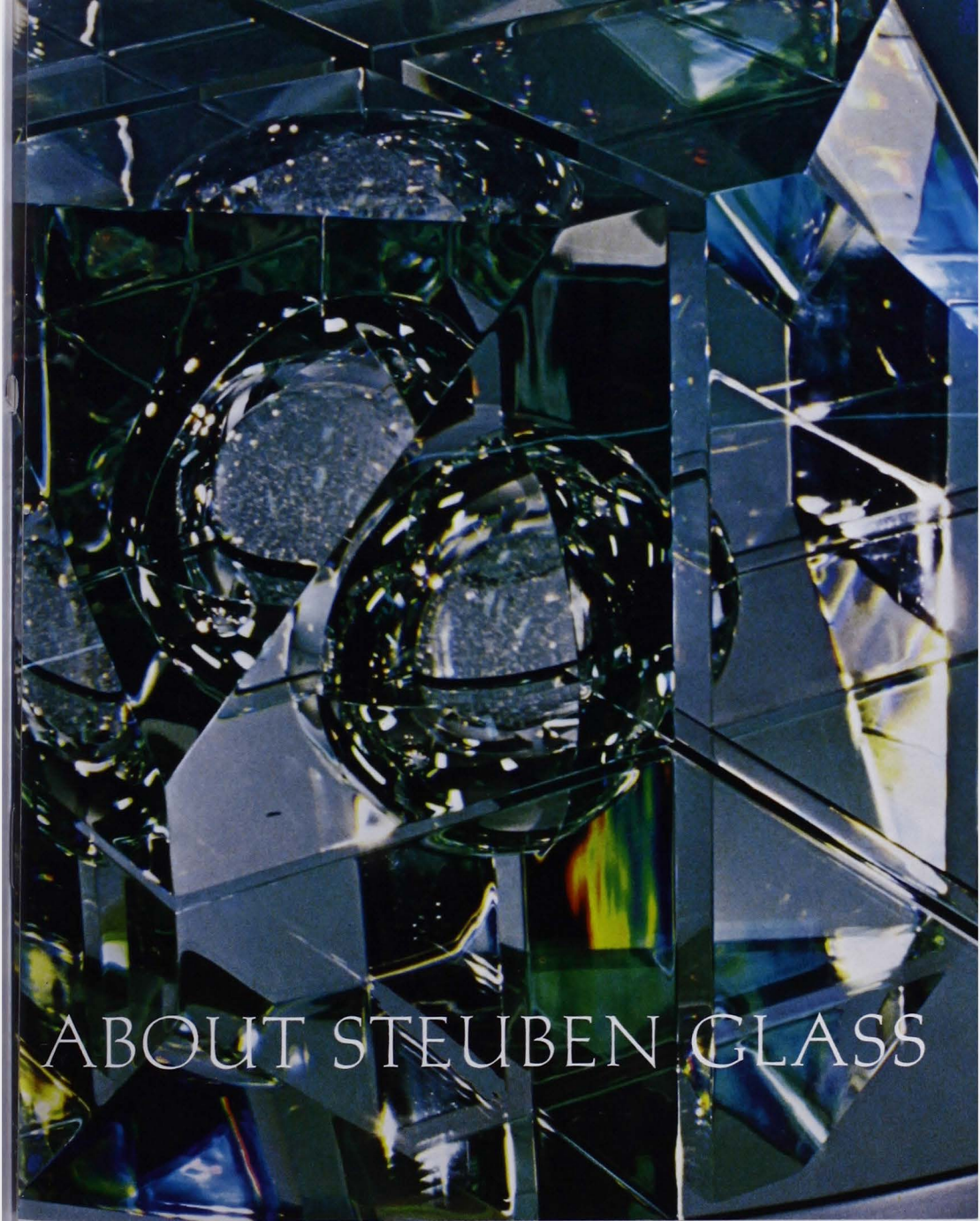

ABOUT STEUBEN GLASS

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A 17TH CENTURY FLORENTINE, Antonio Neri, who wrote the first book about glassmaking, said, ". . . glass is more gentle, graceful, and noble than any metal, and its use is more delightful, polite, and sightly than any other material . . . known to the world."

