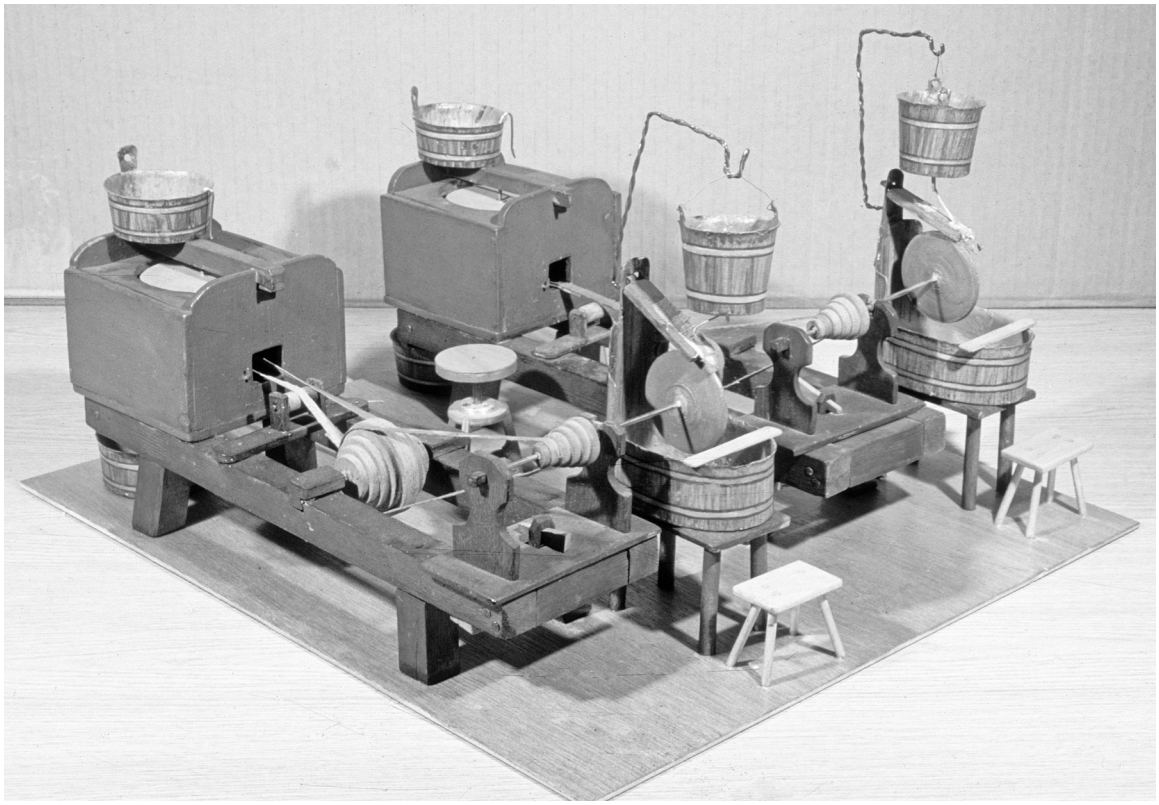

Figure 64. Model of a wheel bench for grinding smooth surfaces (English work)(Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

only process that can be considered for the Atlas bead. The old method of giving beads a round shape in a pan or drum also made them shiny because of the heat; it was a kind of fire polishing. The term *schmelz* (melted) is taken by some authors as going back to the process of polishing by heat in fire (Lilie 1895:166); improvements led to "double melted" (twice-polished beads) and to the "new double melted" which was made in especially good quality from sharp-edged glass produced by Riedel (Posselt 1907:10).

The term "polished" (*geschmirgelte*) bead is confusing because it is not the bead itself that is polished: the inside surface of the mold was so highly polished with an abrasive that the surface of the bead was already shiny after mold-pressing and did not need any additional polishing.

According to Posselt, larger beads were polished at a wooden wheel first; fire polishing in a polishing furnace followed later. Fire polishing is supposed to have been invented by accident more than 100 years ago by a man from Neudorf: "He dried the beads in the oven with a very hot fire and left them in rather long (he probably forgot to take them out in time). The beads had begun to melt and because of that, they took on a "marvelous shine" (Posselt 1907:8, 9).

The so-called "machine-beads" were made by throwing raw broken beads into a box with a grindstone; the sharp edges were rounded off through rotation, then polished. One contemporary source gives detailed information on the processes used for polishing towards the end of the 19th century (*Sprechsaal* 1896:1026).

MOLDED BEADS

Beads with a wide variety of appearances were pressed into shape (e.g., Figure 76; Plate 16C). These processes, referred to as "squeezing," "molding," or "pressing," also involved an extremely wide variety of tools and machines. "Molding "and "squeezing" were expressions that were apparently used for simpler tongs and shop work; "pressing" was more likely to have been reserved for processes involving machinery. There is mention in 1856 of "molding works" and "squeezing workshops" (Reichenberg 1856:166), of "pressing or squeezing work," also still found in 1880 (Karmarsch-Heeren 1880, 4:52), and Parkert (1925:184, 185) writes of the "molded or pressed bead." According to Parkert (1925:132, 133), the glassworker Domenico Miotti and the glassmaker Christophore Briani are to be credited

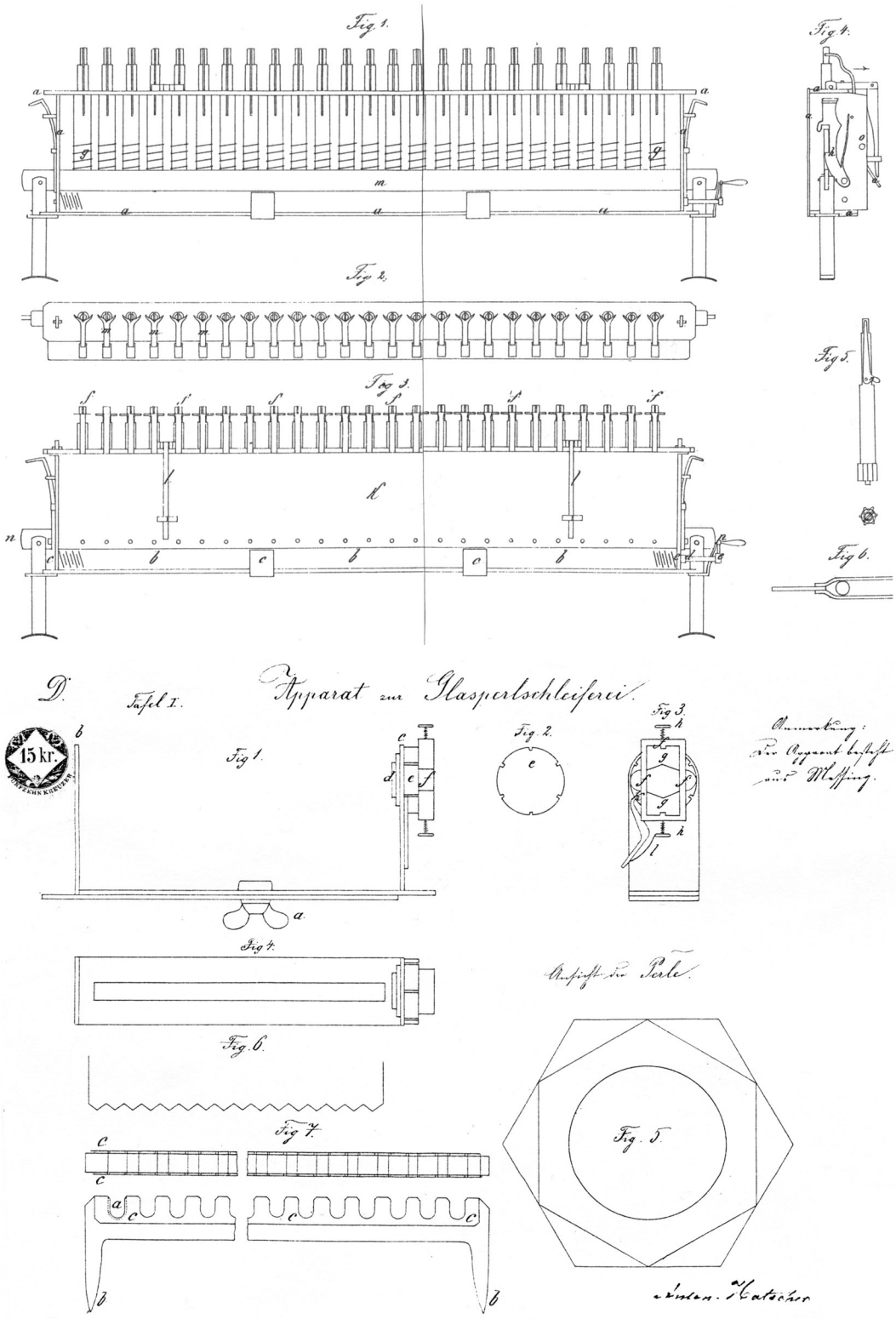

Figure 65. Apparatus for cutting glass beads, 1868, Anton Hatscher, glassmaker in Haida, privilege no. 18/209 (Austrian Patent Office, Vienna).

