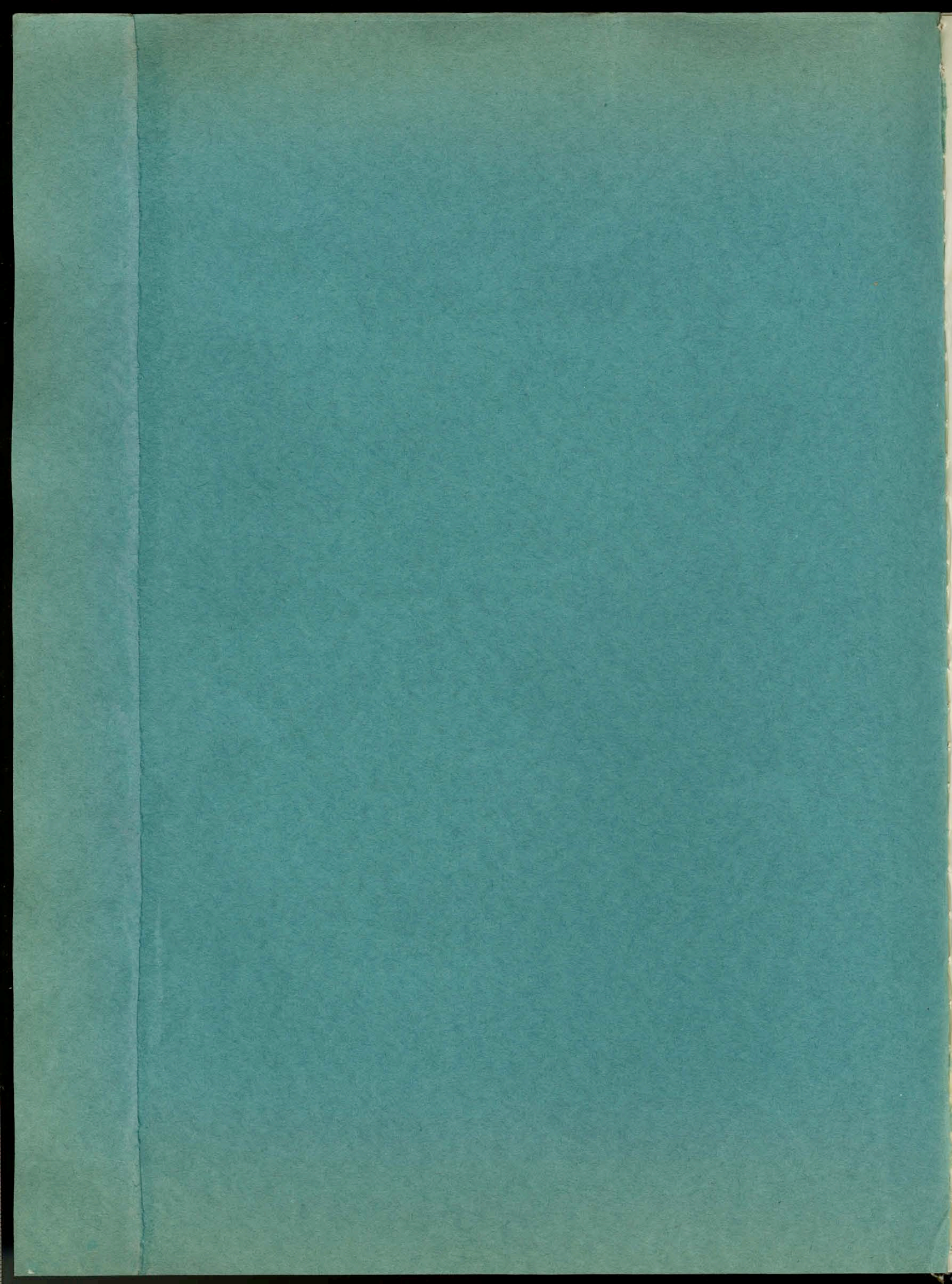


MODERN
GLASSMAKING
in Czechoslovakia



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IN
CZECHOSLOVAKIA

P U B L I S H E R

MILKA HIPMANOVÁ

P R A G U E

INDUSTRIAL PRINTING ESTABLISHMENT, PRAGUE

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Prof. F. Kysela

MODERN GLASSMAKING IN CZECHOSLOVAKIA

Dr. Jindřich Čadík

Czechoslovakia, whose State form and cultural organization dates from the beginning of the X century, is, above all, a land of extensive traditions. Into the territories of Bohemia and Moravia ran the most Northerly traces of the glass industry of the Romans, but this, of course, left no influence on subsequent history. In the Middle Ages a new beginning had to be made. Bohemian glass, the story of which can be traced back to the XI century, does not substantially differ from the same product in other parts of Central Europe. Specimens of stained glass windows, preserved in museums take us back to the XIV century. The general cultural expansion under the regime of the Luxembourg dynasty based on

the Italo-French tradition which had been transplanted to Bohemia, and led to the beginnings of a busy period in the cutting and polishing of precious stones, passed on the whole without bringing about an improvement in the production of glass, although the output at that time was considerable. In the years 1380 and 1392 the glassmakers joined the painters guild, so that it would seem as if the customary decoration of glass was the staining of it by means of transparent colours. The XV century was almost entirely occupied by the Hussite wars and the new consolidation of the Bohemian Kingdom and thus made no new contribution of note to the history of industrial art. From the middle of

