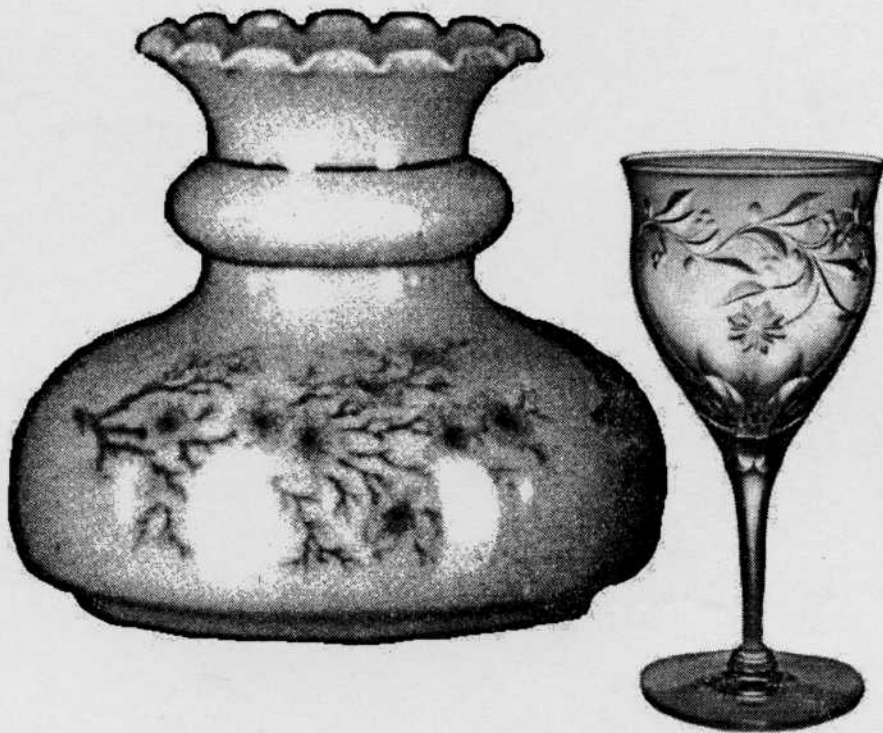


Extrinsic Ornamentation of Glass In The Morgantown Area



Rebecca J. Ball



Riverfront Museums, Inc. - Morgantown, West Virginia
Opening a window on the history of Monongalia County

Extrinsic Ornamentation of Glass in the Morgantown Area

By

Rebecca Jane Louise Ball

Morgantown
West Virginia
1960

Rebecca J. Ball's *Extrinsic Ornamentation of Glass In The Morgantown Area* was published as a typed document in 1960 as a thesis for the degree of Master of Fine Arts at West Virginia University.

The typography and illustrations in this edition have been redone by volunteers on behalf of Riverfront Museums, Inc.

Edition © 2001 by Riverfront Museums, Inc. All rights reserved.

Third printing

Riverfront Museums, Inc.

PO Box 469

Morgantown, West Virginia 26507-0469

Acknowledgments

The author realizes that the willing help and cooperation of numerous individuals has greatly contributed to the completion of this paper. Thus, to these many persons, she wishes to express appreciation.

This extended family list includes several members of the author's family, Anita, Gator, Lucy, Patsy, J.P., and Talumatta; friends - Theodosia, Florence, Margaret, Josephine, and Gilbert; the management and personnel of the eight local glass companies involved in this study, particularly Nick Dorohovich, George F. Jones, Senior, John R. Gentile, John E. Toth, Rose Marie Orosz, M.R. Davis, R. Emmett Lynch, John Wimer, Arner Lindquist, Samuel K. Hayden, Sylvia Long, Paul Sacco, Carl Sacco, and Delbert F. Howett; and her graduate advisor, Professor Charles E. Patton.

TABLE OF CONTENTS

Chapter	Page
I. Introduction	1
A. Purpose	
B. Methods and Procedures	
C. History of Local Factories	
D. Procedures Preceding Ornamentation	
II. Cut Glass	11
A. Historical Development	
B. Procedures	
III. Engraved Glass	16
A. Historical Development	
B. Procedures	
IV. Etched Glass	22
A. Historical Development	
B. Plate Etching	
C. Needle Etching	
D. Frosting	
E. Flequing	
V. Fused Decoration	29
A. Historical Development	
B. Silk Screening	
C. Spraying	
D. Decalcomania Application	
E. Gold, Silver, and Platinum Application	
F. Lustering	
G. Marbelizing	
H. Iced Decoration	
I. Enameling and Hand-Painting	
VI. Paperweights	39
A. Historical Development	
B. Procedure	
Appendices	42
Bibliography	46

LIST OF FIGURES

Figure	Page
1. Morgantown and Area Glass Factories	3
2 - 3. Processes Preceding Ornamentation	6-7
4. Glassblowing Tools	8
5. Glassworker's Tools	12
6. Seneca Glassware Cut Patterns	14
7. Rose Bowl	17
8. Copper Wheel Engraving	19
9. Etched Glass	24
10. Production at Davis & Lynch	30
11. Decorated Lamp Parts	37
12. Paperweight Making	40

Chapter I

Introduction

It is well known that West Virginia leads the nation in the production of coal. She also leads the nation in the making of glass, and one half of these glass plants are located in the Monongahela Valley, stretching from Weston in the South to Morgantown in the North. Morgantown produces the bulk of hand blown table and lighting glassware in the state.¹ In eight of these factories there is extensive extrinsic ornamentation of glass.

After a piece of glassware is made and annealed, it is necessary to finish or decorate it in some way, even if only to remove the pontil mark roughness or to polish it. On the other hand the glassware may be elaborately decorated.

In this thesis an attempt has been made to explore and record the various processes of extrinsic ornamentation in this area. Extrinsic ornamentation involves the use of materials and techniques of its manufacture, such as cutting, etching, engraving, and fused decoration - or a combination. Thus blowing, applied decoration, and molded ornamentation are excluded in the main study. However, a general knowledge of glass making and its fabrication is helpful in the appreciation of ornamentation as all of the processes are related. For this reason, a part of this chapter is devoted to this.

As an introduction to each chapter a history of the process is given. It is especially interesting to note that basically the way of ornamenting has not changed through the ages. The remaining part of the chapter is concerned with the way this ornamentation is executed at the various factories that do it. In some cases comparisons are made; otherwise, contributions and procedures are simply stated or incorporated with the historical treatment.

The method of attack has involved four equally important procedures: research, inter-

view, direct observation, and a study of special factory information. To aid in the research of this paper, several sources have been studied: books, periodicals, newspapers, booklets, brochures and pamphlets.

About twenty-five books are referred to at least once; many of these several times, a few constantly. The books mainly belong to the West Virginia University Library collection, and constitute a wide variety concerning the glass industry. Some are elementary in approach such as Logan's, *How Much Do You Know About Glass?* and Diamond's, *The Story of Glass*. Nonetheless, they are interesting, informative, and good as beginning sources for study.

Several books include illustrations which aid in the understanding of the many types of glass, both ancient and contemporary. The very finest illustrations are in Vavra's, *5000 Years of Glassmaking*. In this ten by fourteen inch book are over 500 illustrations, many full page and in color.

One of the major sources of reference for this study is McKearins', *American Glass*. In it are 2000 photographs and 1000 drawings. These illustrations are not as magnificent as those in Vavra's book but are pertinent to the information provided in the book, which is quite conclusive. It is listed in the bibliographies of many other books on glass as a prime source for information.

As far as concise descriptions of major technical processes, Scholes, *Modern Glass Practice* is most helpful. It, too, is cited in many bibliographies.

Several books are devoted to the study of one particular area such as Bergstrom's *Old Glass Paperweights*; Warman's *American Cut Glass*, and Daneil's *Cut and Engraved Glass*.

In most of the books, there is a conflicting

spelling of certain terms. For example an annealing oven is a lehr, leer, or lear. There is also conflicting terminology. A worker's area is called a bench, chair, cradle, or table. A pontil rod is also called a punty or puntee. However, there is no conflict within the same book, and most include a glossary of the terms within that particular book.

In some books such as Waugh's, *The Art of Glassmaking*, and Plaut's *Steuben Glass*, an artistic, yet prejudiced commercial tone prevails; perhaps rightfully so.

The most valuable sources of information concerning the specific procedures in the extrinsic ornamentation of glass proved to be twenty-four booklets, brochures, and pamphlets. Most of these are privately printed and not dated, but can be traced through the distributor. The bulk of the important ones belong to the Beaumont Glass Company. All that are cited are significant and important to the paper. The others are significant in the full understanding of techniques. Most concentrate on but one area.

The newspapers and periodicals referred to as compared to the books, booklets, brochures and pamphlets are more a matter of interest than importance to this study.

The glass companies, especially the Beaumont Glass Company, lent the writer booklets, brochures and pamphlets that technically explained many procedures. Through observation, written procedures could be compared and contrasted to the various ornamentation. Thus, these two are incorporated extensively.

A considerable amount of the information in this paper is the result of personal interview and direct observation. Little reference is given to this in the main report because of the complexities involved. The writer wants the reader to know that material not footnoted was gathered by these two methods, and that no personal opinion or criticism is given.

An additional chapter has been added which does not fall precisely under the categorization

of extrinsic ornamentation. This is the art of paperweight making and has been included because it is done in this area and is of local interest and prominence.

The glass business has its own jargon. To the novice it is often technical and complicated. Throughout the paper, glass terminology is used. Rather than to stop the train of thought by defining each term as it appears, a glossary has been included. The large number of words to be defined prevents their inclusion in the introduction as well as their repeated definition throughout. The reader must remember when he meets an unfamiliar term, that it well may be a part of this jargon. If so, it is defined in the glossary. Also several illustrations have been used simply because they are often more easily understood than prolix descriptions.

The eight glass factories in this study include the Beaumont Company; Davis and Lynch Glass Company; Gentile Glass Company; Monongahela Valley Cut Glass Company; Morgantown Glassware Guild, Incorporated; Sacco Glass Company, Seneca Glass Company, and the Superior Cut Glass, Incorporated.

"Glass is an inorganic substance in a condition which is continuous with and analogous to the liquid state of that substance, but which, as the result of having been cooled from a fused condition, has attained so high a degree of viscosity as to be for all practical purposes rigid."²

This is to say that glass is a metal such as steel, bronze, and brass. Glass has always had a monetary value and at times a glass vessel has been more precious than gold, yet no other manufactured material is made from such inexpensive, plentiful and available ingredients.³ Authorities still speculate concerning its origins. It is generally accepted that during 70,000 B.C., or earlier man shaped obsidian into tools and weapons. During 3,000 B.C., or earlier man first made glass, probably by

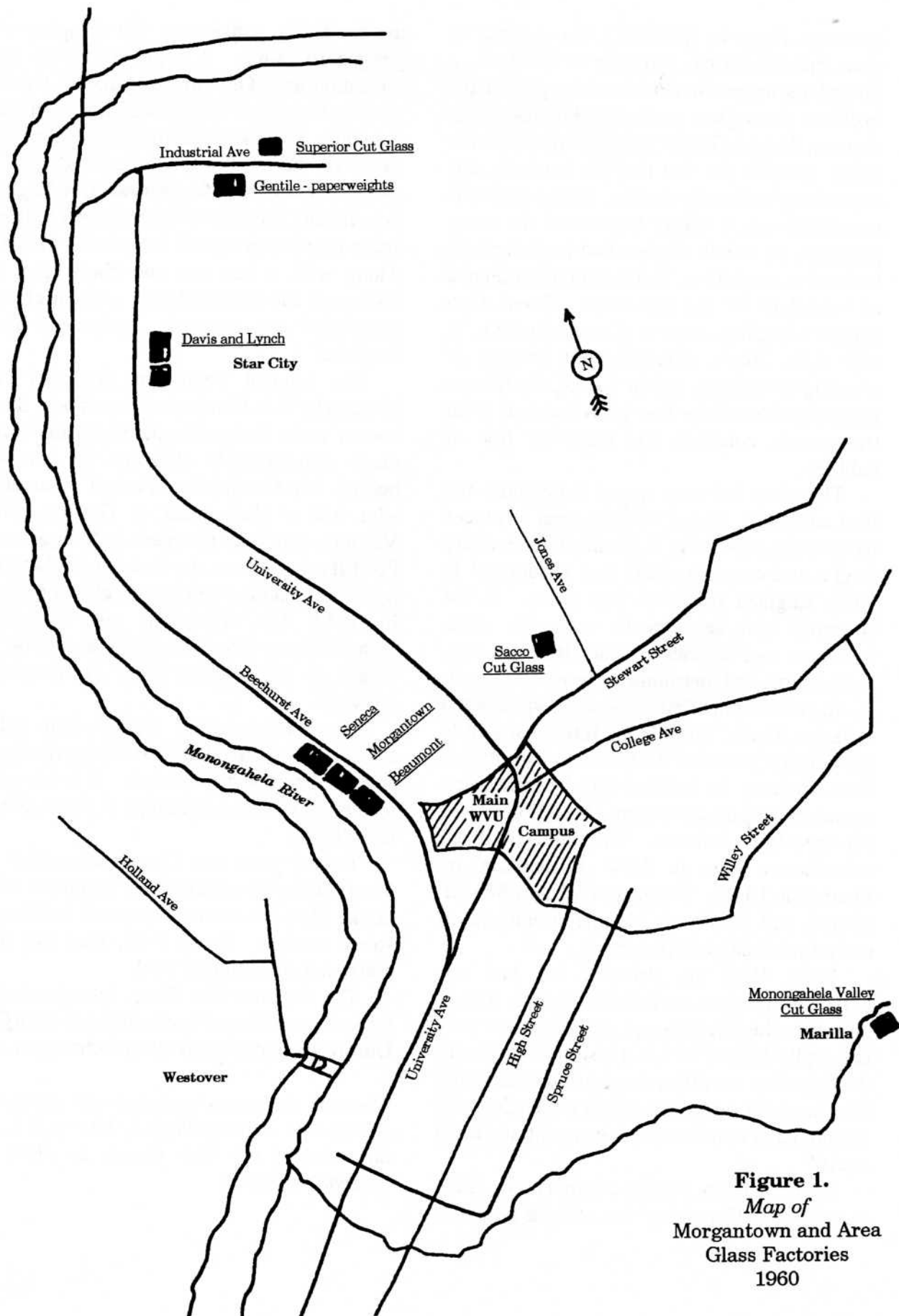


Figure 1.
Map of
Morgantown and Area
Glass Factories
1960

accident. Egypt in 1,200 B.C., was a center of glass manufacturing, and then in 300 B.C., a Phoenician artisan invented the blowpipe. This, in effect, threw glass production into the public domain, thus causing an industrial revolution in glass. Despite the fact that the raw materials were cheap and easily attained, glass before this revolution was a luxury because of the many processes an article of glass had to go through before its completion. The blowpipe eliminated at least half of the processes. Rome then became a leading center in glass production. In 200 A.D., Rome developed the process of blowing into molds, and in 1 A.D., the Roman Empire produced the first glass that was at all transparent, colorless and relatively free of bubbles.

The glass industry spread throughout the East and West, and artistically great advances were made, especially in Venice where a very fragile and exquisite glass was produced.⁴ In 1674, England produced flint glass. In the sixteenth and seventeenth centuries, glass became a tool of science, when the telescope, microscope, and thermometer were developed.

In America the first glasshouse was erected at James Town, Virginia, in 1608, just a little more than a year after the first colonists arrived from England. In fact this was America's first manufacturing establishment.⁵ In 1609 glass was exported from America. The first centralized manufacture was in New Amsterdam on Manhattan Island. The names Wister, Stiegel, Boston and Sandwich became prominent in early American glass history.

From 1900 on, America has had unbelievable progress in the field of glass. This is known as the scientific era and covers not only the application of fuel, but also the machinery developed to manufacture glass automatically. This has led to an amazing mass production, and research and new developments continue to be made.⁶

Fostoria, Ohio, was the original home of the Seneca Glass Company,* but with the failure of

the gas fields in that area, the company was obliged to move. A prime factor in their relocation from Ohio to Morgantown was the abundant amount of gas flowing along the riverside. This meant security for a long time. Thus, on June 18, 1896, it entered into an agreement with the Morgantown Building and Investment Company to erect a factory building and a fourteen-pot glass furnace for \$20,000. Along with a free site and cheap gas, the Baltimore and Ohio railroad, without charge, transferred all movable equipment from Fostoria.⁷

The original Beaumont Company was founded by R.A. Canfield of New York. It was known as the Union Stopper Company which made non-refillable stoppers for whiskey bottles. Mr. Canfield had Percy J. Beaumont, who had a glass plant at Grafton, West Virginia, take over the plant in Morgantown. For fifty three years the Beaumont Company has been making hand-blown glass products. In 1940, Mr. Beaumont put the entire manufacturing program under one roof on the locale of the original plant on Beechurst Avenue.⁸

The Monongahela Valley Cut Glass Company was founded in 1912, by George F. Jones, Senior and his father. It is presently located in Marilla and George F. Jones, Senior is the head.