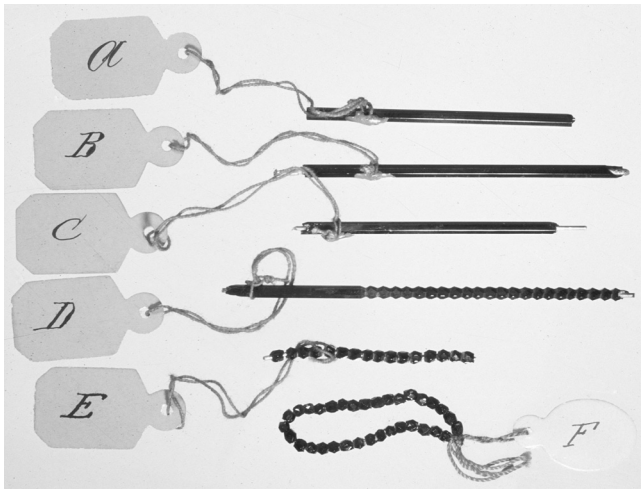

Figure 66. Method for making small cut-glass beads (enamel), Gustav Strauss & Co., Gablonz, 1889, privilege no. 38/3267 (Austrian Patent Office, Vienna).

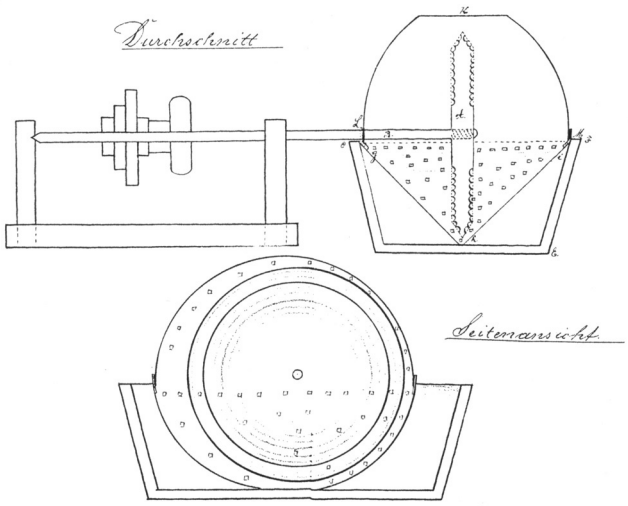

Figure 67. Method and apparatus for cutting glass beads, Emanuel Rössler, Wiesenthal, 1888, privilege no. 38/3129 (Austrian Patent Office, Vienna).

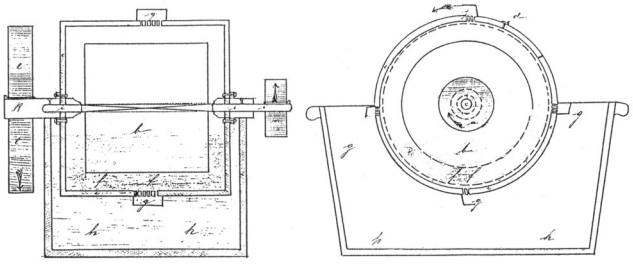

Figure 68. Device for cutting glass beads, Adolf Bayer, locksmith in Gablonz, 1888, privilege no. 38/1991 (Austrian Patent Office, Vienna).

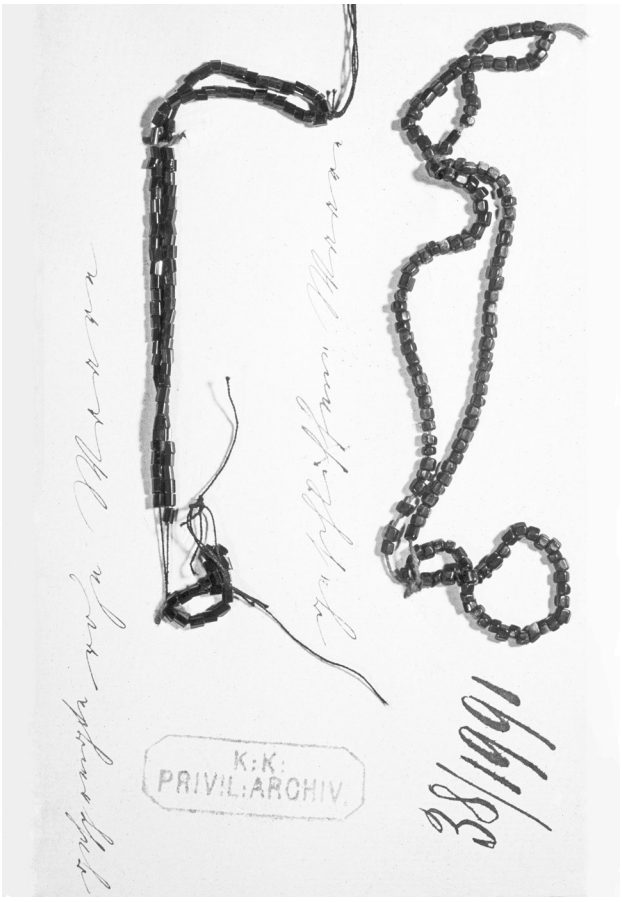

Figure 69. Sample accompanying privilege no. 38/1991.

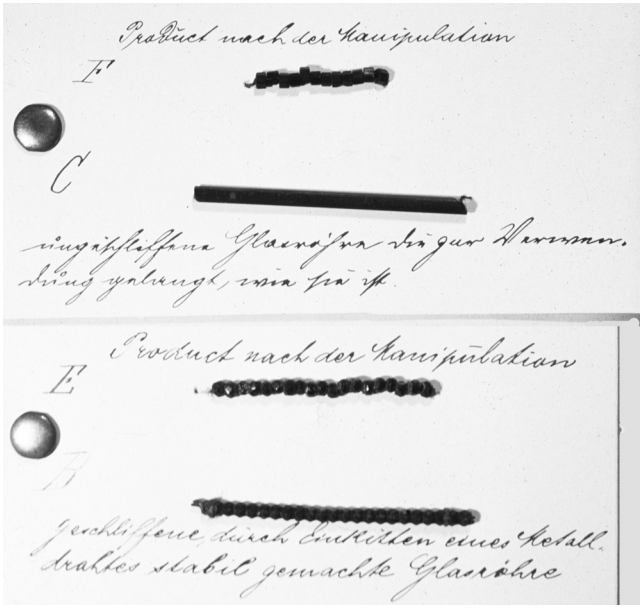

Figure 70. Innovations in the method for making glass beads, 1889, Gustav Strauss & Co., Gablonz, privilege no. 39/1892 (Austrian Patent Office, Vienna).