Antonio Neri was not the first to admire glass. It has been valued since ancient times for its ability to capture and reflect light and for the wealth of shapes it can be given—as well as for its many utilitarian virtues. That it is solid, yet we can see through it, adds to its fascination.

For 3500 years, glass has been made in the same way—by heating sand with an alkali such as ashes to help it melt, and with a stabilizer such as lime to help it resist the attack of moisture. In the process, these ordinary ingredients can be transmuted into something precious. Since 1676, the finest glass, called crystal, has been made with the addition of lead. Lead gives crystal greater brilliance, weight, and reflective qualities than glass made without it.

In the finest lead crystal, the material contains no trace elements or minerals. It is as naturally colorless as pure water. When you put two pieces of crystal of different types side by side, it is often possible to see that one of them is clearer, brighter, and more colorless than the other. If a tint is present, it may be difficult to see in a single piece, but the color will deepen if several pieces are lined up—as they might be on a shelf or on a buffet table—and looked through as a group.

Much glass, even some of the finest, has minute flaws in it: air bubbles called seeds, specks of matter called stones,

faint lines called cords. These become apparent if the glass is held to the light.

Steuben glass is colorless and free of seeds, stones, and cords. It is thirty per cent lead. With this pure material, Steuben strives to make the finest glass objects in the world. So that you will understand how carefully each piece of Steuben is made, we are going to show you the actual making of two hand-blown designs, the *Bamboo Vase* and the *Mallow Flower Bowl.*

Each of these pieces was born in the design library, as is all Steuben. Once a month the design staff meets there to discuss ideas, works in progress, and works about to be introduced. Steuben designers have been actively recruited from all over the world. At present, they number nine, selected for their talent and vision. Some benefit from many years of experience working with Steuben's material. Others bring to this material a fresh perspective, as they themselves are artists in glass and other media. This group sets the standard of visual excellence for Steuben.

Unlike many great glasshouses, Steuben does not aim to establish a uniform style for its objects. Each designer is free to express in his work his own creative imagination. If there appears to be a Steuben style, it is the material itself which produces unity in diversity, each designer using in his own way the same weighty, brilliant, flawless glass.

When the design group is considering a new design, the first step is often a drawing. If the drawing seems to have possibilities, a wax, clay, plaster, acrylic, or crystal model is made. The model may then be presented to other members of the Steuben staff. The designer of each piece is responsible for it from drawing and model stage until the glassmakers have produced a prototype which wins his

approval. If Steuben decides to introduce the piece, the designer and the glassmakers undertake a trial production run together, during which production problems are solved and the cost of manufacture determined. Finally, the decision to introduce—or abandon—the design is made. This process may take anywhere from two months to several years.

To make its glass, Steuben brings sand from an area in Africa where the purest sand has been found. The sand is mixed with alkali, lead, cullet (broken glass of the same formula), and a stabilizer. The dry materials of each batch of glass (1) are carefully tested and weighed before mixing. They are then heated in a melting furnace, stirred constantly with a platinum stirrer. Platinum imparts no impurities to crystal and can resist the corrosive effects of the molten glass. For these reasons, it is also used in some areas of the furnace lining.

To maintain a constant level of glass quality, the Steuben

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melting furnace must be taken apart every two to three years and rebuilt (no glass can be made during this four-week period). Every hour, twenty-four hours a day, samples of crystal are taken from the furnace to be examined by microscope for purity. Three times a week, samples of the crystal are examined by X-ray spectroscopy and other chemical tests. The outside areas surrounding the factory are kept damp so that air-borne dust and other impurities do not contaminate the glass.

Steuben objects are handmade. There are no assembly lines at Steuben. Each piece is made by an individual "shop" of experienced craftsmen; each shop is headed by a "gaffer" or master glassmaker and works at its own "glory hole" or reheating furnace.