Twenty years ago Carl Sacco started the Sacco Glass Company in the basement of his home. Now it is located on a small building on Jones Avenue. Since 1948, Carl has been assisted by his brother, Paul.

The Superior Cut Glass, Incorporated, is located in a little yellow building in Star City. During the midst of this study it changed hands

**Seneca - the name of an Indian tribe that figured prominently in transAllegheny history. It is also the name of the Ohio County in which the company operated.*

Formerly it had been the Merritt Cut Glass Company. It is owned by John E. Toth and Rose Marie Orosz.

The Morgantown Glassware Guild, Incorporated, is the largest hand-blown glass factory in this area. It is located in Seneca. The president is Samuel K. Haden.

The Davis and Lynch Glass Company is located in Star City. The company was founded in 1929, but did not move to its present location until 1949. Now it is undergoing expansion. The owners are M.R. Davis, Senior, and R. Emmett Lynch.

The Gentile Glass Company is owned and operated by Mr. and Mrs. John R. Gentile. The factory is located on Industrial Avenue in Star City.

The earliest need for glass in the trans-Allegheny was for window panes and whiskey flasks. Today, the needs have, of course, changed considerably. Before one can fully understand or appreciate the extrinsic ornamentation of hand-made glass, the processes preceding its ornamentation should be made known because each is a necessary process that leads to a finished product. Since the extrinsic ornamentation is the last of the processes, then a brief summary of the others should prove beneficial.

It is doubtful if there is another industry with so many divisions as the glass industry, because of the many processes for the production of glassware, technical requirements, skill, training and responsibility resting on the skilled craftsmen. Glass articles are made from the hot liquid glass; thus, workers must depend on their eyes and sense of touch for the production of many articles.⁹

An item may be handled from twelve to thirty-five times. Following are fifteen steps in the production of a goblet, from the time the batch is prepared until the product is finished.

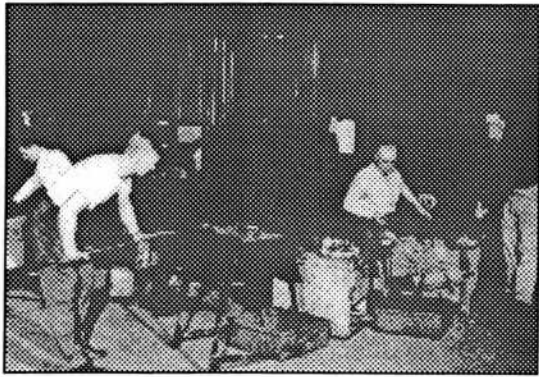
1. The batch is prepared.
2. The batch is refined and conditioned for blowing.

3. A gob is gathered on the end of a blowpipe (after the molten glass has cooled down).
4. The glass is blown.
5. The presser forms the stems.
6. The footmaker forms the foot.
7. It is placed in the lehr and annealed.
8. It leaves the lehr and is properly tempered.
9. The top (that part of the product next to the lip of the blower which is extraneous to the mold), is cracked off.
10. The sharp edge of glass is ground.
11. The edge is fire polished.
12. It is reannealed because of the heat applied along the edge.
13. It is now ready for decoration.
14. The next steps depend on the type of decoration that is to be employed.
15. Now complete, it is ready to be sold.¹⁰

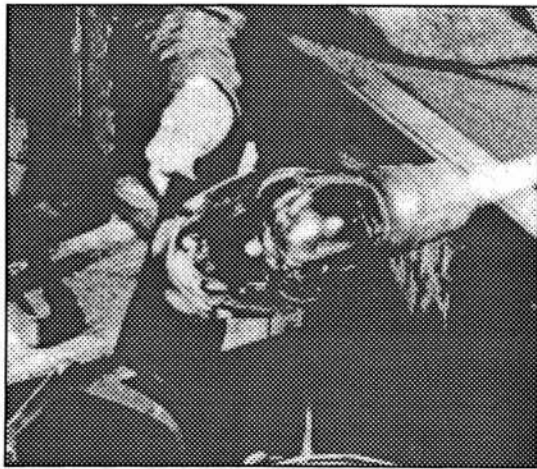
There are many recipes for making glass and for all of them certain basic ingredients are essential. These are silica, usually in the form of sand, and alkalis such as potash and carbonate of soda or lime. Accessory ingredients, such as white oxide of arsenic, alumina, nitre (salt peter), oxide of lead or of manganese, borax or chalk, are mixed with the essential materials according to the type of glass desired.¹¹ To make colored glass, metallic oxides of cobalt, iron, nickel, copper, manganese and chrome are mixed with the basic batch to give all shades of color. The basic kinds of glass are green glass, glass of soda, flint glass and lime.

Practically all glass articles fall into one of three main categories: 1) blown glass, 2) molded glass, and 3) pressed glass.

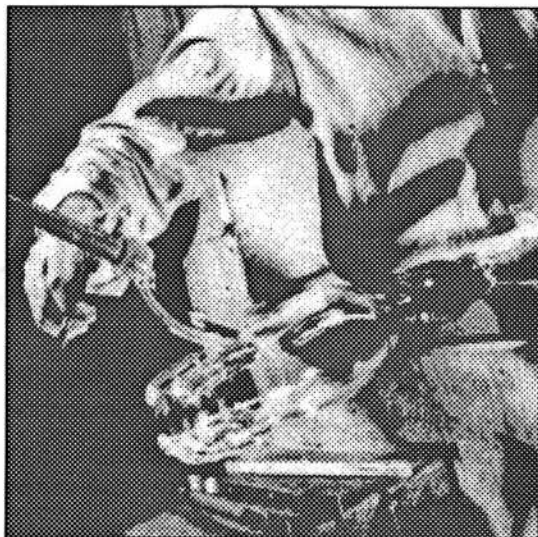
♦ Blown glass is usually referred to as hand-blown, free-blown and off-hand-blown. Any piece so called is formed by blowing and manipulation with the tools of the craft and without the aid of molds to give a



(1) A Shop at work



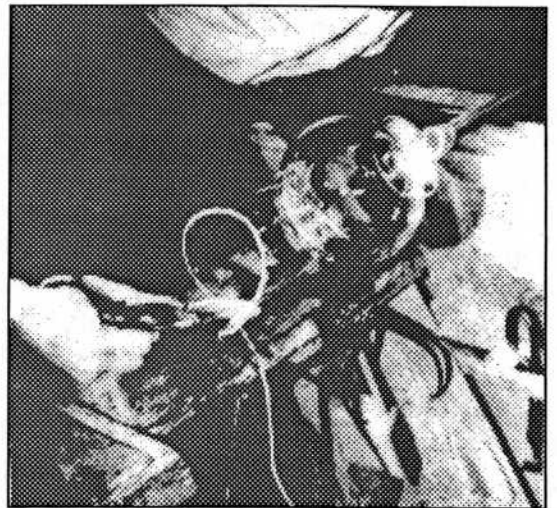
(3) Shaping glass with a paddle



(5) Adding a handle

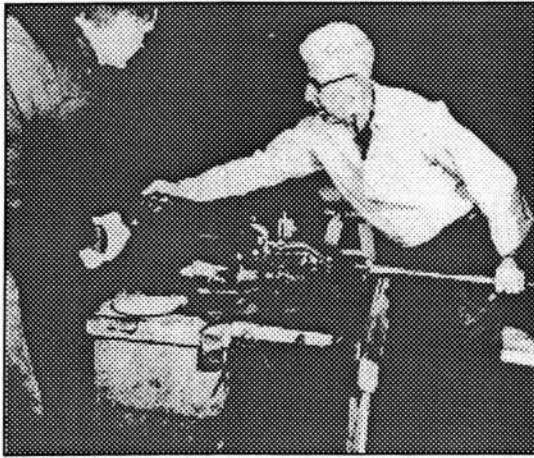


(2) Blowing a bubble of glass

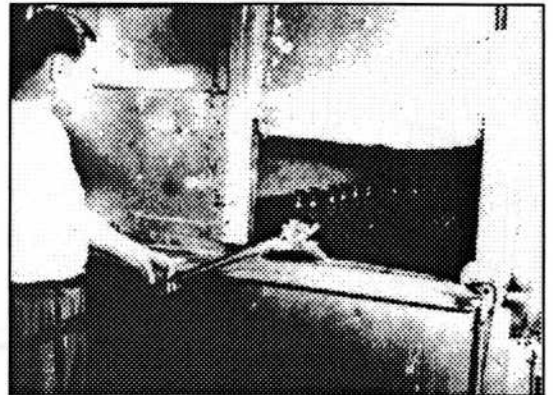


(4) Trimming with hand shears

Figure 2.
Processes Preceding Ornamentation



(6) Reshaping a rim



(7) Placing glass in annealing oven



(8) Grinding to remove pontil mark

Figure 3.
Processes Preceding Ornamentation

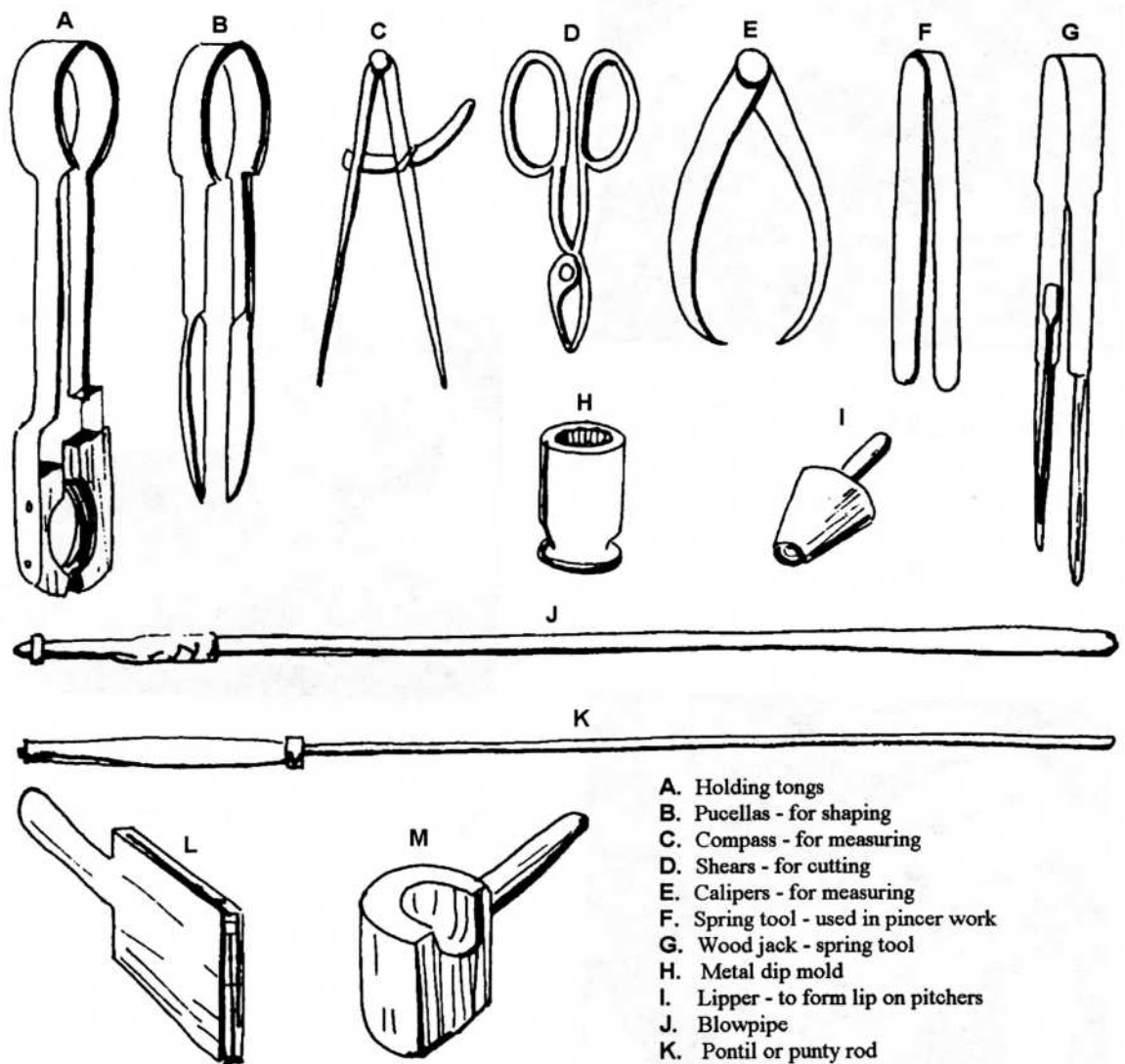


Figure 4. Glassblowing Tools From *American Glass*

- A. Holding tongs
- B. Pucellas - for shaping
- C. Compass - for measuring
- D. Shears - for cutting
- E. Calipers - for measuring
- F. Spring tool - used in pincer work
- G. Wood jack - spring tool
- H. Metal dip mold
- I. Lipper - to form lip on pitchers
- J. Blowpipe
- K. Pontil or punty rod
- L. Battledore - to flatten the bottom of objects
- M. Block - to aid and give symmetrical form

decorative pattern or either a partial or complete final body form. It is the culmination in the art of glass-making, and its ornamentation is an art in itself.

- ◆ Molded glass is usually called blown-molded. Glass may be molded for shape only or in a full-size piece mold. Molds are of two types:

- ◆ Dip molds - in one piece and open at the top.

- ◆ Piece molds - comprised of hinged pieces. Shape or pattern-producing molds account for most of the fine artistic glass which has survived through the ages.¹²

- ◆ Pressed glass is the last mentioned process and is the least complicated of the three. It consists of putting the proper amount of liquid glass into a mold, then thrusting a plunger into the glass and forcing it to assume the shape of the inside of the mold and the outside of the plunger.¹³

The workers in the older glasshouses were divided into groups called shops. Each shop consisted of the master blower, called a gaffer, and his assistants. The gaffer supervised all steps in fabrication, performed the final shaping and finishing. He was also responsible for keeping the output of his shop up to the standard of the glasshouse. This same system is used today with variations made to suit the principal departments, such as the Pressed Ware Department, the Pressed and Blown Ware Department, and the Paste Mold Blown Ware Department.¹¹

There are two approaches to the ornamentation of glass: one, to employ decorative devices to enhance the beauty of the metal itself; the other, to use the metal as a background for decorative designs.

Applied decoration comes under the first approach. This type of decoration must be applied while glass is in its plastic state when glass on glass can be shaped by tooling or imbedded by marvering.

Also under the first approach comes molded ornamentation. It utilizes wood, iron, or brass molds having a pattern or design cut on the inside. It was a decorative technique used by skilled blowers to create some of the most fascinating glass to come to us from the late eighteenth and early nineteenth century glasshouses.

The second approach is extrinsic ornamentation. After the making and annealing of glassware of various sorts, it is often desirable to ornament or decorate it in some manner. Some of this decoration is done at the factory where the glass is made. Other factories specialize in decorations using "blanks" purchased by a glass manufacture.¹⁵ This type of decoration is not applicable to the glass in its plastic state. It involved the use of materials and techniques foreign to glass itself. This includes those processes covered in this thesis: cutting, decals, engraving, flequing, gold application, silkscreening, silvering and spraying.

Chapter II

Cut Glass

The earliest known cut glass may have been made five or six hundred years before the Christian era. Any incisory form of ornamenting glass with diamond or hard metal point by a lapidary's wheel was usually described by early historians as being "cut." The first cut glass of which we have knowledge was made in Rome. Many Constantinople craftsmen were glass cutters.¹ Modern glass begins with the sixteenth century when the art of cutting and engraving was revived in southern Europe. During the seventeenth century, the Germans "rediscovered" the technique of cutting glass, and from here it spread throughout the British Isles and was brought to America in the late eighteenth century.² From the early nineteenth century on cutting was a most important decorative device.

"M'Cord and Shiner, manufactureres of Cut Glass, No. 3 & 7 Bank Alley, Back of the Merchants' Coffee House, Philadelphia. Setts [sic] Glass Executed to order at the shortest notice. Workmanship warranted equal to any in the world, or no sale."

The preceding advertisement appeared in the 1830 Philadelphia directory along with this one by Thomas F. Walker and Company at No. 15 North Fourth Street:

"Heavy English Tale and Flint Tumblers, rough and cut bottoms, ring and star bottom do; rough and star bottom Decanters, Pocket Bottles, Flower Glasses, Lamp Shades."