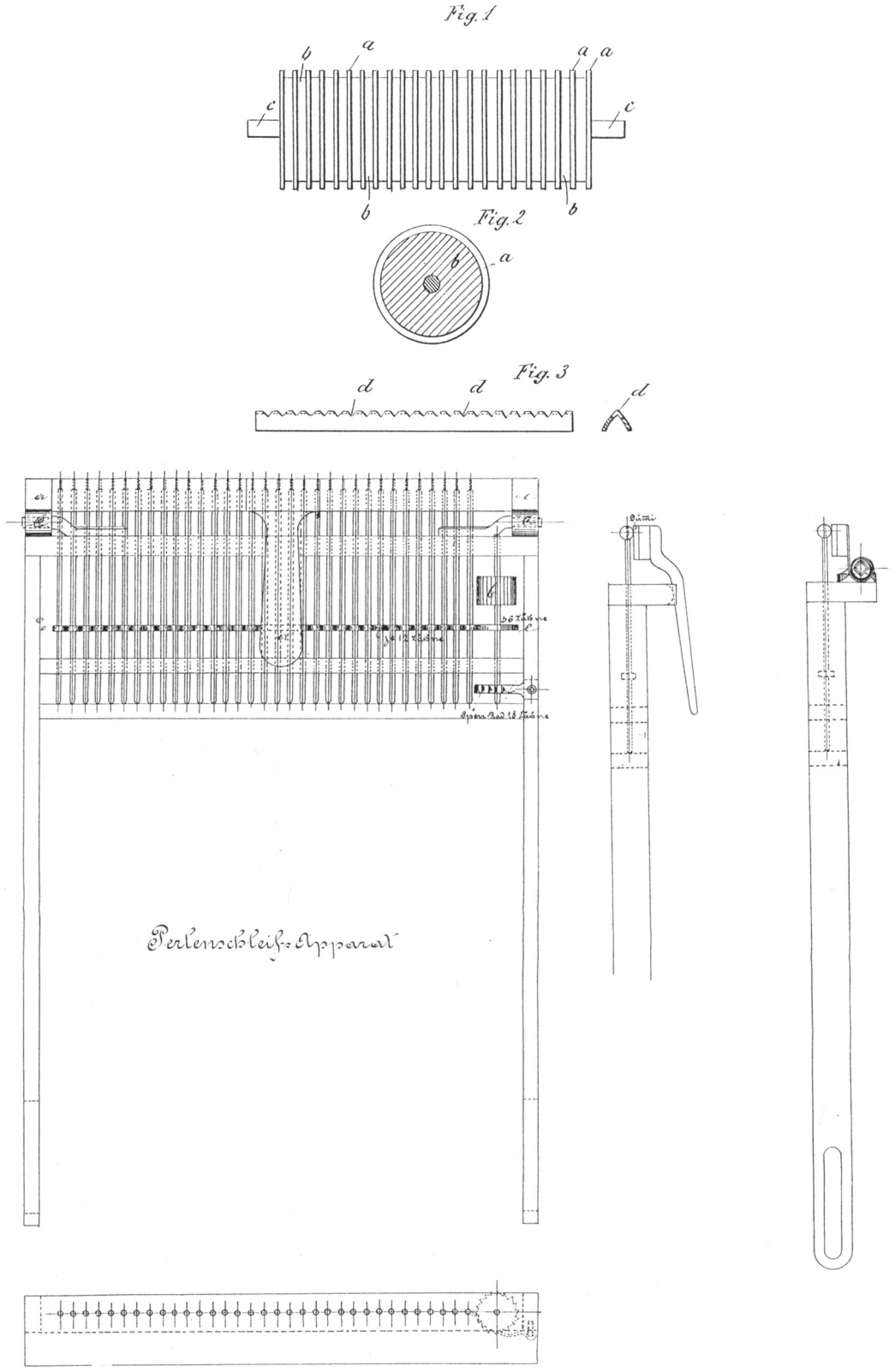

Figure 71. Apparatus for cutting beads, 1889, Dr. Weiskopf & Co. as cessionary of Anton Schöler, glasswares manufacturer in Wiesenthal, privilege no. 39/2276 (Austrian Patent Office, Vienna).

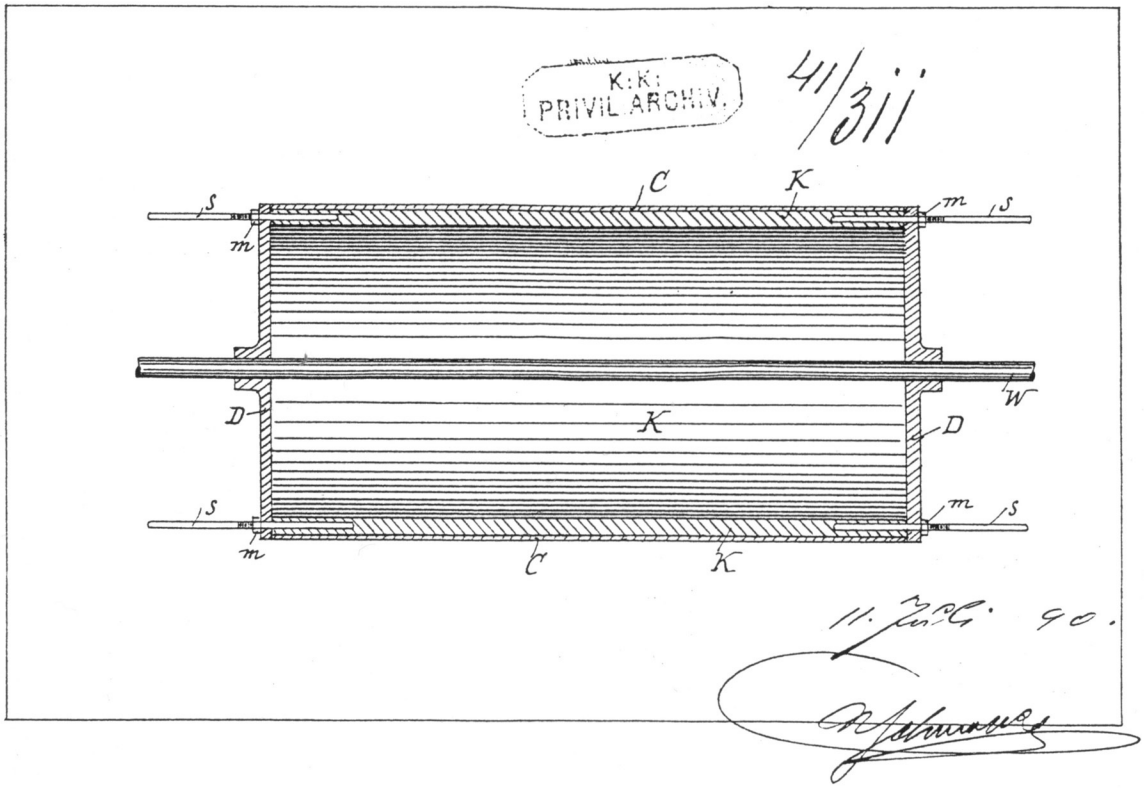

Figure 72. Apparatus for round cutting glass corals, 1891, Anton Schmidt, Friedstein, privilege no. 41/311 (Austrian Patent office, Vienna).

Figure 73. Sample accompanying privilege no. 41/311; globular beads before round cutting, elongated beads already cut and polished.