To begin any design, a shop member called the "gatherer" brings to the glory hole (2) a precise portion of molten glass from the melting furnace (3). This portion of glass is called a "gather." Its size is measured not in pounds, ounces, or inches, but in seconds of pouring time. Since glass at the same temperature flows at the same rate, each object has its own individual time—whether it be 53 seconds of glass for *Olive Dish,* 48 seconds for *Mallow Flower Bowl,* 75 seconds for *Bamboo Vase,* or 390 seconds for *Great Whale.*

When the gatherer brings the glass for *Bamboo Vase* to the glory hole, the "servitor" shapes the gather into a ball with a hollow, rounded wooden form (4) and then into a cylindrical shape in a metal and graphite block. The intense heat has turned the molten glass the color of amber. The shaping process helps the blower to blow the glass out evenly. During shaping, the molten glass is repeatedly reheated to keep it workable and continuously rotated to prevent it from sagging toward the ground and becoming misshapen.

After the glass is reheated three or four times, the servitor blows a small bubble of air through a tube into the gather (5). The glass is heated twice again and given more shape with wooden paddles and steel tongs called "jacks" (6).

Bamboo Vase is then blown into an iron mold, as is *Mallow Flower Bowl,* to ensure that the vessel's shape is accurate. Molds are used when the spatial relationships within the design are such that consistency is essential. The key element of other designs may be the quality of spontaneity; these designs are free blown, a process which requires great control and judgment. Free, or offhand, blowing also requires more time than mold blowing. A characteristic of free blown glass is variation: no two pieces of the same design are ever exactly alike.

The glassblower inflates the glass with short puffs of his breath, not long blows. He removes his mouth from the pipe frequently and between breaths puts his thumb over the end of the pipe; the trapped air inside grows hotter and further expands the crystal bubble.

The predetermined variations in the wall thickness of *Bamboo Vase* take a great deal of time to achieve. These variations are an intrinsic element in the design. They result in subtle changes in the light pattern reflected by the material and are carefully calculated to collect light in a form complementary to the vessel's shape (7). The extra glass, called the "font," seen at the top of the vase will later be scored with a diamond point and revolved next to a flame; when it cracks along the scoring, it can be removed. The lip will be beveled by a wheel imbedded with diamond chips.

To carry out the exact intent of the designers, the glass-

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makers must be assured of a blowing room which moves rhythmically and harmoniously. Every motion is deliberate and precise. An observer feels transported to another time. And indeed he is, for though the purity of Steuben's material was made possible by 20th century science, the methods Steuben uses to form that material are virtually unchanged from those in use in Restoration England. As with any craft, some days the work goes better than others. When the glass works easily, the gaffer says that the glass is "docile," or that it is "good natured," or "sweet."

Bamboo Vase is taken straight from the blowing iron to a cooling oven. After *Mallow Flower Bowl* is blown, it is fixed to a "punty iron," a long metal rod (8), and the blowing iron is removed from the glass. The glass surface is frozen with gusts of compressed air so that it will not alter its shape during subsequent working.

The neck of *Mallow Flower Bowl* is opened with steel tools. Excess glass is removed with shears of a special design (9). These shears cannot be bought and, like most of Steuben's tools, they are made in the tool workshop at the factory. *Mallow Flower Bowl*'s cut edge is further formed with a wooden paddle (10). The wooden tools are

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usually made of cherry wood which has few knots, resists warping, and is not easily burned by the molten glass.

The shearing and smoothing, like so many operations in Steuben glassmaking, must be done very slowly; if the process goes too quickly, the subtle shape of the design will be irretrievably lost.

The rim of *Mallow Flower Bowl* is crimped in five places with a special implement (11). All measurements are checked with calipers. If any imperfections are detected in the material at any point during this entire forming period, the piece is discarded and a new gather fetched from the furnace.

Pieces may be hand formed in ways other than blowing. Some designs, such as *Shore Birds* (12), are made off hand. In offhand forming, the gaffer, working in harmony with the natural behavior of the molten material and with the force of gravity, achieves his form with

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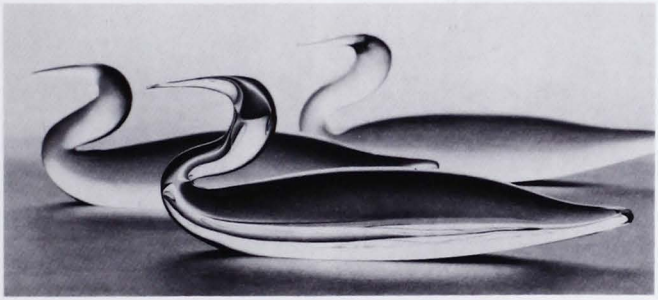
skillful manipulation. Other designs can be achieved only through hand pressing, a tradition developed in the United States in the early 19th century.