The designs used followed those of England and Ireland. American cut glass is classified in three main periods: the Early American Period, the Middle Period and the Brilliant Period.

The first period begins about 1771

when Stiegel's glasshouse at Manheim, Pennsylvania, was entering its most successful period. It ends in 1830. Pieces from this period are rare. Generally the glass is of a good quality, although some of it will show bubbles. Patterns included the use of the roundelet or kugel, the single star and panel curves.

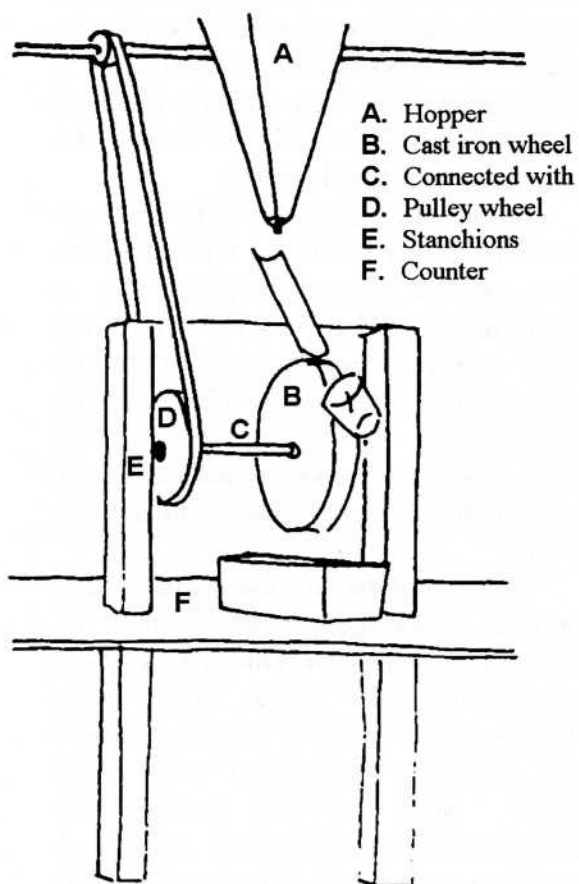
The second period started in 1830 and continued until 1880. At this time, fine line cuttings became popular. It is doubtful if the cut glass industry could have survived the competition of the pressed line glass of the 1860's, if the manufacture of lamps shades and chimneys had not come to the rescue. A lot of colored glass appeared during this period.

The cut glass of the third period brought about the greatest market the industry has ever seen. During this period new and better glass sands were discovered, natural gas was used as fuel, and electricity was applied to the wheel lathes. Most important, though, now many Americans could afford cut glass. It had been a symbol of elegance and leisure, now of prestige. The designs are complex ornate and intricate as motifs become combined.⁴

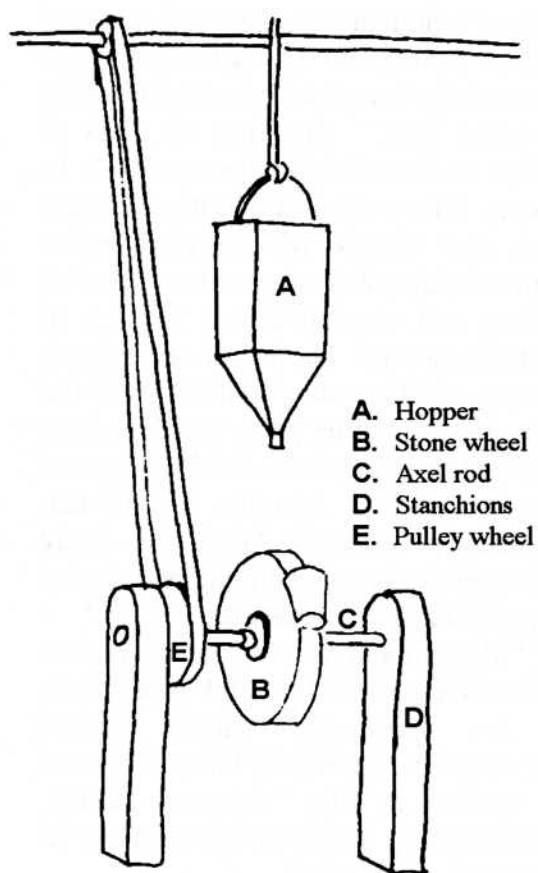
Fundamentally, there are two different approaches to the design of cut glass.

- ◆ A surface decoration carried out for the purpose of adding brilliance to the glass at the same time considering the shape of the object.
- ◆ New forms created by the grinding away of masses of glass.⁵

In both cases cutting glass often serves to disguise imperfections of the metal. The first approach is the one mostly employed in the Morgantown area..



a. Glass cutter's lathe for roughing



b. Glass cutter's smoothing wheel

Figure 5. Glass Cutter's Tools - from *American Glass*

The piece to be cut is first blown and annealed by the same processes explained in the first chapter. Glass to be cut should be of a high quality, composed of heavy lead flint or of a fine grade of potash, and should either be handblown or blown-molded. In order to withstand the treatment of roughing, smoothing, and polishing, the glass should be thicker, stronger and softer. In cutting, the glass is held between the cutter and the wheel and pressed down against it. The speed of the wheel controls to some extent the type of cutting.

There are three types of cutting.

- ◆ “Hollow” - produced by a wheel with a rounded profile. The diameter of the wheel is in a vertical position.
- ◆ “Bevel” - produced by a wheel which is v-shaped. This is also called mitre cutting, and accompanying it is the danger that the wheel will penetrate the vessel and ruin the blank.
- ◆ “Panel” - which is flat or concave. It produces concave flutes, plain flutes, relief diamonds or bull’s eye motifs. There is less danger of penetration since the wheel isn’t as sharp as for bevel cutting. The diameter of the wheel lies in a horizontal position.

All cut forms are produced by one or a combination of all of these types, and the wheel varies in diameter and its profile or cutting surface corresponds to the pattern of cutting desired.

Whatever the degree of cutting, the process is basically the same.⁶

- ◆ The areas to be cut are marked on the glass with a special ink applied with a small brush.
- ◆ The forms of the design are cut by application of the glass to a slowly revolving wheel of sandstone or carborundum. Many pieces, depending on the type of cut, are first cut in the

rough. A rougher holds the blank against a large rapidly moving iron wheel, but the wheel does not actually do the cutting. Instead, the glass is cut by a stream of fine, wet sand that drips from an overhead funnel onto the edge of the wheel and hence to the surface of the glass. The smoother refines the rough stone cut and cuts the small lines or motifs indicated by the design.

- ◆ The rough, opaque white surface left on the glass by the abrasive wheel is subsequently polished in order to restore transparency and luster to the glass. In some cases this rough, opaque white surface is left on. In other cases after the glass is polished, further decoration is cut on the same piece and left unpolished for variety and contrast. But when it is all polished, a prismatic brilliance is imparted to the glass.

Four of the factories in the Morgantown area specialize in the cutting of glass.* These four are the Monongahela Valley Cut Glass Company, the Sacco Glass Company, The Superior Cut Glass, Incorporated, and the Seneca Glass Company. The first three concentrate only on the cutting of glass and do no other form of decoration. Seneca specializes not only in the cutting of glass, but also blowing, etching and engraving.

The Monongahela Valley Cut Glass Company was founded in 1912, by George F. Jones, Senior, and his father. It is presently located at Marilla in a large building. It occupies one-half of the main floor and all of the top floor.

**This excludes the Gentile Glass Company where Mr. Peter Gentile is prepared and able to cut glass but does not do it extensively.*



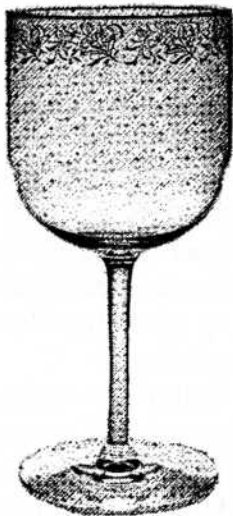
TRADITIONAL
1966 Shape Cut 1432



ANNIVERSARY
1965 Shape Cut 1421



OLD MASTER
960 Shape Cut 1435



PLATINUM LACE
White Decal and
Platinum Band
GOLD FLORENTINE
Black Decal and
Gold Band
1973 Shape



BRIDAL TIARA
1966 Shape Cut 1439



GOLD BROCADE
960 Shape Cut 1438
with 2 Gold Bands

Figure 6. Some patterns cut by Seneca Glass Company

There are twenty-five cutting units which include all of the necessary cutting equipment. At the present there are only about five handcutters employed. In a personal interview, Mr. Jones explained that the foreign imported glassware has considerably damaged the sale of much American glassware. The facilities for cutting at all four factories far exceeds the number of glass cutters. For instance, the Seneca Glass Company at one time employed over fifty hand-cutters. Now they have only six.⁷ Also labor and materials have so increased in cost that the large scale production of fine handmade and handcut glass is no longer profitable.

The Monongahela Valley Cut Glass Company is the only one in this area which also uses an automatic cutting machine. There are fourteen of these machines, and one can cut a certain pattern in 300 glasses when in the same amount of time a cutter can only cut 100. But needless to say, this is not hand-cut glass.

Seneca Glass Company uses its own hand-blown glass for cutting. The other three use blanks that they purchase from other glass manufacturers, or from companies that send their own blanks to be handcut and sent back.

These four glass companies have cut hundreds of different patterns into glassware and different demands call for new creations. Each company develops its own idea or someone else's into an appropriate pattern. Currently, Seneca is prepared to create over four hundred patterns of glassware. If one desires a replacement of a pattern twenty years old, Seneca is able to produce it.³

All four companies use for cutting a composition wheel composed of carborundum and sandstone. These wheels vary in size from one to twenty-four inches.

The wheels used for fluting may vary from twenty-four to forty inches. Also, the width may vary considerably.

At the Seneca Glass Company are more than fifty units for roughing, cutting, fluting, and polishing. The Monongahela Valley Cut Glass Company had twenty-five units; Sacco Glass Company had fifteen, and the Superior had eight.

Twenty years ago Carl Sacco started the Sacco Glass Company, and for twelve years has been assisted by his brother, Paul. They have always been associated with glass and as young boys worked in factories in Pennsylvania. The building they now occupy is of cement block and has three stories. On the third floor the office located. All of the cutting is done on the second or main floor, and on the ground floor the polishing and packing is done.

Before 1900 glass was polished on wooden wheels which were made from willow, cherry, or other soft woods which gave the glass a lustrous appearance.⁹ A mixture of rottenstone and pumice was also used. It consists of a two-part mixture of rottenstone to a one part mixture of pumice with enough water added to give it a muddy appearance. This is channeled to fall on the wheel. This mixture is still used. It is applied by electric power with a wheel of cork and a brush. For certain pieces of glassware a brush wheel is used to polish it, and sometimes a wheel of wool, depending on the need. At the Seneca Glass Company instead of polishing all of their cut glass with this mixture much of it is given a hydrofluoric acid bath. The articles to be bathed are placed in racks and soaked for fifteen minutes. The advantage of the acid bath process lies in its rapidity, though hand polishing is preferred by many.

The Superior Glass, Incorporated, is

located in a small yellow building in Star City. It is owned and managed by John B. Toth and his daughter, Rose Marie Orosz. All facilities are on one floor. The display room and office are in front of the building, beyond this is the packing area, and beyond this the cutting room. A special room in the rear of the building is provided for the sole use of the designer to mark the glass previous to its cutting. Though this company, formerly called Merritt Glass, changed hands in the midst of my research, it did not change method. The lathes here as in the other factories are run by electricity.

The earliest power used in England for cutting lead glass was a treadle. Treadle cutting was confined to more or less simple motifs, such as panels and relief diamonds. A little later apprentices turned the lathes by means of a flywheel. The speed of the wheel was often erratic because the boys were not always steady at their work. They became tired and lazy. Even so, the motifs developed a sharper line and cross hatching was possible. Then water power speeded the wheel and deeper and sharper motifs appeared.¹⁰

After all the processes are complete,

the handcut glass is ready to be packed and shipped. Not all are shipped within the United States. The Monongahela Valley Cut Glass Company has sent cut glass of the Leyton pattern to Caracas, Venezuela; Superior Cut Glass, Inc., has sent to Alaska; Sacco Company has sent to Canada, Mexico and Puerto Rico; and Seneca all over. Just recently John Wannamaker gave Seneca an order for 218 dozen custom-made glassware of every size. This was an order from the President of Liberia and is the official glass of the executive mansion. A design with crests was cut into every piece.¹¹

Here in the United States, cut glass from the factories in the Morgantown area goes to all states to supply fixture shops, retail stores, hotels, private individuals and other concerns.

This handcut glass reflects more than two hundred years of expert craftsmanship. Patterns are combinations of the old motifs adapted to the simplicity of modern design. Mitre splits, panels, flutes, bull's eye, and fringe motifs are still used, but in combinations that do not interfere with the basic and unified expression of the article itself.¹²

Chapter III

Engraved Glass

"Engraving, then, is in brief terms the Art of Scratch."¹ - Ruskin

Diamond engraving is simply drawing upon or scratching the surface of glass with the point of a diamond. During the period of the Roman Empire glasses were decorated by being engraved with a sharp point, although it is not known of what material this point was made. During the second half of the sixteenth century this method of diamond engraving originated. Diamond engraving seems to have gone out of fashion when wheel engraving prospered, particularly in Germany, towards the end of the seventeenth century.²

Wheel engraving was employed during the period of the Roman Empire. After its decline this decoration was continued in Egypt and probably in both Iraq and Persia, but it was not until the end of the fifteenth century that the art was revived in Europe.³

From the point of view of technical excellence, no wheel engraving can be finer than that on many glasses engraved in Silesia and Bohemia during the first half of the eighteenth century. Many of the designs that were engraved were not original but were adapted by the cutter from pattern books such as *Neue Croteschgen-Werk*, by Paul Decker or the *Zierathen-Buchel vor Glasschnieder und Kuntlser* by Joh. Conradt Reiff, which were based on the original work of French engravers. These designs were largely of conventional ribbons and foliage, not landscapes.⁴

Drinking habits in almost any country have influenced glass production. It has been said that England's whole social history could be told in terms of her drinking glasses made to match various drinks, such as beer, ale, cider, wine, whiskey and gin. Many of these vessels bore engraved scenes, portraits and mottoes.⁵

Often it is difficult to distinguish with words between the cutting of glass and the engraving of glass. James Plaut in his book, *Steuben Glass*, says that the engraving of glass is to ordinary glass cutting what watchmaking is to riveting, so exacting and delicate is its execution. Glass may also be etched with acid or blasted with sand so as to appear "engraved." Such methods have much less subtlety and finish. Wheel engraving is distinguished by the precision and firmness of its forms and edges, and by the fluidity of its curves.⁶

Actually, engraving differs from cutting in the size of the wheel used, and, consequently, in the type of decoration possible. Usually when a piece of glass is engraved, it is held under the wheel and pressed upward toward the engraver and against the wheel. In cutting, the glass is held between the cutter and the wheel and pressed down against the wheel. In both cases, the wheels are revolving at a high speed, but the engraving requires more time, skill, training and natural talent than cutting and compares with cameo sculpturing in its aesthetic appeal. The result of the wheel engraving is a shallow intaglio, which, by an optical illusion, seems to be in bas-relief, the most hollowed parts appearing to the eye as the most prominent.⁷

Glass was engraved in America in the later years of the eighteenth century and its still being engraved, but the peak of production and popularity was reached during 1830 to 1880. The earliest piece of this era are on clear glass and unpolished. Later, engraving was used on glass of two colors, usually blue or red on white, or three colors, blue, yellow and white. The themes were mythological or historical. The pieces most commonly engraved were decanters, bottles, wine glasses, cologne bottles, cruets, and pitchers.⁸