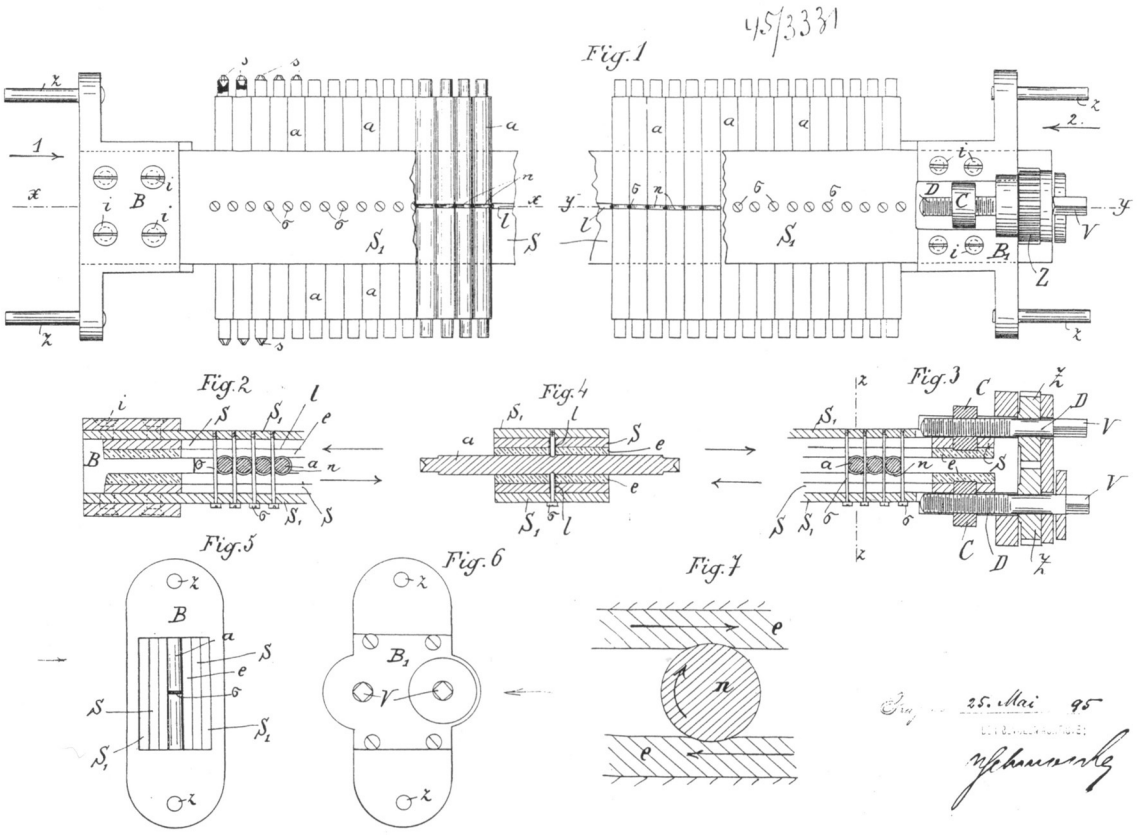

Figure 74. Apparatus for cutting glass stones, precious stones, beads, etc., 1895, Daniel Swarowski, Franz Weiss & Armand Kosmann in Johannesthal, privilege no. 45/3331 (Austrian Patent Office, Vienna).

with the first attempts at technical improvements in bead production concerned with giving a solid bead a special shape by pressing.

In Bohemia at the beginning of the 18th century, according to Schreyer (1790:93), the Wenzel Brothers and Franz Fischer in Turnau had already "invented a different means... using iron pincer-molds for pressing 10 to 15 and more of the same stones at one time, so that proper facets appeared on each pressed stone with this method because the iron mold was already shaped that way...."

In a report by the Count von Zinzendorf from the year 1774, there is already talk of a pair of tongs with a mold in which the desired figure is "pinched" (Kleinert 1972:17). The introduction of molding in Gablonz is attributed to a "certain Endler" by Benda:

> The invention of "molding" stones into shapes has caused the stone-cutting profession to be reduced to a common trade. In Turnau they already practiced this molding in the last century, but kept the secret of how to do it very strictly.... Nevertheless, a certain Endler from Gablonz must have succeeded in finding out something about it, since he established the first molding hut in Gablonz toward the end of the last century. This Endler, known under the name, "the old molder," must have been born around the year 1760 and was, to a certain extent, a genius.... But just as peculiar as brilliant, Endler knew how to make inventions better than how to make money with them. He had to be in a good mood to mold a few hundred dozen stones for someone, after good money and a lot of persuasion.... And so it turned out that the composition molding works in our area were not developed further and were at a very low state for a while after Endler's death.... It wasn't until the years between 1817 and 1820, that Anton Mai, No. 146, erected the first composition furnace in Gablonz (farther away in the mountains there was a certain Seidel who was supposed to have made compositions earlier) and he made ruby and garnet-colored compositions which he molded into beads. His first molders were Abraham Dubsky from Turnau and Wenzel Jäckel from Gablonz... (Benda 1877:281 ff.).

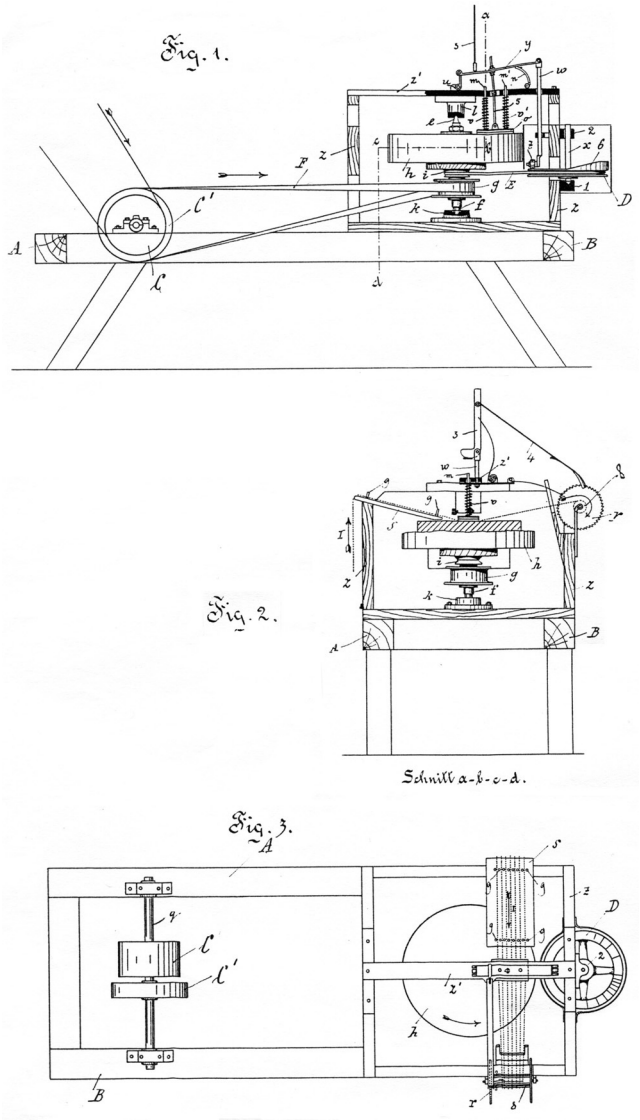

Figure 75. Bead-cutting machine, 1887, Stefan Hellmich, bead refiner in Wolfersdorf, Privilege no. 47/4347 (Austrian Patent Office, Vienna).

Lilie reports on the situation of glass molding at the end of the 19th century in detail:

> Glass molding... concerns itself with the molding of stones, buttons, beads, kernels, laurel berries, cubes, and so on. The method of production is already indicated in the word, "mold." For this the molder uses iron tongs into which is engraved the shape of the particular design which the article is to acquire. The production of these molds (called *Kappel*), i.e., the main component of these tongs, gives work to many engravers, specifically in Gablonz and its environs. In order to protect their designs, some of the exporters of such *Kappel* make them in factories built especially for this purpose. One of the first molders was a certain Endler (beginning of this century), Waldgasse No. 10 in Gablonz, not far from the furnace of Clemens Huyer. Among the molded glass articles made during the years 1867-1873, the little glass stones with holes, the so-called *Flüssel*, had especially enormous sales. In molded buttons and the like, either holes for sewing, threading, or attaching were pressed in with the mold or metal shanks were inserted as a part of the molding process....
>
> Molded beads, mostly black, but also in all the other colors, are molded in iron molds in the molding works, then cut in different ways and decorated (iridized, etc.) for sale. If the pressing is done in molds of steel or nickel (which makes the corners turn out more sharply defined and the surfaces smoother), then they are called "polished" beads (*geschmirgelte Perlen*); these are usually not cut, but supplied to be used in this state... (Lilie 1895:164-166).
>
> By polished buttons one means those which are not cut, but which are made to imitate cut buttons by using a press-mold that is polished so smooth on the inside with an abrasive that the buttons pressed in them acquire the appearance of being cut (Benda 1877:287).

