series machines (617,947-617,950).

A second horizontal parting line is present out from the bottom of the jar's straight neck on the initial part of the slightly downwardly angled shoulder. Similar to the Vaseline jar, this most distinctive feature was caused by the intersection of the drop-down press mold and the blow mold. It is in the form of a V-shaped groove that extended around the upper shoulder of the jar, just below (generally within 1/16th to 1/8th of an inch) the neck/shoulder joint (Figure 42). These are very distinct, and you can insert a fingernail and trace the parting line completely around the jar. Again, this is an attribute seen on the 1896 Blue patents (531,609, 567,071, 584,665; 733,805) and is verified on jars embossed:

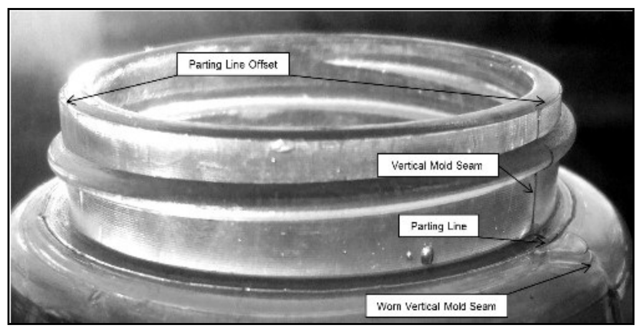

Figure 42 – Characteristics – including V-shaped groove – on early Mason jars

ATLAS / MASON'S (arched) / PATENT / NOV. 30TH / 1858
-ATLAS- / MASON'S (arched) / PATENT / NOV. 30TH / 1858
ATLAS. / MASON'S (arched) / PATENT
ATLAS / MASON'S (arched) / PATENT
-ATLAS- / MASON'S (arched) / PATENT

Jars embossed -ATLAS- (arched or straight) / MASON / FRUIT / JAR have the second horizontal parting line in a different location (Figure 43). On these examples, the line is at the intersection of the bottom of the neck and top of the shoulder; caused by the use of a hinged two-piece neck ring employed on Blue's 1898 series of machines (617,947-617,950).

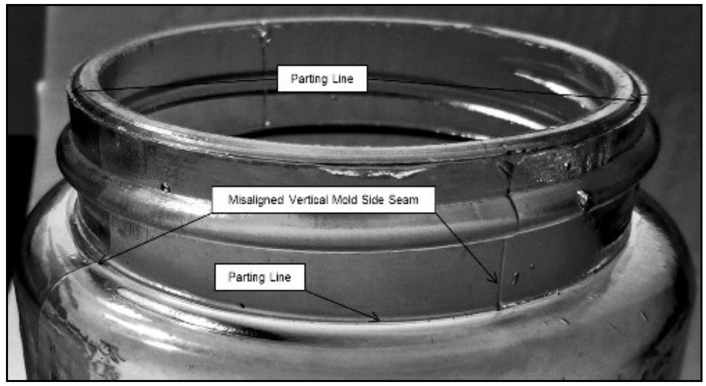

Figure 43 – Characteristics on -ATLAS- / MASON'S / PATENT jar

The final horizontal parting line encircling any of the above jars is at the intersection of the bottom of the body and the top of the base. As discussed in the lip section above, the base can be either centered or off-set with similar characteristics as the parting line below the mouth.

On opposite sides of the Atlas Mason jars identified above, there are vertical side seams. For all *except* the -ATLAS- (arched or straight) / MASON / FRUIT / JAR model, each seam extends from the bottom of the first horizontal parting line, down the finish through the thread to the intersection of the neck and shoulder and then across the first segment of the shoulder to second horizontal parting line, continuing down over the sloping downward shoulder to the intersection of the bottom of the shoulder and top of the body and finally down the body to the third horizontal parting line.

With the constant sliding up and down of the one-piece press mold, there would be endless metal-on-metal interaction with the inner shoulder region of the blow mold cavity. The outside shoulder of the press mold would rub up against the vertical side seams across the curved shoulder inside the blow mold each and every time it was put into motion, causing this area of the inner blow mold to be gradually smoothed out. This would mean that over time the distinct vertical side seam fragment on two-thirds of the shoulder would become less and less visible. As the molds age with use, this part of the vertical mold seam may become visually imperceptible, being only apparent to the touch.

Because of the two-piece ring neck feature used to produce the -ATLAS- (arched or straight) / MASON / FRUIT / JAR marked jars, the vertical seams can either align as above or terminate at the second horizontal parting line in one location and begin again at the same parting line at another position on the jar's body. The non-aligned finish-neck and shoulder-body vertical seams were caused when the pressed parison was transferred from the press to the blow mold on Blue 1898 series machines.