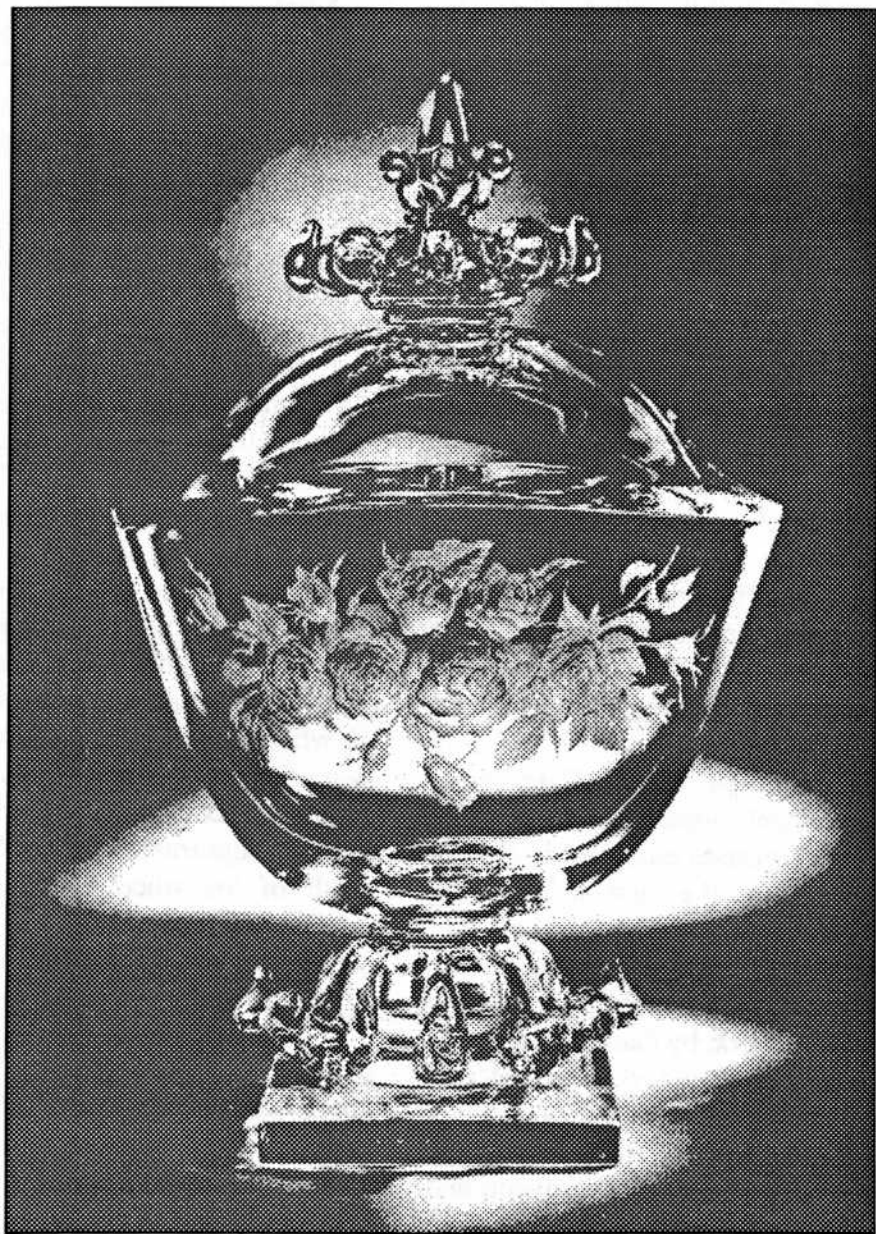


Figure 7. The Rose Bowl - This engraved bowl was presented by President and Mrs. Eisenhower to His Imperial Highness, The Crown Prince of Japan, as a wedding gift.
From *Enjoying Steuben Glass*

In the Stiegel glass of the seventeen hundreds, the copper wheel was used for glass engraving. Now stone wheels of emery are also used for this purpose. These wheels are very small in diameter and of various sizes and types, and part of the skill of the artist lies in the selection of the wheel most suitable to his needs of the moment.³

A. Jardel is one of the famous early American engravers. He was a French glass-worker who came to Pittsburgh in 1818, and opened a store. He advertised "to engrave and execute everything that may be wished in his line at a moderate price"; also, "He has on hand and will constantly keep an assortment of elegant glassware of every description." When business was not good, this postscript appeared: "A few gentlemen can be accommodated with genteel boarding."¹⁰

Later his pieces became recognized as superb examples of his craft, and it became a fad to own anything engraved by him. Bakewell presented vases engraved by Jardel to Lafayette when he visited Pittsburgh in 1825.¹¹

Famous early American engravers are Louis Vaupel, Henry S. Fillerbrown and Joseph Locke. Several of the Leighton family were talented engravers. The William Leightons, Senior and Junior, were engraving glass at the Hobbs, Brockunier Glasshouse in Wheeling, West Virginia, during the late years of the Middle Period. William H. Morse, whose work is more recent (1915 to 1925) was one of the most skillful engravers in American history.¹²

Presently, one of this country's best engravers is Joseph Libisch who began to engrave glass at Steuben in 1921. He began his apprenticeship as an engraver at the age of 12 in Hungary. He apprenticed under master class engravers in Vienna and Prague, then came to America and worked for several firms from 1920 to 1921. He has executed many engravings designed by Steuben's chief designer, Sidney Waugh.¹³

The Seneca Glass Company is the only one

in the Morgantown area to employ an engraver for the decoration of glass. His name is Arner Lindquist, and since 1929 he has been with Seneca.* In 1913 at the age of seventeen he came to the United States from Sweden, and already at this age he was well versed in the glass trade. His father was a glass cutter, and at the early age of seven years, Arner was working in a factory. He was taught such things as markings by the apprentice method, and by the time he arrived in the United States he already had his union card. From 1913 until 1929 he worked in various factories throughout the states and concentrated on specializing in engraving.

When in 1929, Mr. Lindquist began to work at Seneca, he used engraving wheels of copper and also of stone. But after this demand for copper-engraved glass diminished and the stone wheel, which Mr. Lindquist prefers, survived. Steuben Glass still today employs the copper wheel method when engraving its world famous glass. Mr. Lindquist says there are no major differences between the two types of wheel engraving and each is a delicate, technical operation that requires skill and patience and experience on the part of the engraver. The cut created by the stone is not as grey-white in appearance, nor is it as rough. It is more difficult to clean the accumulated dust from copper-engraved glass than stone-engraved. This smoother appearance also goes in a little deeper since stone is prone to cut deeper than copper. Also the copper wheels get dirty and are difficult to clean. There is little difference in size in that each size used depends on the type of cut desired. The diameters of the wheels may vary from one-fourth inch to four or five inches. A stone wheel is wider than a copper wheel.

Mr. Lindquist tells of four main types of stone wheels employed in the process of

**Seneca also employs Mr Lindquist's two brothers who occasionally engrave, but Arner is well-known as the main one.*

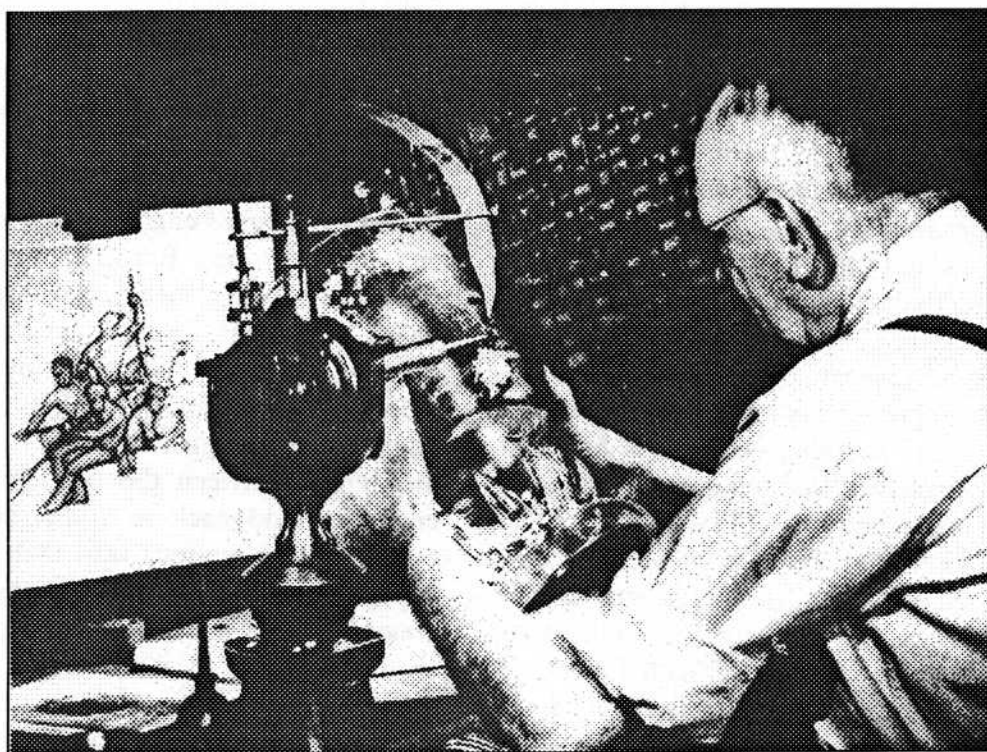


Figure 8. A copper wheel engraver at work in the Steuben plant at Corning, New York.

From *The Story of Steuben Glass*

engraving. One is a LINE which has a sharp reverse V point and is used to engrave fine lines. Another is a MITRE and has the point of a forty-five degree angle. The PUNTY has a rounded edge and is used especially to form leaves on flowers. A fourth is called an EDGE because it provides an edge line on such motifs as leaves. Little lines can be shaped around the edge of any of these wheels which will in turn cause a like impression on the engraved glass. When this is done it is called a THOUSAND MITRE. The stone is determined by the shape of the glass. For example, a glass that curves inward calls for a deeper stone. The type of stone used is emery. The stone comes in a form not yet shaped for engraving. With patience, a skilled touch, and a black diamond, Mr. Lindquist will shape this form into one of the listed shapes or a variation thereof. This is an extremely difficult task and sometimes unrewarding, especially when the stone breaks in two near completion.

Engraved work is seldom polished, as the grey-white appearance is one of its characteristics. Sometimes though Mr. Lindquist will use cork wheels of appropriate sizes to polish parts of an engraved piece. In this way he shades parts of the engraving to give an even more unusual effect. On occasion he will polish large areas of engraving in order to cause more attention to fall on a grey-white engraved area elsewhere on the same piece.

Always in this type of work there is the danger of silicosis. Thus, a steady stream of water falls on the revolving wheel, to keep the dust down, whether in shaping, cutting or engraving.

Today, there is a tendency to engrave only a small area of a glass article. Otherwise, it would be too expensive and the distribution of engraved glass would be minimized. Actually though, Mr. Lindquist prefers a rhythmic overall decoration when motifs are the main decorative element. On the other hand, over-all decoration is not advisable on certain shapes of

blanks when concentration is to be centered on a special engraved area. This is true of glass articles where one side can be seen through to the other, such as a tumbler or goblet. With such shapes, "spot" decoration is more effective than an all-over design unless a rhythmic or running band is employed.¹⁴ Obviously, confusion would result when the two images mingle and a centered area would not succeed. But with objects that one looks down upon like a bowl, tray or plate, then over-all decoration in the form of motifs, subjects, or a combination, is successful.

Presently, Mr. Lindquist is engraving a bowl entitled Hunter's Dream.* It is sixteen inches in diameter. For the past four years he has been working on it in his spare time and hopes someday to leave it to a museum. In it he attempts a movement of many species of game animals a hunter dreams of catching. The hunter sits in the middle as the animals parade around him.

In his earlier days he created a rose pattern which he still uses to a large extent today. Nature is his guide when it comes to creating patterns. Mr. Lindquist has engraved almost all types of flowers, leaves, and fruits. With various motifs he has engraved onto glass many representational subjects such as an ice skater, a girl feeding a deer, a Zodiac dish, and two platters of the Lord's Supper.

It is quite difficult to engrave letters into glass, and a mistake is immediately evident; yet, Mr. Lindquist has become quite skilled at this. At one time, he engraved on forty-seven glass bells, the names of the governors of each state, the particular state they represented, and the date. These were the Christmas gifts from the Governor of West Virginia to each governor in the United States. Now, Mr. Lindquist engraves all of the monograms for the House

**Mr. Lindquist is equipped to engrave at his home as he has a lathe and well over one hundred stone wheels.*

Glass Corporation of Point Marion, Pennsylvania.

Even though the demand for skilled glass craftsmen has diminished, there is as much now to keep him busy at the Seneca Glass Company

as there was when he first came here in 1929. Generally there is less engraving on one piece than there used to be. In the display room are several of his pieces with both over-all and spot decorations. Any of these he can duplicate.

Chapter IV

Etched Glass

Etching is frequently confused with engraving because of its frosted appearance. Etching and engraving are by no means the same thing. Engraved glass is cut by a revolving wheel and etched glass is made by the application of a corroding acid.¹

Glass is readily attacked by hydrofluoric acid. If the clear strong acid is used, the resulting surface is more or less roughened, largely depending on the composition of the glass. A high lime content promotes this roughness, which gives to the grooves, etched by the acid, a translucent character called "color." When sulfuric acid is added to the hydrofluoric acid, the resulting surface is smoother. If the acid contains ammonium fluoride, forming a solution of ammonium bifluoride, "white acid," the resulting surface has a satin finish or matt character.²

Etching is often employed for making graduation on technical glassware and for applying various designs like trademarks. The vapor of hydrofluoric acid will also etch glass producing a matt or rough surface.

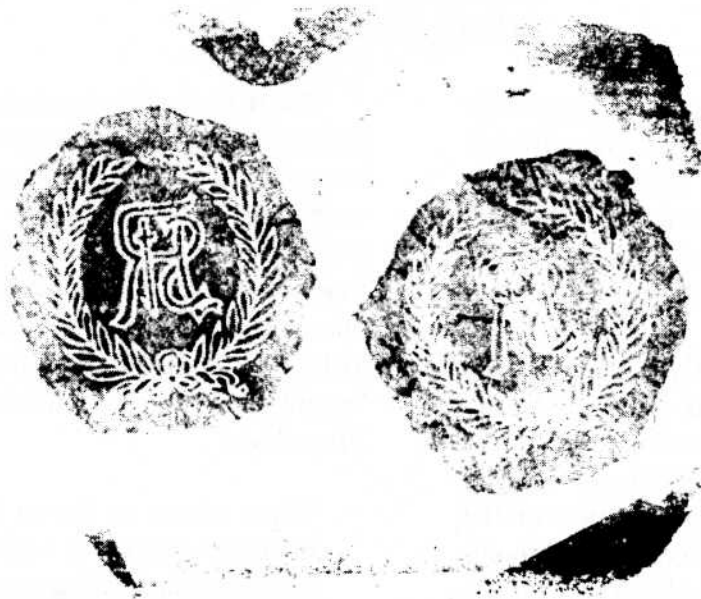
It is said that the use of hydrofluoric acid was discovered by the Swedish chemist Acheele in 1771. Various experiments were made in its use in the late eighteenth century but were not successful in producing designs. Pellatt said in 1349: "Etching by fluoric acid has been introduced, but its bite is not sufficiently rough and is not found effective for general purposes."³ Its use for decorating inexpensive tableware did not become general until the latter part of the nineteenth century.