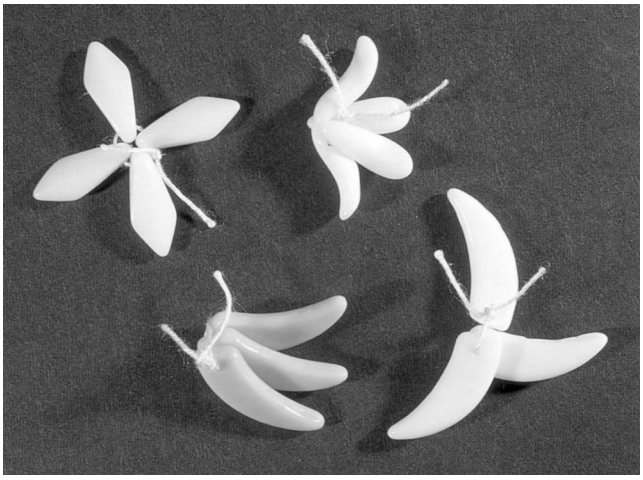

Figure 76. Various shapes of pressed beads (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

Another source mentions that the so-called polished bead was pressed in hot nickel molds which gave it a surface that looked almost cut (Fischer Collection n.d.). Arnold (1909:92) calls *Flüssel* "little black stones:" "They possess

two pierced holes and are put on the market on threads to be used for passementerie."

"Up to the beginning of the 70s, the molding furnaces were heated exclusively with wood, later with mineral coal, in more recent times with oil" (Labau n.d.). While molding with iron tongs over an open wood or coal fire was common, the Mahla Brothers company in Gablonz introduced glass molding using hydrogen into its factory in Morchenstern in 1891:

> This new type of fabrication resulted in a much more perfect method of production since the glass becomes white-hot much quicker because of the intense heat of the hydrogen gas and appears much sharper in the pressed design. In this way, a molded ware is produced that is so close to the cut ware, laymen are hardly able to distinguish between them (Gablonz 1898:161).

At the turn of the 20th century, Winter (1900:16) reports on molders and the use of double molds which were forbidden at times.

The Molding Technique and its Apparatuses

The solid bead molded in two-part molds was made either with or without holes. Articles intended for mounting (e.g., earrings, etc.) did not necessarily require perforation (Plate 15C). A tong-like tool (Figure 77) had always been necessary for pressing or "squeezing" and in the course of time had been improved upon a number of times. In the beginning, it took two people to perforate a bead; one to mold it, the other to make the hole:

> The production of hand-pierced beads required 2 people, a molder and a piercer, who sat opposite each other at the molding furnace. The molder guided the melting end of the glass rod, the *Schmelz*, into the mold and the piercer, who had screwed the needle into a hand vice, knew exactly how long to wait for the precise moment when the presser pressed the mold together, to pierce with the needle at the same time. This cooperation demanded considerable skill of both workers. To make sure the needle pierced in the right place, a so-called "snout" was attached to the mold. It is astonishing that it was possible to make up to 20 or 25 bundles, that is 24,000 to 30,000 single beads, a day in this complicated manner (Labau n.d.).

The mandrel-pressed bead, the so-called *Dörnel*, could be made by a single worker, however. When glass-pressing tongs with mandrel-bead molds were used, the perforation

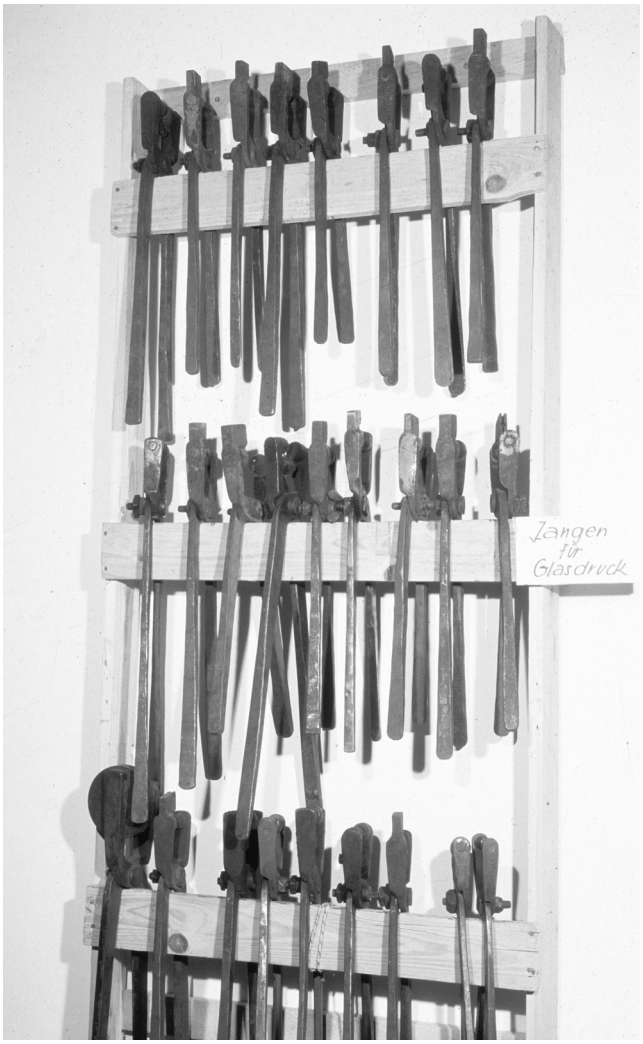

Figure 77. Press-molding tongs from various Neugablonz companies, 1948 (Neugablonz Industry and Jewelry Museum, Kaufbeuren-Neugablonz).

did not pierce the whole glass bead. The mandrel, a conical brass rod, was fixed in the upper part of the bead mold; there was a corresponding indentation in the lower half (Glasdrückerei Labau n.d.). Mandrel-pressed beads have been preserved both in Vienna (from the Biedermeier period) and in the Gablonz Museum (from the late 19th century) which still show the extruded flash before being cut off (Plates 19A-B).

According to Posselt, it took one person to mold the round molded beads; for the laurel berries (elongated beads) two people were required: a molder and a piercer.

> The molded bead was round and the facets still had to be cut.... In the years between 1860-1880, many molded beads were made in all kinds of glass and the facets were molded into them at the same

time; they only needed to be ground over (Posselt 1907:15).

The first glass molding works in Labau were built in 1857, by Joachim Wenzel and Josef Klinger. Beginning in 1868, there were also molding-piercing machines (Labau n.d.). For "molding or squeezing work," rods of many colors, from 10 to 35 mm diameter and about a meter long, were used along with iron and brass molds (Karmarsch-Heeren 1880, 4:52). There were two types of "kernel molding machines:" top piercers and side piercers (Parkert 1925:185). Exchangeable "caps" (*Kappel*) to insert into the molding tongs made it possible to create a great variety of bead shapes (Figures 78-79). After molding, the flash (the ridge of excess glass that extrudes from the seams of the mold) is removed in shaking-sacks. Smooth polishing was done in drums with quartz sand or by tumbling (Figure 80). The resulting mat beads were polished, either on poplar-wood discs with rotten stone (*Trippel*) or by fire polishing (Parkert 1925:188). "Smooth tumbling" without sand, but with water ("water polishing") was also possible (Glasdrückerei Labau n.d.). Some of the steps in making mold-pressed beads are illustrated in Figures 81-83 and Plate 18D.

Figure 78. "Cap table," Neugablonz, around 1948-1949 (Neugablonz Industry and Jewelry Museum, Kaufbeuren-Neugablonz).

The work in the molding hut is known to us from contemporary photographs (Figures 84-88) and from preserved inventories. Specialized literature shows illustrations of molding tongs and machines (Figures 89-96). Beyond that, we also know a number of privileges from which the complicated mechanisms of various types of tongs emerged (Figures 97-99). In 1883, Josef Fischer of Tannwald received a privilege for tongs "for making molded glass beads and stones in all shapes, sizes, and colors with two holes in the shape of a cross." Franz Hiebel of Friedrichswald submitted a process in 1884, which was only partially accepted in 1889 (Figure 95) to make a "cylindrical hole of the same width from beginning to end, pressed through the glass beads molded with these tongs." In 1893, Theodor Hübel, Gablonz a. N., invented mold-pressing with tongs whereby the glass bead was threaded onto wire at the same time (Figure 93).