Whatever the forming method, when a piece is completed, the glass is allowed to cool somewhat, losing its amber color—however, it is still very hot, hot enough (350–400° centigrade) to light a cigarette. Here *Mallow Flower Bowl* is being removed (13) from the punty iron to be placed in the "lehr." There it will move on a belt



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through cooler and cooler areas for about eight hours, until it is cool enough to handle. With this slow cooling, no internal stresses develop in the glass. Other pieces, especially solid pieces, may take two or three days to cool down in an even slower cooling oven, the "kiln."

After cooling, scratches and tool marks are removed from *Bamboo Vase* by hand polishing (14). Steuben polishing does not add any artificial finish to the glass. Rather, it restores the permanent natural luster the glass has as it comes from the fire—the original brilliance inherent in the material itself which may be temporarily dimmed by tooling and grinding. Steuben is the only major glass company which does not acid polish; acid polishing usually leaves less than a smooth surface, reducing both clarity and reflectiveness. Fine hand polishing produces a crystal surface smooth and clear to look through. It also makes a surface that is highly reflective—that is, since more light comes back at you, the object is more brilliant.

During the polishing process, the mark where the punty iron was attached is removed by grinding. The glass surface is usually ground with three grades of sand before smoothing with pumice and polishing. After the piece is washed, it is inspected (15) for flaws. If any flaw remains, it is either repaired by further polishing with pumice and jeweler's rouge, or the piece is destroyed. There are no seconds at Steuben. When a piece has passed every inspection, it is signed by hand (16) in diamond point engraving.

In designs which include cut planes, the accuracy of cuts, the sharpness of angles, the flatness of planes, the smoothness of curved surfaces are all important elements requiring experience, skill, and steady nerves.

Bamboo Vase is an engraved design. The harmonious relationship between the bamboo—a traditional Chinese motif—and the classic shape of the vase was an important design consideration. To execute the engraving on *Bamboo Vase,* a Steuben engraver transfers the designer's drawing of the bamboo leaves to the glass with a stylus. He then goes over the outline of the leaves with ink and covers the vase with a protective shellac. To cut the design, he works with about fifty copper wheels (17) of different diameters and widths—all of which he makes with his own hands. On some engraved works, he may also use a diamond point tool. His other basic tools are wood, cork, and lead wheels for polishing, various abrasives, and a small power lathe. To become a qualified copper wheel engraver takes at least six years of apprenticeship.

To engrave *Bamboo Vase* (18) may require fifty hours of meticulous work. There are other Steuben engraved

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works which have taken months to complete, sometimes representing seven hundred hours or more of skilled workmanship. Fine copper wheel engraving produces a fascinating optical effect in that convex or intaglio surfaces appear concave, or in relief. Each engraved line is made by carefully pressing the crystal against a spinning copper wheel which penetrates deeply into the glass. Crisp detail, precision and depth of cut, sculptural modeling, flowing line, and variety of tone and detail are among the characteristics of good copper wheel engraving.

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The completed *Bamboo Vase* (20) and *Mallow Flower Bowl* (19) are seen below.

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Steuben's age-old craft system, while slow and painstaking, ensures that each piece is made from beginning to end by the most experienced craftspeople. Since it takes such a long time to make, the output of Steuben is extremely limited. Steuben customers know that they may not be able immediately to have the object they want. They often have to place an order and wait for it while Steuben artisans complete it especially for them.

Nevertheless, Steuben produces a wide range of designs and introduces many new ones each year. These include vases, bowls, table glasses, candlesticks, and other functional objects; prismatic sculptures; animals; decorative objects; major engraved works; and jewelry which combines crystal with precious metals. New designs are frequently offered to customers by mail long before they are

advertised or even displayed in our store. Many designs are developed in series. A few are made in limited editions. Others are by special order only.