The trouble with the etching of glass in America in the late nineteenth century seems to have been that except for the work of Joseph Locke or John Northwood, it was not developed as an independent art, but used as an imitation of cutting. Etching was described in 1812, by Schoolcraft, who called it "engraving" in his manuscript on *Vitreology*:

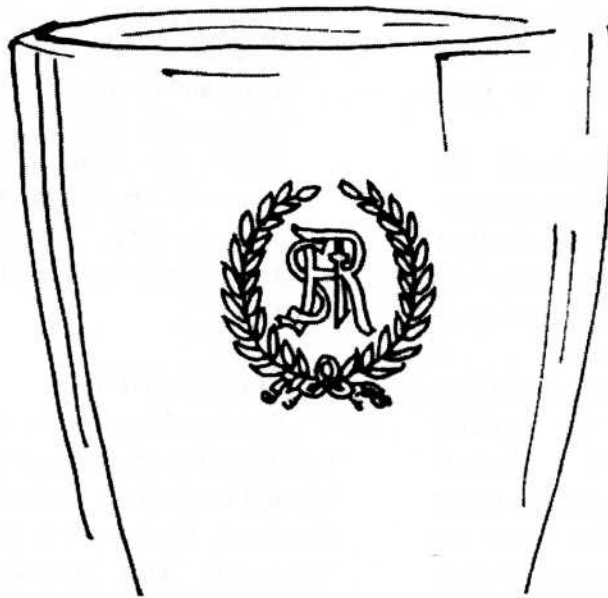
When a vine or flower is required upon the surface of a glass this (is) done by simply using a copper wheel of the size of a cent, with water. The ornaments are, however, most accurately engraved by the fluoric acid which is used in the same manner upon glass that aqua fortis is upon copper; the surface is first covered with a coat of wax and rosin, and the figures drawn by sharp instruments that cut through and remove the coating. The liquid acid is poured on and immediately corrodes the glass. When deep enough, its effects are stopped by pouring on water.⁴

PLATE ETCHING:

Plate etching in its simplest form was patented by James Napier in 1859. He had learned the method in Glasgow, Scotland. His idea was to fix a print or lithograph with printers ink to the surface of the glass, by an ordinary starch paste. After the applique was dry, he subjected the entire piece to acid three times, and washed it with water. This method was not reliable and was soon replaced by the plate method. Napier etchings were frequently on



(a) Resist from plate on tissue-like paper to be placed on glass



(b) Design etched into glass

Figure 9. Etched Glass - Design produced for the St. Regis Hotel by Morgantown Glassware Guild, Inc.

flashed glass which gave a white frosted background a colored outline. Plate etching, since the times of Napier's patent, has been done continuously in America.⁵

Any designs can be reproduced on glass by plate etching. By photo-engraving the design is reproduced on a steel plate. The design proper is left at the normal surface, while the metal between the designs is etched away to a depth of perhaps one millimeter by acid. The design is transferred to the glass in the following manner:

- ◆ A quantity of resist is rubbed on the warm steel plate.
- ◆ The excess is wiped off by a smoothing tool.
- ◆ A sheet of thin tissue paper is rubbed on tightly against the plate.
- ◆ The paper is stripped away bringing the resist with it.
- ◆ The paper is placed on the surface of the glass.
- ◆ The resist adheres smoothly to the glass.
- ◆ The paper is removed (after wetting with water or alcohol).
- ◆ Part of the glass is left covered by resist except for the lines of the design.
- ◆ The remaining surface of the ware is protected by brushing hot resist on it.
- ◆ The ware is immersed in acid for about ten minutes. The acid for etching is contained in shallow pans of lead or vulcanized rubber under a hood or fume cabinet. The hands should be protected by thick rubber gloves.
- ◆ The ware is washed thoroughly in boiling hot water to remove the resist.⁶

Sometimes a second etching process

follows plate etching. White acid is applied to relatively large areas, such as flower petals or panels in the original plate design, while the rest of the ware is protected. The white acid is usually applied as a paste, mixed with some inert material like barium sulfate. Its action is fairly rapid and requires less than one minute for a good satin finish.⁷

The various qualities of etching depend entirely on the use and composition of the resist, acid, and the method of applying the pattern.

NEEDLE ETCHING:

Designs can be traced on glassware by etching through marks scratched by steel needles through the protecting coating of wax on the ware. This resist can be beeswax, paraffin, rosin, Burgundy pitch or mixtures. It is applied by dipping the glassware into a pot of melted resist. A revolving vacuum chuck holds the piece of ware while square-ended needles of small diameter touch the surface. The needles are stationary or have specific motion. The needle plus the rotation produces a variety of designs. The ware is immersed for about ten minutes in hydrofluoric acid and then washed thoroughly with boiling hot water to remove all of the resist.⁸ This is the simplest technique of etching and was followed by many early American glasshouses including those at Sandwich, Cambridge, Pittsburgh, and Wheeling.

These early etchings can be distinguished from engravings by the needle-like tracery of the pattern. This is never deep, and the lines are often disconnected because little pieces of wax escaped the needle and held the acid from the glass. Wine glasses,

finger bowls, tumblers, and other lightweight bar and tableware were often decorated by this method with designs of loops and scrolls and fine lines.

Some of the finest etching results when an artist cuts the pattern through the wax resist without the aid of a stencil or pattern to guide him. Several artists in America free etched toward the end of the nineteenth century. One of them was Joseph Locke, a friend and associate of Edward Drummond Libbey, of the famous Libbey Glass Company.⁹

Mr. Delbert F. Howett directs the plate etching at the Morgantown Glassware Guild, Incorporated. When this factory was first established, it did needle etching along with plate or deep etching. Over twenty years ago it dispensed with the needle etching method.

Twelve work in the plate etching department, including Mr. Howett, printers, transfers, painters, etchers, and removers. The work is done in three different rooms. In the etching room, there are five compartments for acid etching with hydrofluoric acid (70 percent). Occasionally, to make the etching smoother, sulfuric acid is added.

Ammonia fluoride can be added to the acid to give the glass a satin finish. After the glass is etched, it is put in cold water to stop the etching process. After it is etched, the glass is washed in an automatic machine which sprays boiling water onto it in order to remove the wax, washes it with soap, and rinses it. The plate etching processes at the Morgantown Glassware Guild and Seneca are much the same.

The ingredients used to make the waxlike printing ink is a trade secret. It was handed down to Mr. Howett from his mother's side of the family and he,

in turn, will hand it down to whom he chooses. Whatever the formula, it will be valuable to know because with it the cost of the ink has been cut down incredibly. To use pure beeswax would cost \$1.25 a pound. But with this formula it costs only twelve and a half cents. The wax used to cover the inside and remaining surface of the glass article is a mixture of beeswax, paraffin, lamp black and rosin. When the glass cannot be dipped, the resist is put on with a brush.

The type of plate used is polished steel. The average cost of a plate is thirty to forty dollars. To make a plate is a complicated photographic process following the original design first drawn on white paper with black ink. The plates used are made at Martin's Ferry, Ohio. For each line of ware it takes about seven different patterns: one each for goblet, saucer, sherbert, cocktail, wine cordial, five, nine or twelve-ounce footed. In some other cases one pattern may be used for two types of glasses. In other cases a more complete line may be required such as an addition of an oyster cocktail or parfait. The cost for plates alone can run over three hundred dollars.

In the history of this glass factory there have been so many etchings required that the number of plates that have been used would be difficult to estimate. When a plate is no longer used, it is stored away with the wax still on it, for this will prevent it from rusting. If for some reason it should be cleaned, it is heated to melt and remove the wax, then cleaned with kerosene. The length of time that an article remains in the acid depends on different factors including the type of glass used, the desired depth, the desired

appearance and the acid mixture. The acid bath lasts about fifteen minutes.

For white acid etching, ammonia fluoride is added to the acid and the article to be etched goes through a double process. First, for about three minutes, it is given a regular acid bath, then immersed in cold water. For eighteen seconds it is dipped in the acid with the added ammonia fluoride, then immersed again. This gives a satin appearance to the glass. It is used more to cover large areas rather than detailed work. And because of the work extra process, it is more expensive.

Most of the blanks used for etching come from Morgantown Glass Guild, but many also come from outside factories in Ohio and other parts of West Virginia. Often the firm ordering etched glassware sends its own blanks.

On an average day the twelve workers will etch over three hundred dozen blanks, but the demand fluctuates considerably. The busy season begins at the end of August and runs through December. Certain situations can arise at anytime to make a difference in the orders. For instance, Mr. Howett feels that the hotels he supplies in Chicago will be ordering more than the usual amount of etched glassware because of the recent political conventions. An order for a large hotel, firm boatline or railroad is a continuing matter. It does not stop at the first order as they constantly need to be restocked. The Baltimore and Ohio railroad may order five hundred dozens of glassware in a month. If a strike develops, considerably less is ordered.

In 1950, the Morgantown Glassware Guild supplied the passenger ship, the USS United States, with etched glassware, and it continues to replenish

its supply. The first order, as Mr. Howett recalls, was for fifteen thousand dozens of pieces. For the months of June and July, they sent to the ship 3,000 dozens of pieces. The Moore and McCormick is another steamship line this factory supplies.

Some railroads that use the Morgantown Glassware Guild etched glass include the Santa Fe, Illinois Center, Delaware and Hudson, and Baltimore and Ohio railroads. Department stores also order, including Montgomery Wards, and Sears and Roebuck. Continuous orders come from some of the best known hotels and night clubs from the East to the West Coast - "21" Club, Fifth Avenue Hotel, Shelbourne Hotel, Colonial Restaurant, St. Regis Hotel, Neptune Inn, Beefeater's Club, Pierre Restaurant, Brake Hotel, Halfway House Hotels, Romanoff's, Scandra, Desert Inn and the Sheraton East Hotel.

This factory at one time etched glassware of its own design to an order but found that this was not profitable as often the etched ware might not sell. Now the etching is done only on an order basis. And as in other aspects of the glass industry, the demand for etching has decreased, but not so much at the Morgantown Glassware Guild because other factories discontinued etching, and it took over the orders. The etched design is usually a spot design as opposed to the over-all. To cover the glass with an etched design costs considerably more, and commercially the demand is less. For instance a dozen goblets with a spot design might cost eight dollars while the same goblets with over-all design might cost eighteen dollars a dozen.

Seneca Glass Company has been

etching since the early nineteen hundreds. They did needle etching until about 1940. Now they concentrate on plate etching. Mrs. Sylvia Lang has been with the Company since 1924 and is the present head of the etching department. There are no major differences between Seneca and the Morgantown Glassware Guild. At present three workers are employed in this department who on an average day can turn out from sixty to seventy dozens of etched glassware.

The plates of steel are made at Pittsburgh with the pattern supplied by the purchaser. The wax used as resist is paraffin. In the etching solution sulfuric acid is never added as at the Morgantown Glassware Guild. Another difference is that the Etching Department only uses blanks blown right at the Seneca Glass Company.

As at the Morgantown Glassware Guild, this Etching Department etches only to fill orders. It does not supply any railroad or steamship lines but it does supply the United States Steel, and the American Iron and Steel. Two of their purchasers also have ware etched at the Morgantown Glassware Guild - Romanoff's night club in California and at the St. Regis Hotel in New York. Also it sends etched ware to the Essex House, Ritz Tower, Westbury, Sheraton Palace, and the Lawyers' Club In New York.

FROSTING:

A third company in Morgantown to do etching is the Beaumont Company on University Avenue. The type of etching it does is not plate etching, nor needle etching; rather it is a process called by Beaumont, frosting. The result gives to the glass a satin or frosted appearance.

The Beaumont Company does not work with small tableware glass as do the other two factories, but makes lamp parts ranging from a small to a very large size, difficult to manipulate. It has been frosting for many years.

All types of lamp parts are etched to give them a frosted appearance. This includes crystal glass, opal glass, furlux, and glass that has the color mixed in the batch. First, it is dipped in the hot water and then into a cleaning acid. This is one-sixth percent of seventy percent hydrofluoric acid; the rest is water. Then it is placed into a commercial frosting acid for at least forty-five seconds. To stop the etching, it is put in cold water. Finally, it is washed in hot soapy water, rinsed and put on a table to dry.

The crystal or colored glass does not take as long to etch, the furlux is etched for one minute and the opal for about two minutes. The lamp parts are frosted all over and there is no spotting or stenciling of designs. Three hundred of the large-size parts or eight hundred of the small size can be frosted in a day. Lamp parts are not ordered in such large quantities as tableware. Nor are they handled with the same facility because of their size. This frosted effect can serve as the complete decoration of the part or it can be the base for further extrinsic ornamentation.

The Davis and Lynch Glass Company at Star City also etches lamp parts in the same way that Beaumont does. The work area is not as large. Since Davis and Lynch does not blow colored glass, they do not etch it. Opal glass and clear glass is etched. The opal is etched from two to three minutes and on completion is called Bristol. The clear is etched twenty-five to thirty

seconds, and on completion is called crystal Bristol.

FLEQUING:

A method of decoration commonly employed at the Beaumont Glass Company is etching glass by means of glue. This they call flequing. This is not to be confused with the other types of etching already mentioned in this chapter as they employ the use of a corroding acid. This process uses glue and replaces sandblasting. It is speedier, less expensive on a smaller scale and gives interesting effects. Beaumont uses it to decorate lamp parts. The design result looks like ferns or various shapes and sizes. Sometimes, the design has a circular, narrow feathery appearance. Both clear and colored glass can be used. The glue adheres to the glass with such firmness that upon being abruptly separated, numerous glass scales of various thicknesses are detached.¹⁰

First in the process of flequing, the glass

lamp part is thoroughly cleaned. Second granules of animal fat are dissolved in ordinary hot water and heated until quite hot. After the glue has melted to a syrup consistency and while it is still hot, a layer is applied by brush. In about half an hour another layer is applied to give it a smooth, transparent coat of sufficient thickness. This is allowed to dry for twenty-four hours, and for a few hours it is warmed by controlled temperature. At Beaumont there is a special wooden cabinet for glassware in the flequing process. The glue through the effect of desiccation detaches itself from the glass with a noise and removes numerous flakes of glass. After all of the glue is off, the lamp part is carefully washed and dried.

It is important to use glass that is thick enough because the extraordinary strength of the glue would otherwise cause the glass to break. At Beaumont the breakage is from five to ten percent.

Chapter V

Fused Decoration

The big change in decorating procedure began in the early 1930's with the labeling of milk bottles with applied permanent lettering. Gradually the bottlers of soft drinks began to adopt the applied color label. This not only dressed up the package, it eliminated the nuisance of a paper label - coolers would contaminate the labels and they would have to be replaced. Because of this change in decorating procedure, many glass companies have applied color decoration departments. The work has so expanded that today it is probably the industry's largest secondary operation. The success of the present fused decoration has been due largely to the progress which the various color manufacturers have achieved in producing enamels of greater durability than was imagined twenty years ago. And now these fused enamels have become a dominant factor in glass.¹

The decoration is carried out in a decorating lehr. At Beaumont the lehr is eighty feet long. It differs from an ordinary lehr in that it must have a heating-up zone some fifteen feet in length so that the ware may be heated gradually before reaching the fire box proper. Here a temperature as high as the ware will stand without deformation is applied and then the ware passes on through a cooling tunnel as in the ordinary annealing process.

Various types of decorations are fused in two factories in the Morgantown area - the Beaumont Glass Company in Morgantown, and Davis and Lynch at Star City. Some types of ornamentation they both do include spraying, handpainting, enameling, gold application, stamping, banding, decal and icing.

In addition Davis and Lynch does stamping and Beaumont silk screens and

silvers. Both extrinsically decorate lamp parts only which go to lamp manufacturers who assemble the lamps. These lamp manufacturers order them in small or large numbers. A small order will consist of a carton load of hand painted lamp bases. A large order may hit 5,000 and be for a stencil type sprayed ceiling light. Each factory uses its own blown lamp parts for decorations.

Though most of the decorations in this chapter have been listed separately, this is not meant to imply that a ware can have but one type of decoration on it. Many lamp parts have several types that are applied on etched or plain glass. Any of these processes can be and often are combined. Even on silk screened pieces extra squeegee dots are added. Gold is used as an accompanying decoration as well as independently.

On decals gold is added to give the flowers a rhythmic flow. It is used for banding or horizontal and vertical lining. Many sprayed lamp parts unless strictly utilitarian have other decoration applied to them. Even the ones sprayed with a special paint like luster may have added decoration. If the ware is decorated in diverse ways and each way requires a different firing temperature, then the ware may have to go through a number of firings. If the decorations fuse at the same temperature, this then is, of course, not necessary. Each finished lamp part has had several factors instrumental in its completion.

At Beaumont the decorating processes take place in a very large room 70' x 120'. Nick Dorohovich, the head of the decorative processes at Beaumont does all of the preparatory art work and chooses what types of fused decoration will be carried out on a certain ware in order to fill orders properly. The decorated ware is shown in large lamp



Figure 10. Production at Davis and Lynch

1. Gatherer - gathers molten glass from furnace
2. Blocker - shapes initial gather and adds second layer
3. Blower - inflates glass in cast iron mold
4. Glass cut off and transferred to annealing oven
5. Solid color or tint sprayed on glass
6. Hand decorators paint designs on glass
7. Hand decorators paint designs on glass
8. Final inspection after firing of paint

shows in larger cities. One was held this past June in New York City. Beaumont fills orders for supply houses and lamp manufacturers. To carry out the desired decorations fifteen workers are employed. Some specialize in one thing such as spraying or silk screening. The others may have to do several different types of decoration depending on the demand.

The special decorating lehr that is used at Beaumont is eighty feet long. Different types of decorated ware call for various regulations while in the lehr. Colored glass parts are decorated as extensively as the clear lamp parts. When a piece is finished, its average cost is four or five hundred dollars to the lamp manufacturer.

At the Davis and Lynch factory in Star City, a less modern decoration adorns the lamp. It is generally a floral pattern. Though Davis and Lynch can do and have done other types, for commercial reasons it sticks to this. At Beaumont various subjects adorn lamps and just geometrical design is used. New devices are employed extensively to achieve new effects. The head of the decoration department at Davis and Lynch is M. R. Davis, Jr. The company was founded in 1929, and since 1935 it has decorated lamp parts. It has occupied its present buildings since 1949. There are two buildings - one for blowing and one for decoration. The offices and packing rooms are in the same building in which decoration takes place.