Adolf Glaser, mold-maker in Schwäbisch-Gmünd, preserves old tongs, some of which were made by his father (Figures 100-101). They are tongs for lamp or furnace pressing: one pair of tongs for lamp-pressing eardrops (Figure 100e); one pair of tongs with a spring for lamp pressing, as a side-piercer also for lamp work, sometimes called an "after-piercer" mold because the needle pierces after the molding (Figure 100a); one pair of tongs for lamp pressing, as a side-piercer all the way through, the upper cap having a moveable part (pattern) – with this method there is less flash and trimming is superfluous (Figure 100c); one pair of tongs for furnace pressing, pressing through the interior part so that it is more easily removed (Figure 100d); one pair of tongs for lamp-pressing, with top-piercer (the design is a faceted pendant) – it is not pierced completely through, since the nickel mold would wear out too soon (Figure 100b); one pair of tongs for lamp-pressing, top-piercer (faceted heart) (Figure 100f). The molds created by Adolf Glaser for making caps (Figures 102-103) are fine mechanical masterpieces in their precision, a prerequisite for flawless work by a press-molder.

Pressing

The mechanical process of pressing powdered clay and silica components in a mold and then firing the resultant objects to fuse the material was first patented in London by Robert Prosser in 1840 (Sprague 1983:168). The items to be produced included "knobs, rings, and other articles." Whether the "other articles" included beads is not known.

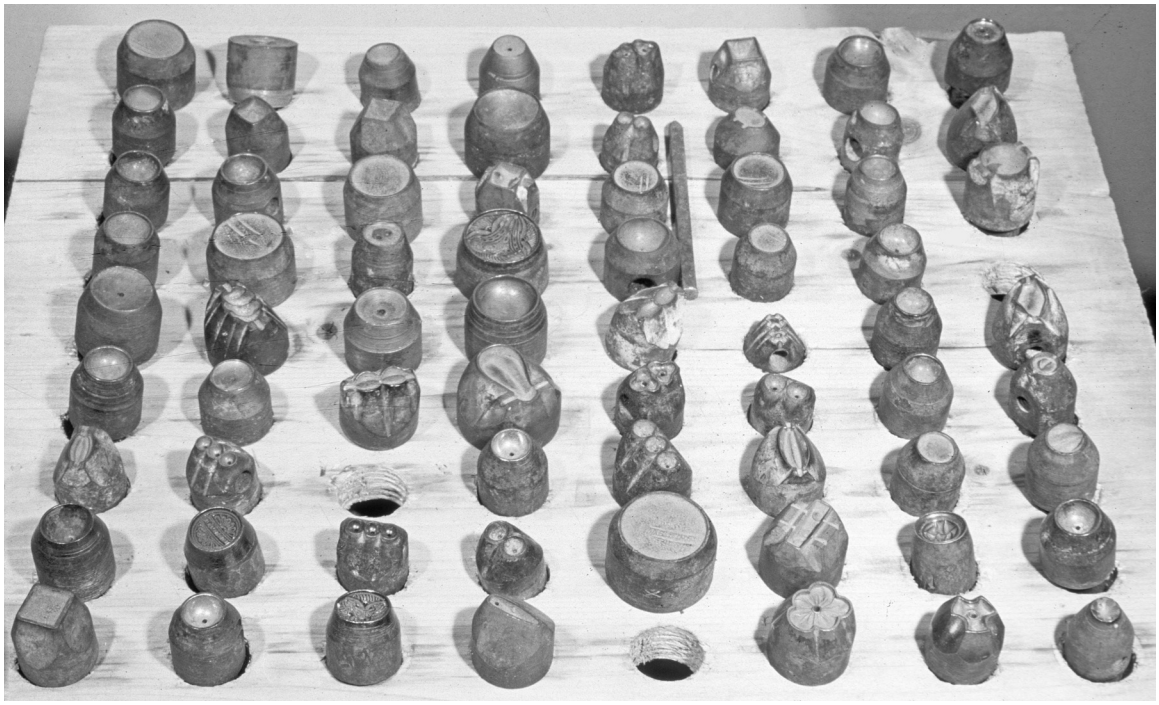

Figure 79. "Caps" from the "cap table" (Figure 78).

For beads, the production methods of Jean Felix Bapterosses are the best known. In 1880, he had a process for "an improvement in the production of buttons, beads, and other similar articles made of ceramic paste" protected in Austria (Figure 98). In 1887, Walldorf & Co. in Gablonz developed a "method and apparatus for pressing beads from plastic substances" (Figure 97), and Albrecht Max received a privilege in 1888 for his "continuous functioning button & bead press" for "pressing clay and other plastic substances by mechanical means" (Figure 99). In addition

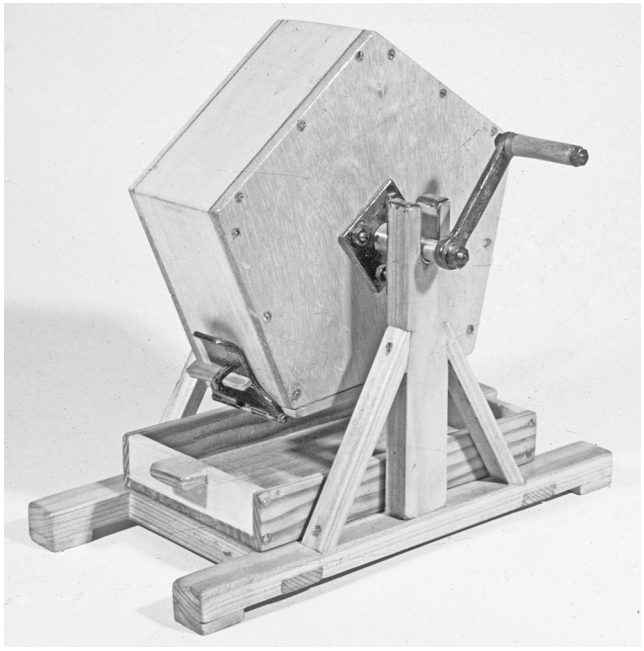

Figure 80. Model of a "tumbling drum," Neugablonz (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

Figure 81. Erna Kleinert sorting beads, Neugablonz, around 1975.

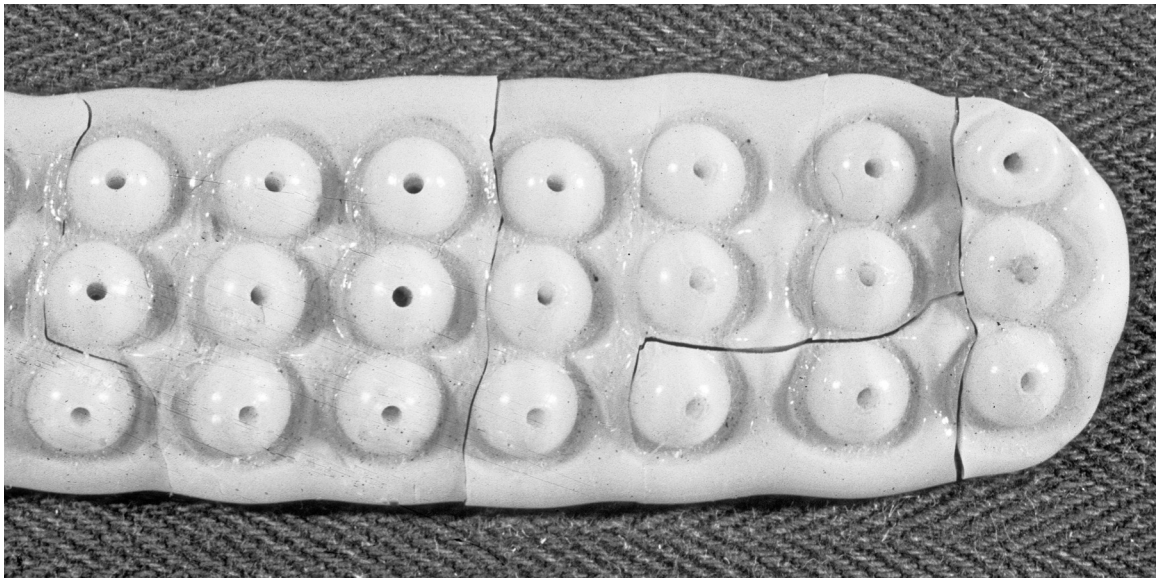

Figure 82. "Three-tiered pressing" made in a glass-pressing house, Heinz Kleinert, Neugablonz, about 1977 (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