The edge of the vertical side seams can be smooth throughout or show accumulations of excess glass at various angles where the vertical seam crosses the top of the continuous thread, at the intersection of the neck and shoulder and at the intersection with the third horizontal parting line. The vertical side seams are very pronounced from the shoulder down to the base. All of these attributes can be seen on the embossed jars that follow.

ATLAS / MASON'S (arched) / PATENT / NOV. 30TH / 1858
-ATLAS- / MASON'S (arched) / PATENT / NOV. 30TH / 1858
ATLAS. / MASON'S (arched) / PATENT
ATLAS / MASON'S (arched) / PATENT
-ATLAS- / MASON'S (arched) / PATENT

Either centered or off-centered on a cup bottom mold style of base is a circular ring impression with a diameter of ¾ inch. Since Blue's 1896 patent submissions show no pressure release valve or parison ejection device – such as the one on Frank O'Neill's patented press (Patent No. 605,648; applied for on October 5, 1897; received on June 14, 1898), there are only three logical explanations for the appearance of this circular feature. First, Blue quietly modified his one-piece press mold and included a pressure release valve or ejection tool in the bottom of it. Second, Blue could have shortened the bottom of the press mold more than as shown in the patent drawings. Then a hole was drilled into the base of the one-piece mold, threaded internally and filled with a anchoring screw which came flush with the inner bottom part of the mold. Finally, the earliest jars had no such mark and haven't yet been discovered by collectors.

In summary, these examples meet most of the criteria established by the study for the Vaseline jars, if the closure differences are taken into consideration. The primary characteristics of the -ATLAS- (arched or straight) / MASON / FRUIT / JAR specimens were misaligned vertical side seams and a lack of machine scars on the bases. Prominent qualities for the jars with the other types of embossing were the V-shaped groove around the shoulder just below the neck/shoulder joint and the absence of any machine scars on the base.

A notable trait of all the Mason jars is the absence of sharp edges at the mouth and the bottom of the top plate – unlike the Vaseline jars described above. The outer seam of the top plate was offset slightly, probably due to the plate being built into both the press head and blow head, reforming the top plate in the blowing action. Blue's third and fourth sets of patents (1898 and 1899) returned to the use of the sliding press mold. By this time, the Blue machines used plungers that were tapered for their full length. In addition, the top plate was slightly rounded, which apparently eliminated the sharp edges. The Atlas Glass Co. bragged about the lack of sharp edges on its Mason jars (Gessner 1896).

Discussion and Conclusions

Regardless of the patent dates for the Arbogast process (1882) or either of the Ripley press-and-blow jar machines (1891), it is almost certain that the pomade-style Vaseline jars blown by the West Virginia Flint Bottle Co. in 1892 and the Enterprise Glass Co. (C.L. Flaccus) in 1893 were the first commercially produced, machine-made containers in the United States on machines designed under the Arbogast and/or Ripley patents. The jars were reported to be defective, specifically due to sharp edges at the mouth and finish.

About 1893, the Hazel Glass Co. joined the early production group, using the same Arbogast/Ripley machines to manufacture similar Vaseline jars. Hazel Glass was using machines designed by Charles E. Blue by ca. 1895 to make the Vaseline jars and other product jars. The following year, the machines were operating so well that Beatty, Brady & Co. opened the Atlas Glass Co., the first glass house founded specifically to make containers by machine. This lead the way into the machine age of wide mouth and semi-wide mouth jar production.

This time line begs more questions than it answers. Under this scenario, Vaseline jars would have been produced – on Arbogast/Ripley machines – in quantity for about four years prior to the use of a Blue machine. Our searches have yet to produce a single pomade-style Vaseline jar that displayed any of the characteristics shown by the Arbogast or Ripley patents. This suggests one of three very different conclusions. First, our assumptions about the characteristics made by these early machines are somehow flawed. While possible, this is unlikely for the reasons specified in the section on markings above.

Second, the machines, themselves, may not have conformed to the patent drawings. We cannot demonstrate this without seeing the mold sections from each of the early machines. It is highly likely that *some* modifications were made to each machine, especially as technology improved. However, it is unlikely that modifications were severe enough to change *all* the characteristics shown in the patent drawings.

The final possibility is that we simply have not found any of the oldest bottles. It is entirely possible that all of the Vaseline jars made on Arbogast/Ripley machines were generic (i.e., lacking the CHESEBROUGH / VASELINE embossing). Finding one of these generic jars would be like discovering the proverbial needle in a very large haystack.

The most important thing about this study, however, is that we *do* know the important characteristics for the earliest (and, probably, some of the later) Blue machines. The major characteristic that is – insofar as we can determine – unique to jars made on the early Blue machines, is the V-shaped groove just below the neck/shoulder joint. This groove, especially in conjunction with a base that lacks any of the typical machine scars, is the most diagnostic feature of the Blue machine.

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