Various operations take place in different rooms. All of the painting is done in one room, the spraying in another, and the firing in still another. About thirty women execute the work. The one lone man is the sprayer. The sixty-five foot long decorating lehr is always full, and it takes a lamp part about an hour and a half to travel through it. The cost of a finished lamp with its decoration may run from five dollars to seventy-five dollars.

SILK SCREEN:

Silk screening is the most widely used decorating process. More ware units are screen printed than are decorated by any other means. At first production was limited to flat items, but later through the development of suitable hand operated equipment, the process was expanded to such lines as - table turners, milk and beverage bottles, and cosmetic jars. The hand operated equipment has been replaced considerably in the past years with a semi-automatic decorating machine.² The silk screening that is done at Beaumont Company, though, is all done by hand. They silk screen primarily to fill orders for EXIT lamps and SORTIE lamps. The EXIT lamps go to various supply houses throughout the country. The SORTIE lamps go to certain French speaking parts of Canada (Sortie means exit). The shapes of both of these are the same - triangular, and the word is printed on both sides. At Beaumont for the screening process, a design is drawn and prepared by a photographic process. At one time other processes were used, but this is superior because of speed and because fine lines can be reproduced. Technically this is the process:

The screen is first coated with gelatin, and made light sensitive by the addition of a dichromate. If a positive or plate is laid over this screen and exposed to light, the gelatin is rendered insoluble, except where it is protected by the design. Treatment with cold or warm water removes the gelatin from the design, exposing the screen for the passage of the "paint" or suspension of the powdered enamel in essential oils. To dry, the excess water is blotted with a newspaper and the screen is set aside to dry.³ The object is placed in contact with the screen. A squeegee, on the upper side of the screen, causes the paint to flow through the meshes transferring a thin layer to the glass surface. The ware is then sent though the decorating lehr at the highest temperature it will stand without deformation.

The vehicle becomes vapor, any varnish gums that may be used are decomposed and burned away, and the enamel fuses permanently to the glass surface.⁴

Squeegee oil is the oil vehicle with which the ceramic color is mixed in order to prepare to paste mixture for screen printing, and a good squeegee oil should volatilize completely before enamel fusing temperature is reached and produce no blistering of the color. It should print sharply and not run. It should be odorless and unaffected by moisture, and in case a second color application is necessary the first must dry properly.

Squeegee lusters of the same color can be mixed to produce intermediate shades. However, mixing lusters of different colors together will not usually produce the expected. Thus, when a red and dark blue luster are combined, the mixture fires out dark blue, not purple. After firing, the luster film is highly transparent and has a metallic iridescence; thus, uniform thickness is important.⁶

Before the EXIT and SORTIE lamps are silk screened, they are sprayed inside for an opaque effect. Otherwise, the light would be too bright. The paint to spray the inside of the lamp is a ceramic paint. It is a chalky mixture made up of water and lead. When fired, it is like porcelain. A special mold is made to hold the lamp while it is silk screened. They are done with either red letters on white or white letters on red. After one side is finished, it is turned over and the other side is completed. A skilled worker is able to complete 300 in a day. The Beaumont Glass also silk screens with gold. Usually the design is an all-over line type motif. Beaumont is the only factory in this vicinity to use the silk screen method.

SPRAYING:

The spray method is the second most important decorating process from the standpoint of volume. The spray gun provides

a comparatively simple means of creating over-all color effects which would not be achieved by incorporating the color directly in the glass itself. It is used effectively on glass tableware, mixing bowls, vases, and jars. Along with the decorative value of the color it also serves a utilitarian value in glass illuminating ware as it provides light dispersion and soft illuminating effects.⁷

Already it has been shown how at Beaumont the spray is used to give an opacity to the EXIT and SORTIE lamps for better transmission of light. More often the outside is sprayed, either all over or partially. Sometimes it is sprayed all over, and then vertical scratches, such as a comb might make, are scratched into the surface of the paint before it is fired, to give an interesting appearance. When the illuminating ware is sprayed partially on the outside, a stencil is used. The stencil is made of lead, and is used to cover that part of the lamp not to be sprayed. Beaumont prepares large quantities of ceiling lights by using a stencil and then spraying. These stencils after a few dozen lamps have been sprayed must be changed. When the stencil is to be cleaned, it is heated to melt the paint and then the excess is wiped off.

The spraying set-up at Beaumont consists of a spray booth with a spray gun, air pressure, regulator, supply of color, revolving turntable, a means of ventilation to completely remove the spray fog, and stencils if necessary. Beaumont has three spray booths and two sprayers. Also, in another part of the factory there is a semi-automatic spraying machine used to fill large orders of continuous lines. This machine can spray twelve lamps a minute. They do not spray everyday at Beaumont as Davis and Lynch do. Since none of the glass they blow is colored, they find it necessary to spray any desired background colors. They also spray foreground color for decorative effects. By hand, the spraying is

completed in a few seconds. The gun is connected to an air pressure supply and adjustments are made with the various valves are regulators. It is necessary to hold the gun about a foot away from the lamp. The first squeeze of the trigger should not be directed at the lamp because the first hit of paint comes out in the form of a slug. This is owing to the elastic nature of the medium and will occur on every new squeeze of the trigger.⁸ Because of the rapid drying of the paint a certain amount of it will accumulate and harden on the nozzle of the spray gun. This must frequently be wiped away to maintain clean spraying.

Turpentine used to be the basic spray medium, but now it is a mixture of three parts of water to one part of alcohol. The average color sprayed with this mixture dries to a somewhat powdery surface and is quite easily scratched or finger-marked prior to firing. Thus, certain binding agents are added to the color mixtures in small percentages. Colors in the spraying operation tend to develop a film in the cup of the spray gun because of the air pressure exerted on the surface. It is, therefore, necessary to shake the spray gun vigorously every so often.⁹ The agitator in the five-gallon tank keeps the paint mixed, or else the lead would go to the bottom. The object to be sprayed is slowly turned after the gun is triggered, and sprayed all over or with the use of a stencil. If the object has an opening at the top, a piece of wood is fitted into it to keep the fumes from the inside. The procedure for spraying is the same at both factories, and extra guns are kept on hand for other effects.

Immediately after use, the gun should be cleaned in a solvent of turpentine by the use of a bristle brush. The entire cleaning job can be done in two or three minutes. This is necessary because of the tendency of the paint to harden rapidly in contact with air.¹⁰

Spraying is done at Beaumont to produce two other decorative effects - veiling and

spattering. These two techniques involve the use of the same materials as in spraying, but in comparison it is an art on the part of the operator who must control volume of flow of paint and manipulate with skill the spraying equipment.¹¹

Veiling gives a thin line, thready appearance to the glass with lines of all shapes going in all directions. Spattering gives the effect of its name - spotted or polka dot. Also, with the spray gun a mist appearance can be had. With misting, the distance from gun to object is six to ten inches. In the other techniques it is twelve to fifteen inches. In veiling, rubber cement is added to the paint to make it come out in threads; otherwise, as soon as it hit the glass it would come off.

Colors available for veiling and spattering from the Engelhard Industries, Incorporation, in New Jersey, include Bright Gold, Bright Gold to resist etching, Bright White Gold, Red Luster Ruby, Black Luster and Gold Bronze, and Veiling Bright Gold.¹²

The spray booth for veiling and spattering is more confined than for ordinary spraying. In both cases though the color is reclaimed and used over since only sixty or seventy percent of the atomized color adheres to the object. By reclaiming, from ninety to ninety-five percent, of the overspray can be saved.¹³ At Beaumont a special little booth is set up for the purpose of veiling and spattering.

When working with gold, there is no need for a fan for ventilation because there are no escaping fumes. The object to be veiled or spattered is set on the turntable or a pedestal on the turntable. Just so it is placed in such a way that the whole area to be sprayed is exposed.

These spraying techniques can be used on almost any type of glass - some with greater success than others. This is learned through experimentation. For this, a practice medium can be purchased that has no precious metal.¹⁴

DECALCOMANIA:

Much decoration at Beaumont, and Davis and Lynch calls for decal work. A decal is printed in several colors and is precisely covered with line and shading not possible by other decorating means.¹⁵ There is also an all gold decal which leaves outlines that can be filled in with color. All of the decals are applied by hand to the glassware. The decals are ordered in different sizes with various subjects. The most used at the two factories are two to four inch flowers and floral designs. Several of these are placed around a lamp part. Usually, the water slide off method is used. But whatever the method, the surface must be completely free of grease and dirt.

In the water slide-off method the subject is cut from the sheet and placed in a shallow pan of water. In about ninety seconds the color film can be released from the backing paper. The decal should not be soaked too long as this can cause the color film to float away from the paper and in turn remove the adhesive which is necessary for holding the film of color on the ware.¹⁶ Next, the entire piece is placed over the area to be decorated, face up, and the backing paper is slipped out from under the color film. After the color film is adjusted on the ware, it is important that all of the water and air bubbles are worked out by means of blotting paper or a damp sponge which is patted on the decal from the center towards the edge. All of the excess water should be sponged from the surface to avoid water marks.

Another type of decal is printed on duplex paper which has been given a water soluble coating. The surface of the ware to be decorated is varnished with a thin coat of decal size which has been diluted with forty to fifty percent turpentine. After the size becomes tacky in a few minutes, the cut out decals are applied with the printed surface against the tacky size. The decal is rubbed until it thoroughly adheres to the size. The

water soluble coating is removed with water. The ware is thoroughly washed to remove all of the gelatin coating from the color film before the ware is allowed to dry.¹⁷ When it is dry, it is placed in the lehr and is fired. In both processes the drying usually takes several hours.

GOLD, SILVER AND PLATINUM:

Metals like gold, silver and platinum may be applied decoratively to glass by mixing the precipitated metal or some pulverized compound of it with a small quantity of a low melting borate "flux," then with a vehicle that will disappear on firing.¹⁸

Ancient glass was often decorated with gold leaf. Sometimes the leaf was glued to a piece of glass with honey and then a pattern traced or cut into the leaf, and over the gold design would be a layer of hot glass. This made a sandwich of gold protected by glass, the piece fired and further decorated with translucent colors. The Arab craftsmen became quite expert at this. Glass with Oriental designs of superb richness were used in the court and mosque.¹⁹

During the Middle Ages, Italian artists made pictures of religious subjects in gold or silver on the back of panels of glass in the same manner that the Romans had done. The parts of gold and silver not required were removed. What was left was drawn upon with an extremely fine point which made fine lines or spaces in which coloring matter was applied. It was on completion given a coat of protecting material, applied to stone or backed by a layer of glass. This process is described by Cennino Cennini in his *Libro dell' Arte* written at Padua towards the end of the fourteenth century. He offers this advice, "...this is delicate work. It must all be done unhurriedly and with great delight and pleasure. And I give you this advice: that on the day before you think of working at this, you hold your hand in a sling, or in your

bosom so that the blood is well rested and rid of fatigue.”²⁰

Much German and Italian glass of the sixteenth century was gilded. The gilt was often mixed with other decorative techniques. In Knuckels' *Ars Vittraria* the author gives the recipe “for making a specially curious drinking glass.”²¹ This is a double glass with one smooth glass fitting into a larger smooth one. Inside the larger one is a painting which has been etched into with a needle to give a veined appearance. On the back, gold or silver was applied with linseed oil. The outside of the smaller glass was also covered with gold or silver foil. The glasses were fit together with the upper rims cemented with a mixture of powdered chalk and lacquer varnish. Most of the glasses made in this way were made during the eighteenth century, usually in the Bohemian and Silesian glass districts. Several other curious methods were popular during this period.²²

Permanent gilding fixed with heat is said to be the invention of a Spaniard, Don Digismondo Brun, during the eighteenth century. An example of his work is a bowl with cover and tray of plain glass all decorated in gold.²³ Possibly gilding was not done in our glass factories before 1820. Some say that Stiegel and Amelung glass may have been gilded, but there is no positive evidence. There is much evidence that it was used extensively during the Victorian era and without much rhyme or reason from the standpoint of design. Women or girls were usually employed to “gild the lily.”²⁴

Both Beaumont and Davis and Lynch do a considerable amount of decoration with gold, silver, and platinum, but in both cases it is restricted mainly to lamp part decoration and is rarely used for commercial decoration. The paint used is a commercial mixture. Liquid Bright Gold is used more extensively than any other gold preparation. It is essentially a gold resinate and when it is fired a gold like film is

left. The gold and platinum can be applied by several methods. The three main ones are brushing, stamping, and spraying.

When the coating dries within an hour, it is fired.²⁵ Beaumont applies gold to all types of glass in various ways - such as vertical, horizontal or veiled lines of various widths. Some lamp parts are banded. Some are decorated with subjects. Various factors will affect the appearance of the gold - sometimes it will be metallic and other times opaque. If an enamel is used as a base, an opaque effect appears.

During the process of firing, ventilation is extremely important. A supply of fresh air along the firing level of the lehr decidedly improves its brilliance and adherence. The lehr at Beaumont has a special chimney for this purpose. The time cycle depends entirely on the ware to be decorated.

LUSTER:

Luster is a decoration of delicate metallic tints. It comes commercially prepared in many colors and can be applied by hand or spray.²⁶ Beaumont does a considerable amount of lustering, all by hand. Davis and Lynch applies luster with a spray. They often dab it with paper after it is sprayed to give an unusual effect. The lamp part to be lustered is first cleaned and dried. The luster is applied with a camel-hair brush evenly and in a medium strength as the lamp part revolves on a hand turntable. Beaumont has more demand for the mother of pearl luster than any other. Available luster colors are ruby purple, ruby, rose red, deep cranberry, purple, sherry brown, mother of pearl, iridescent light blue, rose pink, blue amethyst violet, golden orange, cranberry, light cranberry, rose purple and sapphire.

MARBELIZING:

To marbelize glass gives to it an appearance of marble with veins running through it.

Marbelizing liquid comes commercially prepared and is used in connection with gold and often with luster.

First in the procedure, gold is applied to the glass. When the gold becomes tacky the marbelizing liquid is applied. This is allowed to dry and then it is fired.

In another method luster is applied and is dry in twenty or thirty minutes, whereupon the marbelizing liquid is applied to it and allowed to dry. On top of this goes the gold.

In the first method the gold coating produces a veined effect - fine veins if the gold coating is weak and wide veins if the gold coating is strong. The second method produces a wider or bolder crackle finish.²⁷

When working with large objects, it is sometimes necessary to thin the paints to permit easier brushing. The gold is thinned with a special essence and the marbelizing liquid is thinned with water. Other methods and mixtures of application are also devised and practiced at Beaumont.

ICED DECORATION:

This is a semi-rough embossed decoration with a frosty appearance. It is obtained through the use of colorless granular low melting glass. First the area to be covered is given a coat of a tacky printed oil and the "ice" is placed over the tacky surface.²⁸ Firing is carried out in the same way as for color. Beaumont often uses iced decoration in combination with other decorations.