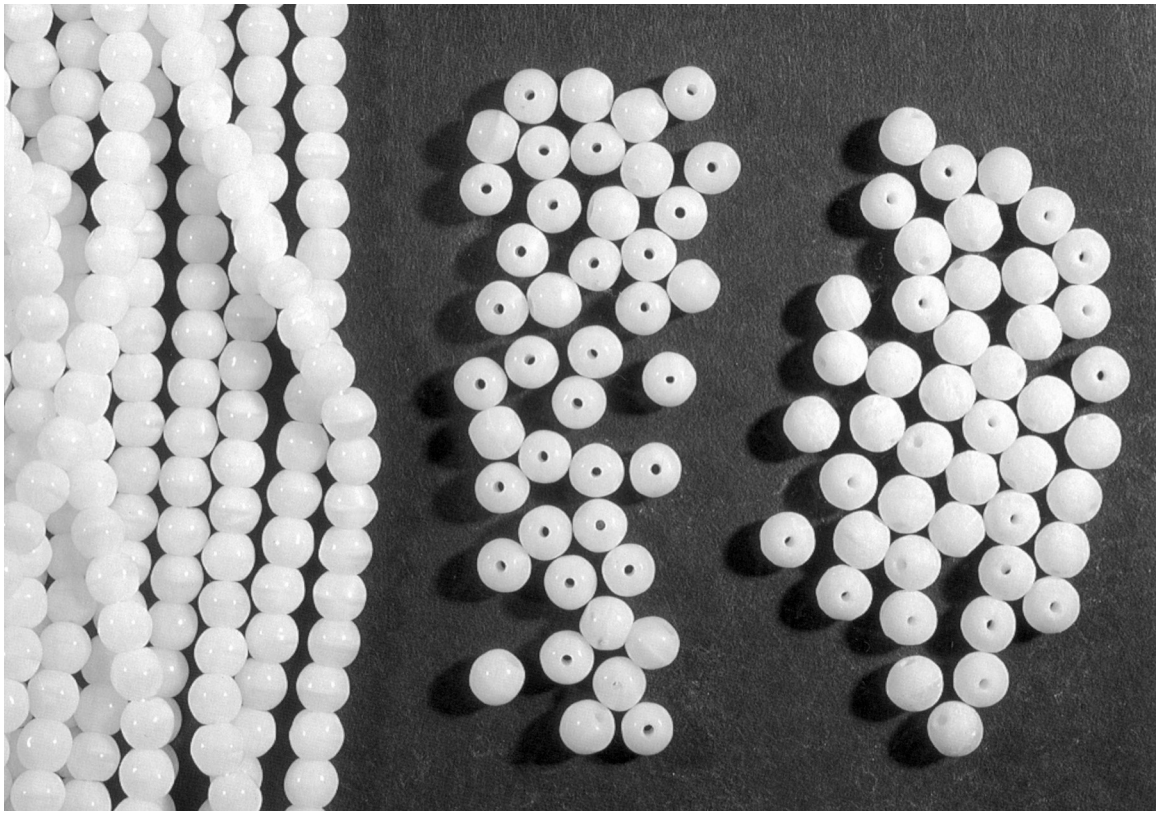

Figure 83. Stages in the manufacture of pressed beads (cf. Figure 82). From right to left: tumbled, polished, and strung beads; Heinz Kleinert, Neugablonz, 1977 (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

to Bapterosses, other foreign companies also received the protection of an Austrian privilege, such as the company Neumann/Buchholz in Saxony in 1888, for a "machine for producing beads of Bohemian glass, clay, faience, majolica,

Figure 84. Glass press-molder at work, probably early 20th century (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

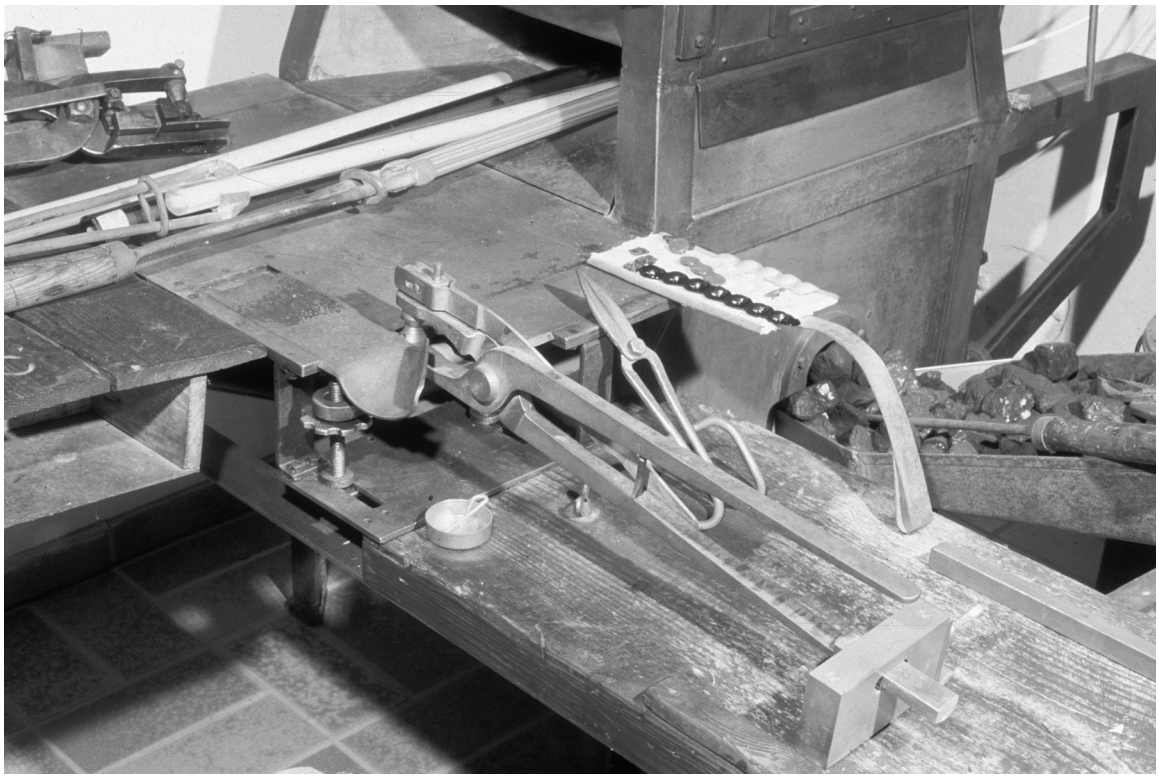

Figure 85. Work station at a press-molding factory (furnace, molding tongs).

Figure 86. Press-molding work station (coal-fired furnace), Neugablonz, around 1947, with contemporary photograph (Neugablonz Industry and Jewelry Museum, Kaufbeuren-Neugablonz).

and other substances in all formats." The Redlhammer Brothers in Gablonz were the first firm to introduce the Bapterosses beads into Bohemia. The collection of sample cards in the Technical Museum in Vienna is an unparalleled inventory.

Parkert deals with the production of porcelain beads in detail. He also writes of the "earthenware bead" and differentiates between the basic materials used:

> ... agate or stone and strass substances. The former consists as a rule of a mixture of fine washed

Figure 87. Heinz Kleinert at his press-molding work station around 1975 (Gablonz Archive and Museum, Kaufbeuren-Neugablonz).