Steuben Glass is an American company. It was founded in Corning, New York, in 1903, by Frederick Carder who manufactured colorful glass objects, much of it in the Art Nouveau style, which have become collectors' items. Steuben is now part of Corning Glass Works, and since 1933, when Arthur A. Houghton, Jr., became president, has produced only clear lead crystal. The company employs about three hundred people, more than half of whom are craftsmen. It is named after Steuben County in New York State where its factory is located. The county is named after Baron Von Steuben, the German soldier who, on Benjamin Franklin's recommendation, was sent by General George Washington to Valley Forge to drill and reorganize the dispirited Continental Army in the terrible winter of 1777–1778. Later, as a major general, he led troops against the British at Monmouth and Yorktown.

The residents of Steuben County pronounce the name "Stoo-ben," with the accent on the last syllable, as does Steuben Glass.

Steuben glass has been chosen as gifts of state by every United States president since President Truman, and is represented in many museum collections around the world, including: Art Institute of Chicago; Carnegie Institute, Pittsburgh; City Art Museum of St. Louis; Cleveland Museum of Art; Corning Museum of Glass, Corning; Detroit Institute of Art; Hermitage Museum, Leningrad; Metropolitan Museum of Art, New York; Musée des Arts Décoratifs, Palais du Louvre, Paris; Musées Royaux d'Art et d'Histoire, Brussels; Museum of Fine Arts, Boston; National Gallery of Modern Art, New Delhi; William Rockhill Nelson Gallery of Art, Kansas City; Royal Ontario Museum, Toronto; Smithsonian Institution, Washington, D.C.; Toledo Museum of Art; Vatican Museum; Victoria and Albert Museum, London.

The most complete collection of present-day Steuben glass may be seen at the Steuben shop at 56th Street and Fifth Avenue in New York City. A selection is also available at the Steuben shop in Corning. Steuben can be purchased only in its own stores or in authorized Steuben Rooms at Coleman E. Adler & Sons, New Orleans; Bullock's Wilshire, Los Angeles; Marshall Field & Co., Chicago; Frederick & Nelson, Seattle; Gump's, Inc., San Francisco; Halls Plaza, Kansas City; Neiman-Marcus, Dallas; Shreve, Crump & Low, Boston; George Watts & Son, Inc., Milwaukee.

Visitors are welcome seven days a week at the Steuben factory. Since 1951, over seven million people have watched the production of Steuben glass at the Corning Glass Center where all Steuben is made.

PUBLICATIONS

STEUBEN, SEVENTY YEARS OF AMERICAN GLASSMAKING by Paul N. Perrot, Paul V. Gardner, James S. Plaut. New York: Praeger Publications, Inc., 1974, 172 pps., illus., black/white and color (16). Catalogue of the first retrospective museum exhibition of Steuben Glass, with descriptions and illustrations of each object shown, preface, and introductory texts on the Carder years (1903–1932) and the Houghton years (1933–1973).

ROMANCE OF THE ROSE by Steuben Glass. New York: Steuben Glass, 1977, 32 pps., illus., edition of 1,500 copies. Description, with illustrations, of a unique masterwork in crystal, gold, and precious stones, designed to interpret the allegorical poem of courtly love, *Le Roman de la Rose.*

SPHERE OF THE ZODIAC by Steuben Glass. New York: Steuben Glass, 1976, 32 pps., illus., edition of 1,500 copies. Foreword by Donald Pollard. Description, with illustrations, of a unique masterwork in crystal, designed to suggest the imaginary sphere of the heavens.

CHINESE PAVILION by Steuben Glass. New York: Steuben Glass, 1975, 32 pps., illus., edition of 1,500 copies. Description, with illustrations, of a masterwork in crystal, gold, and precious stones, designed in the spirit of 18th century *chinoiserie.*

STEUBEN GLASS, A MONOGRAPH by James S. Plaut. Third, revised edition. New York: Dover Publications, Inc., 1972, 116 pps., illus. A history, description, and critical estimate of this American glass, covering the years 1933–1971.

STEUBEN GLASS

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