ENAMELING AND HAND PAINTING:

Glass painting is a very old art which originated in Egypt. The vessels were colored with natural dyes which were attached with varnish, and also in a way which today we call the cold method of painting. This means that the ware was not fired after it was painted. In Rome enamel colors were used which could be baked and added durability to the glass.²⁹ However, the use of glass enamel was not

fully developed until after the ninth century when the glassmen of the Near East took up the art of decorating vessels with translucent enamels. These enamels, made from finely powdered and easily melting glass mixtures, were dissolved in a cement, and applied with a brush.³⁰

The execution of French enameling in the sixteenth century is more delicate than the Italian. The color is usually blue, red, white and a dull yellow with some panels of scroll work. The subjects are usually figures, dressed in the costumes worn in France during the reign of Henry II. These examples are rare. Any enameled glasses that were in use in Germany before 1540 were imported. Later enameled glasses were made in many districts throughout Germany. The first district to do enameling was probably Bavaria. Other important districts were Bohemia, Silesia, Hesse, Baxony, Fitchel Mountains, and Brandenburg. Some glasses were painted and given a coat of protective material instead of being fired.³¹

In the United States, enameling of glass is largely a Dutch and German heritage. This technique may have been used in the early New Amsterdam and New York glass houses. In colonial America, the decoration of glassware was never of the ambitious nature current in Europe.³² The German, Dutch, and Italian workmen who were imported to America by Stiegel gave the glass a definite foreign flavor. Stiegel was the first glass maker in this country to use colored enamels for decoration. Six opaque colors were employed - white, yellow, blue Nile greens, brick red and black. The first enameled glass was advertised by Stiegel in February, 1773. The men who enameled were Henry Nissile, Joseph Welsh, Sebastian Witmen and Martin Yettters.³³

Enamel for painting is made of pulverized glass of a type easily melted. It is colored by the addition of metallic oxides and made to

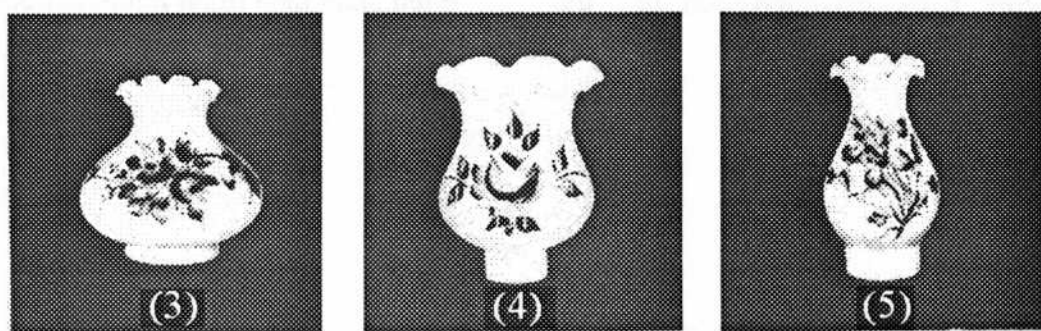
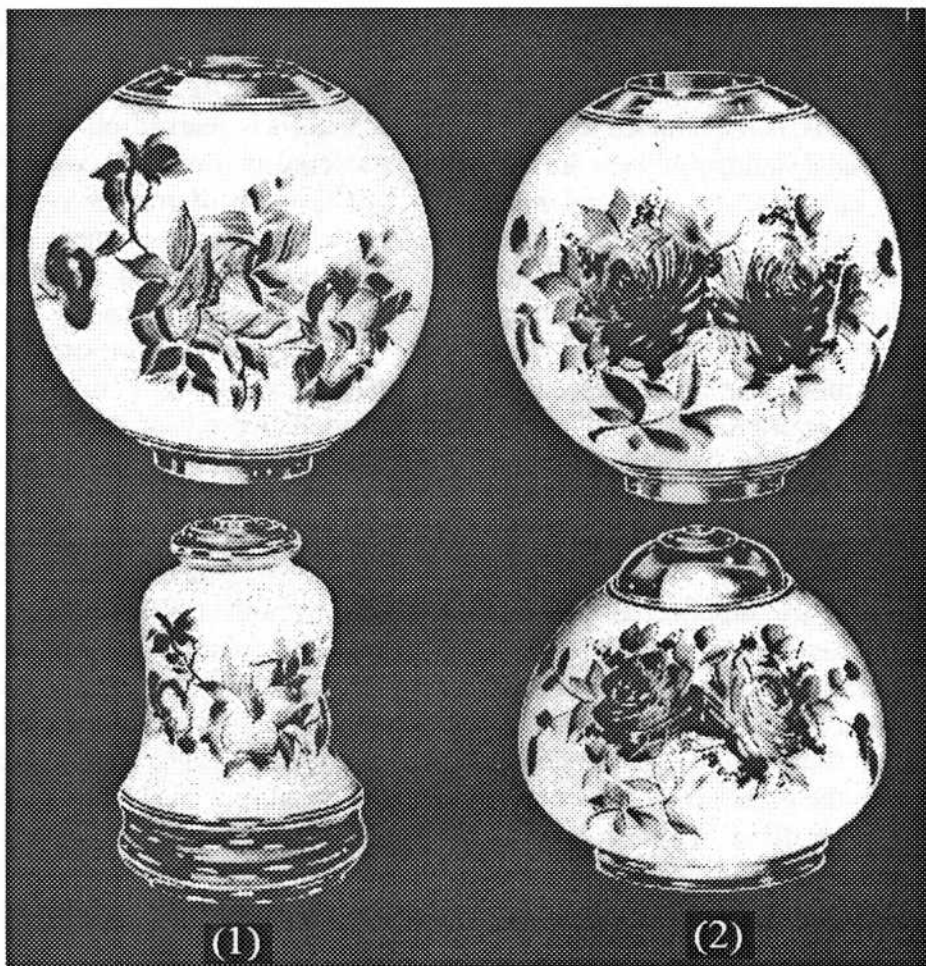


Figure 11. Painted lamp parts produced by Davis and Lynch Company.

1 - 2 Hand painted ball globes and bases, shown with mounting hardware.

3 - 4 Hand painted lamp chimneys.

flow from the brush like any other paint by mixing glass with a solution of gum arabic or some equivalent medium. After the glass has been decorated, it is fired slowly. This causes the enamel to melt and become a part of the heat softened glass. Thus, was glass enameled in past ages and thus, is it enameled today.³⁴

From a chemical standpoint there are two types of glass enamels, resistant and non-resistant. The resistant to a degree resists attacks by acid and alkalis, while the latter does not. Before 1935 resistant type enamels were unknown but by 1940 they were available. Now more than ninety percent of the enamels sold are of the resistant type. In dinnerware the enameling should be resistant because of the acids in different foods. Also, the atmosphere will have an effect on the enamel if it is not resistant.³⁵

Glass enamels are supplied as powder, squeegee paste, thermoplastic solids or in a vehicle consisting mainly of alcohol and water. The main requirement of enamel is that it should fuse at a much lower temperature than the glass which it decorates so that it can be fired without causing deformation. In firing, sufficient ventilation is important so that solvents and decomposition products can escape rapidly. The solvents vaporize first in the preheat zone; as the temperature rises, decomposition of the resinous portion of the

oil occurs. After about ten minutes in the preheat zone, the glassware is fired at the maximum temperature it will stand from five to twelve minutes. The temperature then declines at a rate slow enough to permit good annealing.³⁷ At Beaumont the area to be enameled is marked on with chalk or black wax crayon. Both will come off in the firing. If a design is of great complexity is to go on the lamp base, it is stenciled on. Both at Beaumont and Davis and Lynch, enamel is used as a backing for an opaque gold.

Today handpainting on glass is less artistic than it was at one time. It consists of symbolic reproductions of floral patterns and adding color as a fill in of prints. Davis and Lynch handpaint extensively. There are over twenty women in their handpainting room. Two do work on one specific lamp part. One may paint the flower and the other will paint on the trimmings. The time it takes depends on the size of the lamp and the amount of painting to go on it. One lady originates the design from which dozens up to hundreds may be copied free hand. The paint used is of an oil base. It comes in powder form and is mixed. With this, shading can be accomplished. At Beaumont handpainting is done to fill orders and is executed accordingly. The design varies and is most often other than floral reproductions.

CHAPTER VI

Paperweights

The finest antique paperweights were produced by master craftsmen and represented the highest expression of the skill and the art of the glass maker. Paperweights are interesting because of the many varied, detailed motifs magnified under glass.

Most paperweights are made by building rather than blowing. This is called **OVERLAY**. Air bubbles in glass are due to insufficient cooling of the metal. Tiny dewdrops on flowers and leaves are produced deliberately with drops of alcohol or by piercing - with a special tool.

The first paperweights came from the French factories of St. Louis, Baccarat, and Clichy during the mid 1800's. Paperweights served as bases for many articles useful in their day. These articles were often embellished after the manner of paperweights, or paperweights were incorporated into them. Some examples are wig holders, ink bottles, vases, mantel ornaments, door knobs, door stops, and newel posts. All of the snow weights were made in France.

In America the Sandwich Glass paperweights were produced from 1826 to 1888 by an Austrian, with an unpronounceable name, who called himself Timothy Collins, and also by Nicholas Lutz. These weights were especially fine. Other American names associated with paperweights include the Pairpoint Company established in New Bedford, Massachusetts, in 1865; the Whitehall, Tatum Company, established at Millville, New Jersey, in 1849; and the Ravenna Glass Company.

Such individuals as Francois Pierre, John Hopkins, John A. Gillerland, Christian Doerflinger, Marcus Kuntz, and Emil Stanger contributed to the art of paperweight making during the 1800's and early 1900's.

The important centers for English paperweights were London, Bristol, Nailsea and Stourbridge. The Bristol paperweights show a cameo of glass, silvered and mounted upon a lump of clear glass, and the effect is quite pleasing. Sometimes these glass cameos were placed on vases.

In the Morgantown area, Mr. and Mrs. John Gentile own a glass factory in which they specialize in the making of paperweights. The factory is located on Industrial Avenue in Star City. Mr. Gentile comes from a long line of glass workers. He was apprenticed in the art under his own father. Together they made paperweights at the Morgantown Glassware Guild, Incorporated, during the 1940's.* Mr. Gentile has been making paperweights at the Star City factory since 1950. Though he specializes in making weights, he can also make many other objects of glass such as candle holders, pencil holders, ash trays, and lamp parts. A small quantity of glass is cut at the factory by his stepson. Eighty-five percent of his trade is for paperweights.

The weights are made completely by hand with the tools originally used three generations ago; a cut-down tool, fruit-wood molds, blowpipe, pontil rod, shears, tong, and marver. The dies used are made by August Christoph. The ingredients used to prepare the batch include tank lime, silica sand, live flux, soda ash, nitrate soda, and chemical compounds for luster and decolorizers.

**William Zick, Junior, makes paperweights at the Morgantown Glassware Guild on Thursday and Friday nights. He makes a smaller quantity than Mr. Gentile, but produces them by the same method.*

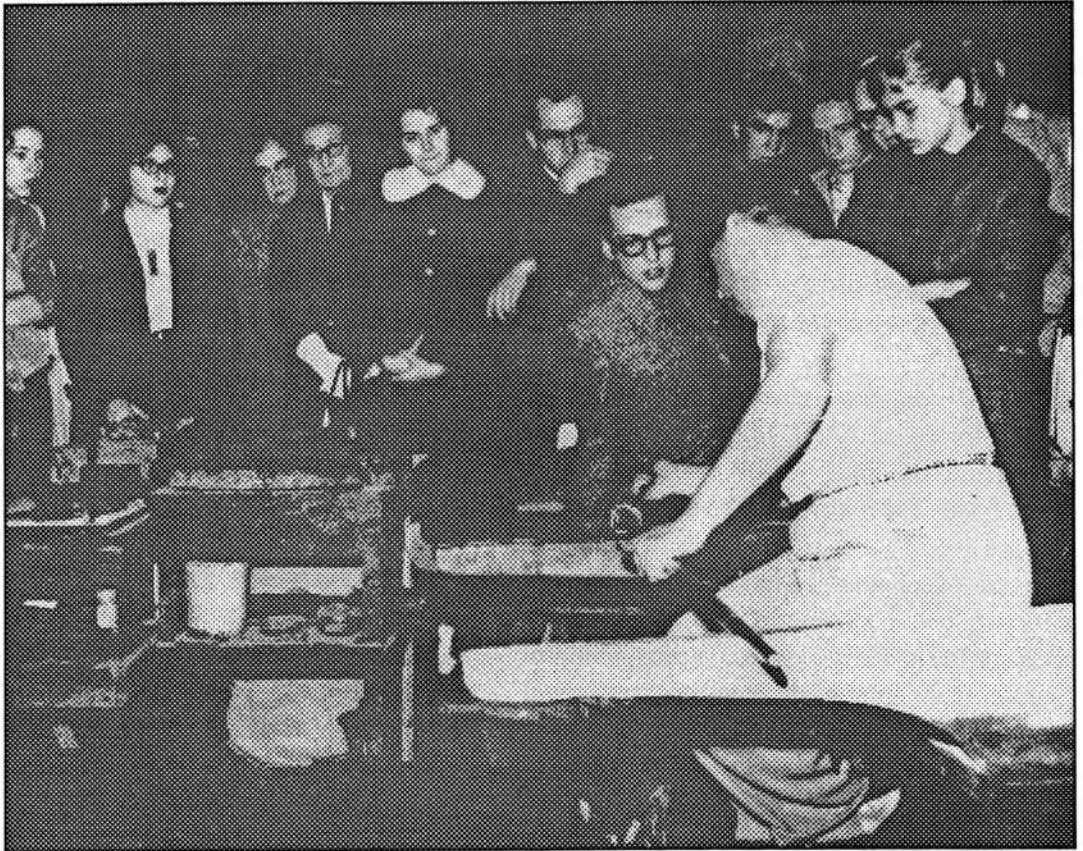


Figure 12. Paperweight making - Mr. John Gentile in the chair working a weight with a wet wooden stick.

These double overlay weights are made like the older ones - by building not blowing. Following are the steps involved preceding the cooling process, in the making of a pencil holder paperweight which is a specialty of this company.

- ◆ A gob of molten glass is gathered from the day tank. This tank holds enough molten glass for one to three day's work.
- ◆ It is marvered.
- ◆ This is pressed in a mold that has little steel-like needles sticking up. Later this will give a bubble like appearance when it receives another layer of glass.*
- ◆ An overlay of liquid glass is added.
- ◆ It is marvered again.
- ◆ More bubbles are added in the same way as step three. The size of the bubble depends on the size of the needles and how deeply they penetrate into the glass.
- ◆ It is given a final overlay of glass.
- ◆ It is shaped by rolling in an open mold of fruit wood.
- ◆ The glass is pierced with an ice-pick like instrument to make places for pencils.
- ◆ Once again, it is shaped.
- ◆ The pencil holder indentations are pierced again with a sharper instrument.

- ◆ For the last time it is shaped.
- ◆ It is removed from the pontil rod by a sharp blow of a metal tool against the end of the rod into the sand, and is taken to the Lehr and goes through the annealing process. The pontil rod when removed leaves a rough mark which is later ground away and smoothed. It leaves a small circular depression which marks it as hand-made glass.

When Mr. Gentile is marvering he works at the finishers' chair, sometimes called a cradle. By the next day the paperweights have been properly annealed and are ready to be smoothed and polished. He has managed to learn to reproduce two famous paperweights, the Millville Rose and the Flying Goose. At present, Mr. Gentile is working on paperweights for the 1963 West Virginia Centennial. He estimates that in the next three years over 2000 weights for this occasion will be made. In 1961, the Civil War Centennial begins and lasts for four years. For this celebration, he estimates 5,000 weights will be made.

The whole process preceding the annealing requires only ten minutes. During his ten-year career, Mr. Gentile has made and sold approximately 10,000 weights.

**At this point if a specific design other than bubbles is desired, then the molten glass is pressed into a mold which has a design on the bottom in intaglio. This is called a die. The design depends on the weight to be made (it may be a flag; an emblem of an organization or a motto). Inside the intaglio portion are bits of glass which may be multi-colored or one color, thus creating a relief of the desired design on the gob of glass. This eventually will be given an overlay of glass.*

APPENDICES

APPENDIX A

Superior Features of Fine Glassware:

- ◆ Handmade (hand-blown, hand-pressed, hand-decorated)
- ◆ More carefully finished, highly polished, rigidly inspected for rough edges and defects.
- ◆ Contains costlier ingredients and requires more time and skilled craftsmanship in production, which adds to the price.
- ◆ More distinctive patterns and shapes styled by designers.
- ◆ Cuttings, etchings and other decorations are more intricate and elaborate, requiring skilled workmanship.
- ◆ Higher permanent luster and greater clarity.
- ◆ Brand names signify high standards of quality maintained through many years of making fine glassware.

APPENDIX B

GLOSSARY

This glossary is compiled from the glossaries of Bergstrom's *Old Glass Paperweights*; Daniel's *Cut and Engraved Glass*; and McKearins' *American Glass*.

ANNEALING: the gradual cooling of hot glass in the lehr.

BATCH: (frit) the mixture of material used for glass.

BATTLEBORE: a wooden paddle used to flatten the bottom of vessels and feet.

BLANK: an uncut glass vessel designed for decoration.

BLOCK: wooden tool used as hand mold to give symmetry to offhand pieces.

BLOWN: glass that is gathered on a pipe and blown into shape by a workman.

BLOWPIPE: a hollow rod used to inflate the glass object and attached opposite the pontil rod.

BULL'S EYE: (roundelet, kugel) American term for concave, round-ball motif.

CAMEO: cased glass on which top layer is sculptured leaving figure in relief on background of another color.

CHAIR: (cradle) wooden bench with slanting arms at which the gaffer works while fashioning on object.

CRYSTAL: natural rock crystal; fine colorless or clear glass.

CULLET: broken glass used as an ingredient of a batch.

CUT: glass decorated by application to a moving wheel.

DIAMOND CUT: surface scratched with a diamond point in a decorative pattern, used by Amelung and Stiegel.

DIP-MOLD: one-piece mold open at the top.

ENGRAVING: decoration by application to a series of small copper or stone wheels.

ETCHING: decoration applied through corroding action of hydrofluoric acid or the like.

FIRE-POLISHING: reheating of finished vessels to obliterate marks left by tools or molds and to obtain a smooth even surface.

FLASHING: coating of one color with a thin layer of another.

FLINT GLASS: (lead, lead flint) metal made with oxide of lead as the flux and sand as the silica.