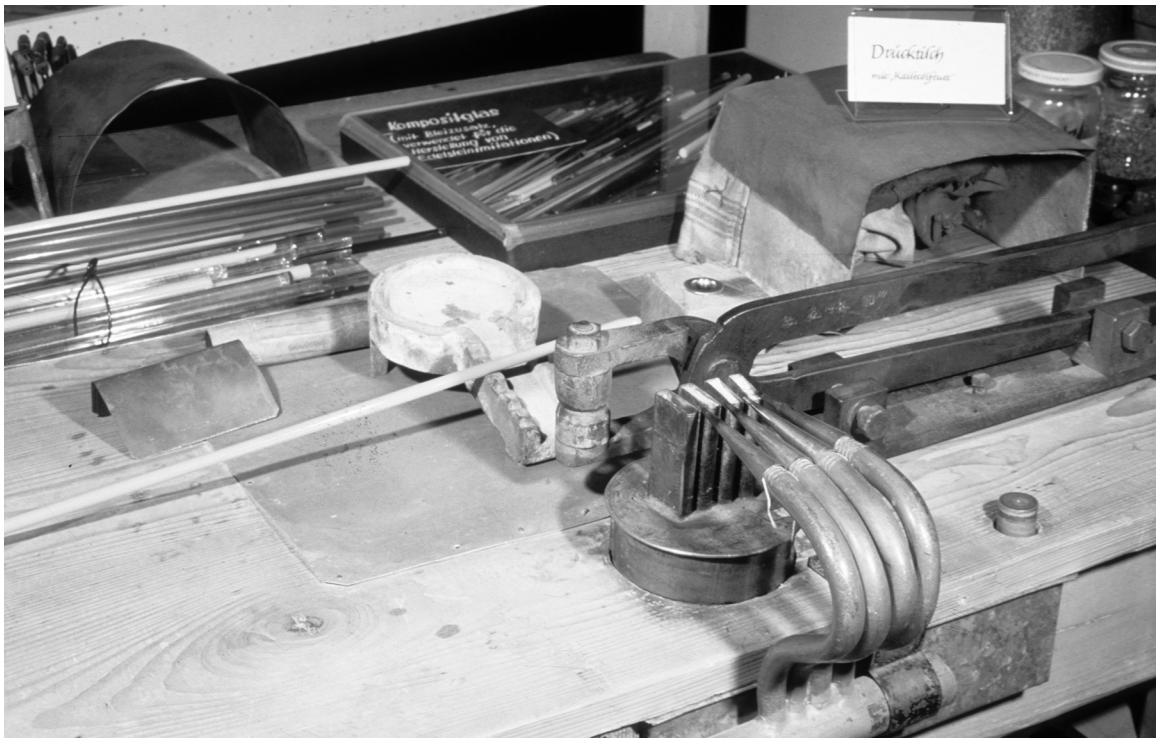

Figure 88. Lamp-pressing work station (using kerosene), Neugablonz, around 1947 (Neugablonz Industry and Jewelry Museum, Kaufbeuren-Neugablonz).

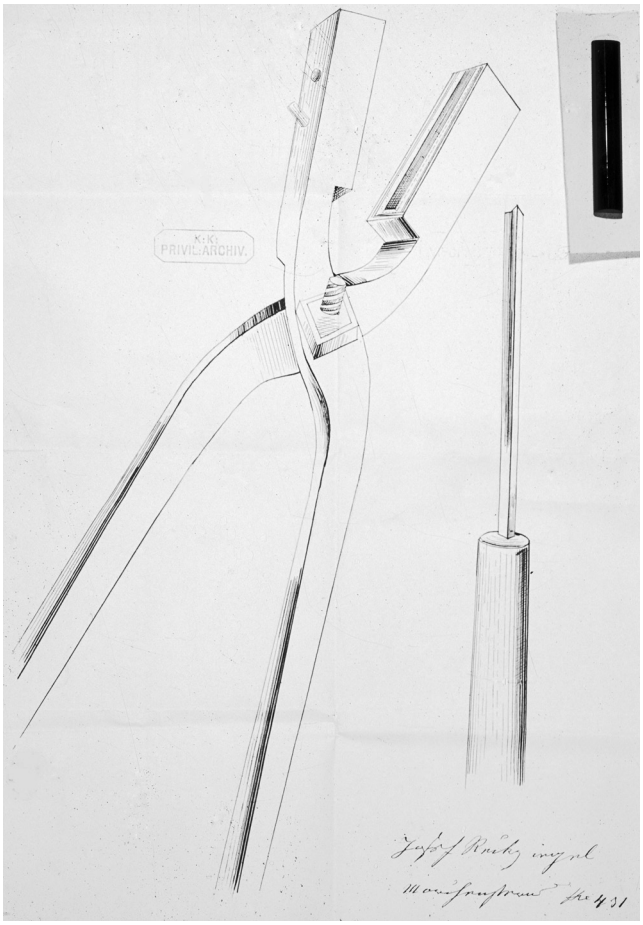

Figure 89. An improvement in attaching the metal backings of glass jewelry items, 1878, Josef Reckziegel, Morchenstern, privilege no. 28/321 (Austrian Patent Office).

> feldspar which has been freed of as much iron as possible by treating with acids, and a small amount of phosphoric lime. The strass pastes, on the other hand, consist only of feldspar (Parkert 1925:200).

The pulverized and sifted material (*Massegut*) is mixed with a binder (milk, gum arabic, tragacanth, or a casein-glue solution), stirred to make a homogenous paste, and when necessary, dyed with metal oxides or mineral colors. The paste, rolled out into sheets, is placed in a pressing frame and pressed with a die. A glassy characteristic is aimed at for the basic material; a special glaze is not necessary. Finally, the beads are fired in a muffle kiln (Parkert 1925:201, 202).

Probably situated somewhere between glass and porcelain, these "earthenware beads" are sometimes difficult to assign to one category or the other; their surfaces generally have a glassy appearance. North American researchers refer to these beads as "Prosser Molded" (Karklins 1985:104).

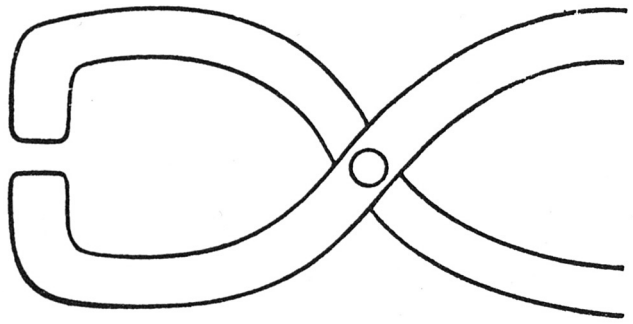

Figure 90. Old molding tongs (Kleinert 1972:37).

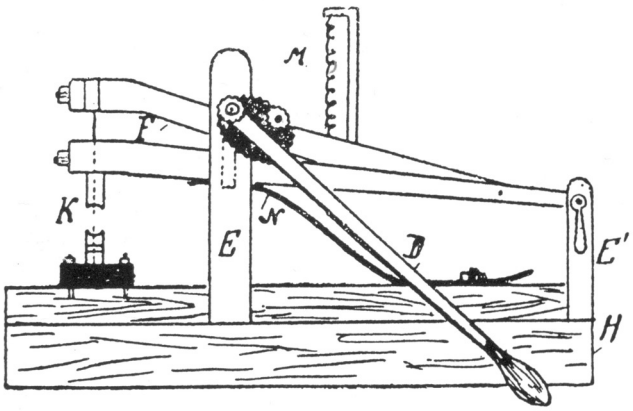

Figure 91. "Körnel pressing machine" (*Körneldruckmaschine*) (Parkert 1925:186).

WOUND BEADS

Drawn beads and wound beads were principally made in Venice and Murano, while "cut beads, bijouterie, artificial gemstones... were made exclusively in Gablonz and in the towns close by" (Jonák 1858:8). Although extremely well known in other regions (such as the Fichtelgebirge), the wound bead (*Wickelperle*) never held a top rank in Bohemia. All the same, a brief mention of the two most important techniques for winding follows: 1) a glass rod heated at the flame of a lamp is wound around a metal rod; sometimes this procedure is combined with molding in molds, and 2) working the molten glass from the pot with an iron rod.

Winding as Lampwork

Solid beads made at the lamp (*perle a lume*) are mentioned by Altmütter: on the one hand, these were beads made from pieces cut from a tube, stuck on a wire, and melted to a round shape at the flame of a blowing table