FLUTE: a vertical panel cutting usually used without other decoration.

FLUX: an alkaline or metallic substance, such as potash and carbonate of soda and oxide of lead, added to the batch to fuse the silica.

FOOTMAKER: glass worker who makes feet, handles, tops, et cetera.

FULL-SIZE Piece Mold: Mold composed of two or more pieces and the approximate size of the finished article.

GAFFER: master blower, or head of a shop.

GATHER: blob of molten metal which clings to end of blowpipe ready for blowing.

Glossary, con't

GATHERER: assistant to the gaffer who makes the gather on the blowpipe.

GLASS: "A substance, the principal and essential constituents of which are silica and an alkali..." (Ure's *Dictionary of Chemistry, Art, Glass*)

GREEN GLASS: glass in its natural color; generally made from coarser and less pure materials than those used for fine wares; also called bottle glass.

LEAR: (leer, lehr) an annealing furnace, arch or oven.

LIME GLASS: metal made with soda and lime as a flux according to a formula discovered by William Leighton in 1864 and producing a glass as clear as lead glass though not so resonant and heavy.

LIPPER: small wooden device used to form a wide lip on a pitcher.

MARVER: metal slab on which gather of metal is rolled after it is taken from furnace and before it is given to the gaffer to be blown.

METAL: a glass, either in the molten or hard state.

MITER: stone most commonly used in cutting. Also used to describe the deep incisions made with miter wheel, as miter cutting.

MOLDED GLASS: blown glass ornamented and/or given partial or final body shape by the use of molds.

MOTIF: one of several figures used in glass patterns.

OBSIDIAN: a volcanic glass.

OPAL: non transparent glass - may be white or colored.

OVERLAY: a colored coating of clear glass applied after weight is finished and before faceting.

PANEL CUTTING: long scooped out indentations, concave flutes.

PARISON: an inflated gather of metal.

PART-SIZE MOLD: small dip-mold or piece-mold used to impress a design on the gather.

PASTE-MOLD: a mold of wood or iron lined with a paste made of beeswax, rosin, and other ingredients.

PATTERN GLASS: (pressed) molten glass dropped into a pressing mold where it is pressed by means of a plunger into the pattern previously cut into the sides of the mold or the plunger.

PIECE-MOLD: mold composed of two or more pieces; either part-size or full-size.

PONTIL: (puntee, puntee rod) long solid iron rod, occasionally a hollow rod, used principally to hold a vessel during the finishing processes after it has been whetted from the blowpipe.

PONTIL: (puntee mark) the scar or mark left on a finished article where it has been snapped off the pontil rod.

POTASH: an ingredient sometimes used in place of soda ash; acts as flux and gives ring to glass.

PUCELLAS: iron spring tool for shaping blown glass.

RESIST: wax coating to protect glass from action of acid in etching bath.

ROCK CRYSTAL: (quartz) natural quartz rock..

Glossary, con't

ROUGHER: glass cutter who puts the first heavy incisions in glass with an iron wheel.

SERVITOR: the blower who is first assistant to the gaffer.

SILICA: sand, essential ingredient of glass.

SHOP: a gaffer and his assistants; a gatherer, a servitor, and a boy usually called taker-in, and others if the nature of the work requires more.

SODA ASH: sodium carbonate used as flux to start melting of batch.

SODA GLASS: glass in which the principal flux is soda; carbonate of lime, usually the second alkaline base.

SUPERIMPOSED: decoration such as swagging and lily-pad formed by tooling a second

DECORATION: layer of glass on the body of the piece.

TEAR: bubble of air imprisoned in glass either accidentally or by the deliberate nicking of the glass while molten.

BIBLIOGRAPHY

Books

- Beard, Alice and Francis Rogers. *5000 Years of Glass*. New York: Frederick A. Stokes Company, 1937.
- Bergstrom, Evangeline H. *Old Glass Paperweights*. New York: Brown Publishers, 1947.
- Buckley, Wilfred. *The Art of Glass*. New York: The Phaidon Press, 1939.
- Callahan, James Morton. *History of the Making of Morgantown, West Virginia*. Morgantown, West Virginia: Morgantown Printing and Binding, 1926.
- Daneil, Dorothy. *Cut and Engraved Glass*. New York: M. Barrows and Company, Incorporated, 1950.
- Diamond, Freda. *The Story of Glass*. New York: Harcourt, Brace and Company, 1953.
- Harrington, Jean Carl. *Glassmaking at Jamestown*. Richmond, Virginia: The Dietz Press, Incorporated, 1952.
- Hunter, Frederick William. *Stiegel Glass*. New York: Dover Publication, Incorporated, 1950.
- Ace, Ruth Webb. *Sandwich Glass*. Massachusetts: Framington Centre, 1939.
- Logan, Harlan. *How Much Do You Know About Glass*. New York: Dodd, Mead and Company, 1951.
- McKearin, George S., and Helen McKearin. *American Glass*. New York: Crown Publishers, 1941.
- Moore, N. Hudson. *Old Glass*. New York: Tudor Publishing Company, 1939.
- Morley, Christopher and Louella B. Everett (eds.). *Bartlett's Familiar Quotations*. Boston: Little, Brown and Company, 1942.
- Plaut, James Sachs. *Steuben Glass*. New York: I. Billner and Company, 1951.
- Scholes, Samuel Ray. *Modern Glass Practice*. Chicago: Industrial Publications, Incorporated, 1946.
- Vavra, Jaroslav R. *5000 Years of Glass Making*. Cambridge, England. W. Heffer and Sons, Ltd., 1954.

Newspapers

Pittsburgh Press, February 16, 2958.

Dominion News, Morgantown, June 28, 1954.

New York Times, February 1, 1948.

Periodicals

"Blueprint for Selling More Table Glassware" *Department Store Economist*. (n. p.) (n. d.).

Buechner, Thomas S. "Art in Glass," *Art News Annual*. (1955). Pp. 136-150.

_____. "Glass Today," *Art News Annual*. (1955). Pp. 151-156

"Crystal Masterpieces," *Design* LVII (September, 1956). Pp. 22-3.

Doctorow, Donald (ed.), "Glass Manufacturers," *American Glass Review* (1958).

"Machine Application of Decals," *The Glass Packer* (January, 1957).

Miller, R. J. "Screen Painting with Bright Gold," *The Glass Packer*. Parts I and II (June, 1954).

Morgantown District Industrial and Business Survey. Morgantown, West Virginia, (1921).

Remington, V. H. "Some Current Methods of Glass Decorating," *The Glass Industry*, (1937).

"Seneca," *Tableland Trails*, Vol. 2, No. 3 (1958).

Booklets, Brochures, Pamphlets

"Bright Platinum Films on Ceramic and Glass," New Jersey: Engelhard Industries. (Mimeographed)

Cook, Harry H. "A Story of Glass," American Flint Glass Workers' Union of North America. Toledo, Ohio: (n. p.), (n. d.).

"1960 Decor," Morgantown Glassware Guild, Incorporated, Morgantown, West Virginia: (n. p.), (n. d.).

Carney, Charles F. "Nonunionism in the Glass Industry," Unpublished Master's thesis, West Virginia University, Morgantown, 1958.

"Chromoveil," Technical Bulletin, 139. Maryland: Pemco Corporation. 1953. (Mimeographed)

"Etching by means of glue," (n. p.), (n. d.) on file at Beaumont Glass Company.

"Fine Arts Festival," Morgantown, West Virginia: West Virginia University Publications, November 13-21, 1958.

"Permanent Gold Labeling and Decorations on Glass Containers." New Jersey: Engelhard Industries, Incorporated, (n. p.). (Mimeographed)

Hall, Gordon J. "An Exploratory Comparison of Conditions in a Union and Nonunion Glass Plant." Unpublished Master's thesis, West Virginia University, Morgantown, 1958.

"How to Apply and Fire Decalcomania." Ohio: Commercial Decal, Incorporated, (n. p.). (Mimeographed)

"Instructions for the Application and Firing of Slide-off Decal." Ohio: Commercial Decal, Incorporated, (n. p.). (Mimeographed)

"Luster Colors." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

"Luster Colors for Glass." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

"Marbelizing Decorations." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

"Screen Printing with Bright Gold." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

"Screen Star." New Jersey: Bond Adhesives Company, (n.d.). (Mimeographed)

Simmons, Harold Champion. "A Study of Light as a Medium of Creative Expression in the Visual and Practical Arts." Ann Arbor, Michigan: Doctoral Dissertation Series, University Microfilms, 1956.

"Squeegee Luster Colors." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

"Veiling and Spattering Information." New Jersey: Engelhard Industries, Incorporated. (n. p.). (Mimeographed)

CITATIONS

CHAPTER 1

1. Charles F. Carney, "Nonunionism in the Glass Industry" (unpublished Master's thesis, West Virginia University, Morgantown, 1958), p. xi ("Reports of the Officers to the Eighth International Convention," American Flint Glass Workers Union of North America, held at New York City, June 10, 1957).
2. Harry M. Cook, *A Story of Glass* (American Flint Glass Workers' Union of North America), p. 1
3. Harlan Logan, *How Much Do You Know About Glass?* (New York: Dodd, Mead and Company, 1951), p. 22
4. Alice Beard and Francis Rogers, *5000 Years of Glass* (New York: Frederick A. Stokes Company, 1937). p. 41
5. Jean Carl Harrington, *Glassmaking at Jamestown* (Virginia: Dietz Press, 1952), p. 3
6. Logan, *op. cit.*, p. 20.
7. *Tableland Trails*, Monongalia Issue, Vol. 2 (Cumberland, Maryland, 1958), p. 95
8. *Ibid.*, p. 164
9. Cook, *op. cit.*, p. 2.
10. *Tableland Trails*, Monongalia Issue, Vol. 2 (Cumberland, Maryland, 1958), p. 97
11. George S. and Helen McKearin, *American Glass* (New York: Crown Publishers, 1941), p. 7.
12. *Ibid.*, p. 26
13. Logan, *op. cit.*, p. 35.
14. Cook, *op. cit.*, p. 3.
15. Samuel Ray Scholes, *Modern Glass Practice* (Chicago: Industrial Publications, Inc., 1946), p. 198

CHAPTER II

1. Edwin C. Warman, *American Cut Glass* (Pennsylvania: Varman Publishing Company, 1954), p. 7.
2. Dorothy Daniel, *Cut and Engraved Glass* (New York: M. Barrows and Company, Inc., 1956), p. 23.
3. N. Hudson, Moore., *Old Glass* (New York: Tudor Publishing Company, 1939), p. 278.
4. Daniel, *op. cit.*, pp. 25-27.
5. Sidney Waugh, *The Art of Glassmaking* (New York: Dodd, Mead and Company, 1951), p. 22
6. James S. Plaut, *Steuben Glass* (New York: Dodd, Mead and Company, 1951), p. 15
7. Personal Interview with glass cutter, Ralph Patt, Seneca Glass Company, July, 1960.
8. *Tableland Trails*, Monongalia Issue, Vol. 2 (Cumberland, Maryland, 1958), p. 98
9. Daniel, *op. cit.*, p. 56
10. *Ibid.*, p. 51
11. *Tableland Trails*, Monongalia Issue, Vol. 2 (Cumberland, Maryland, 1958), p. 98
12. Daniel, *op. cit.*, p. 307

CHAPTER III

1. Christopher Morley and Louella B. Everett, *Bartlett's Familiar Quotations* (Boston: Little, Brown and Company, 1942), p. 553. (John Ruskin, Ariadne Florentina, Lecture I).
2. Milfred Buckley, *The Art of Glass* (New York: The Phaidon Press, 1939), p. 16
3. *Ibid.*, p. 57
4. *Ibid.*, p. 59.
5. Freda Diamond, *The Story of Glass* (New York: Harcourt, Brace and Company, 1953), p. 49.

6. Plaut, *op. cit.*, p. 15
7. Vaughn, *op. cit.*, p. 26.
8. Daniel, *op. cit.*, p. 143
9. Frederick William Hunter, *Stiegel Glass* (New York: Dover Publications Incorporation, 1950), p. 200.
10. Daniel, *op. cit.*, p. 62
11. *Ibid.*, p. 62
12. *Ibid.*, p. 62-64
13. Plaut, *op. cit.*, p. 19
14. "Crystal Masterpieces," *Design* LVII (September, 1956), pp. 22-23.

CHAPTER IV

1. McKearin, *op. cit.*, p. 32
2. Samuel Ray Scholes, Ph. D., *Modern Glass Practice* (Chicago: Industrial Publications, Inc., 1946), p. 200
3. McKearin, *op. cit.*
4. Daniel, *op. cit.*, p. 64
5. *Ibid.*, p. 67
6. Scholes, *op. cit.*, p. 201
7. *Ibid.*, p. 201
8. Scholes, *op. cit.*, p. 200
9. Daniel, *op. cit.*, pp. 65-70
10. "Etching by Means of Glue," (n.p.), (n.d.), p. 495

CHAPTER V

1. V. H. Remington, "Some Current Methods of Glass Decorating," *The Glass Industry*, 1937, pp. 1-8.
2. *Ibid.*, p. 2
3. "Screen Star," (New Jersey: Bond Adhesives Company), p. 1.
4. Scholes, *op. cit.*, p. 4
5. Remington, *op. cit.*, p. 4.
6. "Squeegee Luster Colors," (New Jersey: Engelhard Industries, Incorporated), p. 2.
7. *Ibid.*, p. 4.
8. "Veiling and Spattering Information," (New Jersey: Engelhard Industries, Incorporated), p. 2.
9. "Veiling and Spattering," *Technical Bulletin*, No. 138, (n.p.), p. 3.
10. *Ibid.*, p. 4.
11. *Ibid.*, p. 3.
12. "Veiling and Spattering Information," (New Jersey: Engelhard Industries, Incorporated), pp. 1-2.
13. Remington, *loc. cit.*
14. "Veiling and Spattering Information," (New Jersey: Engelhard Industries, Incorporated), pp. 1-2.
15. Remington, *op. cit.*, p. 7.
16. "Instructions for the Application and Firing of Slide-off Decal, (Ohio: Commercial Decal, Incorporated), p. 1 (Mimeographed)
17. "How to Apply and Fire Decalomania," (Ohio: Commercial Decal, Incorporated), (Mimeographed)
18. Scholes, *op. cit.*, p. 202.
19. Beard and Rogers, *op. cit.*, p. 115

20. Buckley, *op. cit.*, p. 14.
21. *Ibid.*, p. 62.
22. *Ibid.*, p. 63
23. Moore, *op. cit.*, p. 96.
24. McKearin, *op. cit.*, p. 33.
25. "Permanent Gold Labeling and Decorations on Glass Containers," (New Jersey: Engelhard Industries, Incorporated), p. 1. (Mimeographed)
26. "Luster Colors," (New Jersey: Engelhard Industries, Incorporated), p. 1.
27. "Marbelizing Decorations," (New Jersey: Engelhard Industries, Incorporated), p. 1.
28. Remington, *op. cit.*, p. 6
29. Jaroslav E. Vavra, *5000 Years of Glassmaking* (England: W. Heffer and Sons, Ltd., 1954), p. 44.
30. Vavra, *loc. cit.*, p. 6
31. Buckley, *op. cit.*, pp. 15, 40, 55.
32. Beard and Rogers, *op. cit.*, p. 117
33. Frederick William Hunter, *Stiegel Glass* (New York: Dover Publications Incorporation, 1950), p. 203.
34. Beard and Rogers, *op. cit.*, p. 119.
35. McKearin, *op. cit.*, p. 591
36. "Color on Glass" *The Glass Industry* (November, 1959), p. 648.
37. *Ibid.*, p. 650.
38. Remington, *op. cit.*, p. 6.

CHAPTER VI

1. Evangeline H. Bergstrom, *Old Glass Paperweights* (New York: Brown Publishers, 1947), p. 12.
2. *Ibid.*, pp. 91-103.
3. H. Hudson Moore, *Old Glass* (New York: Tudor Publishing Company, 1939), p. 158.

Rebeccah J. Ball's *Extrinsic Ornamentation of Glass In The Morgantown Area* was written in 1960 as a thesis for the degree of Master of Fine Arts at West Virginia University.

From 1896 to the 1980's, Morgantown was known world wide for the production of a wide range of glass products ranging from windows to lead crystal stemware. Many of these were decorated after the initial blowing or molding process. This book provides an illustrated introduction to the various processes used to decorate glass, both in Morgantown and throughout the world.

In addition, it provides an historic record of glass production in Morgantown about 1960.



Riverfront Museums, Inc.

PO Box 469

Morgantown, West Virginia 26507-0469

Opening a window on the history of Monongalia County