that century Bohemian industrial art was linked up for several centuries to the German sphere of plastic culture, although it still retained a local and distinct character of its own. At the close of the XV century a beginning was made in Germany to paint glass with oil colours and soon after with enamel colours. Bohemian drinking glasses of bluish-greenish tint were painted with a wealth of delicate decoration especially in the workshops of the extensive glassmaking family of the Schürers of Waldheim. During the Rudolphine period Bohemia was once more linked up with the Romanesque renaissance tradition. Miseroni, Belli, Bernardi, Caradosso and others introduced to the royal Court the cutting, polishing and finishing of precious stones, and their pupils immediately transferred this art to work in glass, the purification of which, in the colourless form, had in the meantime made great progress. The golden age of Bohemian glassmaking was the century from 1650 to 1750 when the splendid, hard, crystal material was worked both in the fire on the Venetian model as well as by engraving and cutting to produce rare cameos or intaglios.

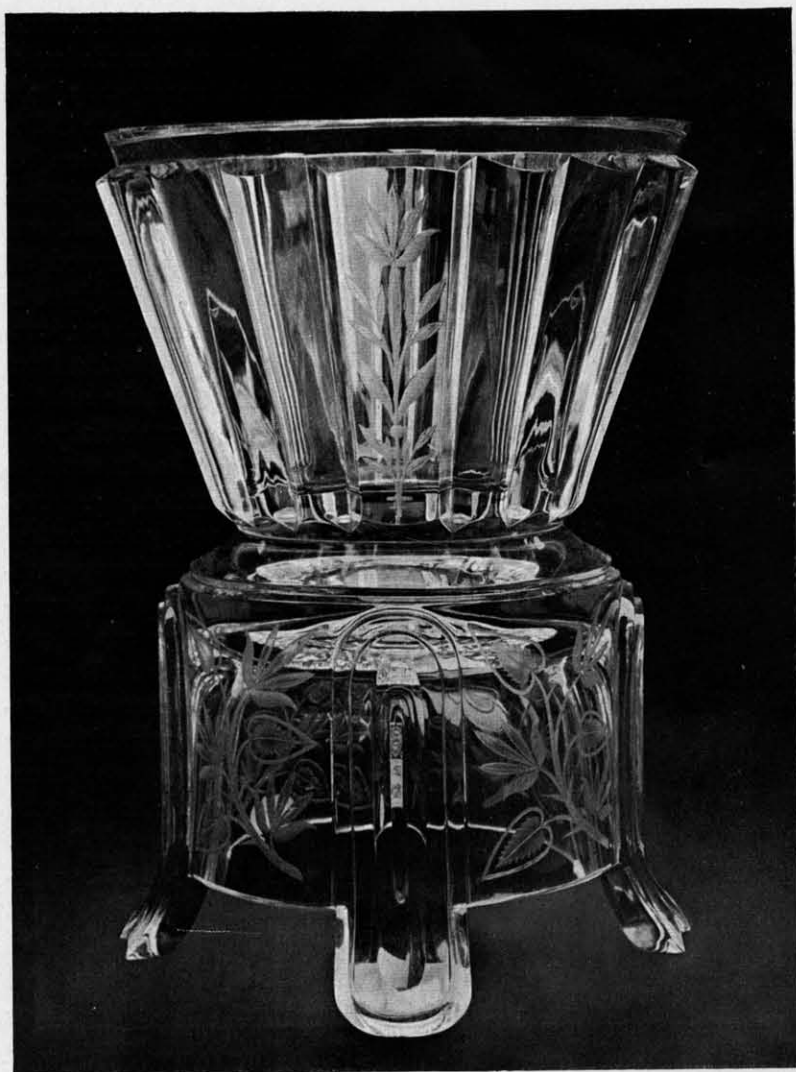
The area covered by the glassmaking industry of Bohemia was determined by natural conditions. A wealth of forests and beds of silicates led to the location of the industry in the frontier districts, while the interior of the country always, as it were, retired into the background of glassmaking. It was the West Bohemian area that first attained economic and artistic significance (Jáchymov, the district of Domažlice and Vimperk), where the Schürer, Müller, Meier and other families were settled, and where, on the artistic side, a decisive rôle was played by the demands of the magnificent courts then kept up by the noble families of the Rosenbergs, Eggenbergs and Schwarzenbergs (Prachatic and Vimperk regions).

Of decisive importance for the era of classical out-



Prof. J. Horejc

put is the North-eastern area of Bohemia—the Krkonoše (Giant Mountains) region. At that time Silesia and Kladsko (Glatz) were under the Bohemian Crown, and it was exactly on the northern slopes of the Giant Mountains that Bohemian glassmaking reached its highest degree of perfection. The magnificent, slightly amethyst-coloured material was cut, engraved and carved in figure and ornamentation with genuinely artistic skill, and this output, with its Baroque decoration and the quality of the material and workmanship, dominated the world's markets of the day. The Seven Years' War and the unwise policy of Frederick the Great put an end to the Silesian workshops of the Giant Mountains, and the glassmakers and refiners migrated — in the main to Bohemia. Thus, from the year 1760 onwards, there



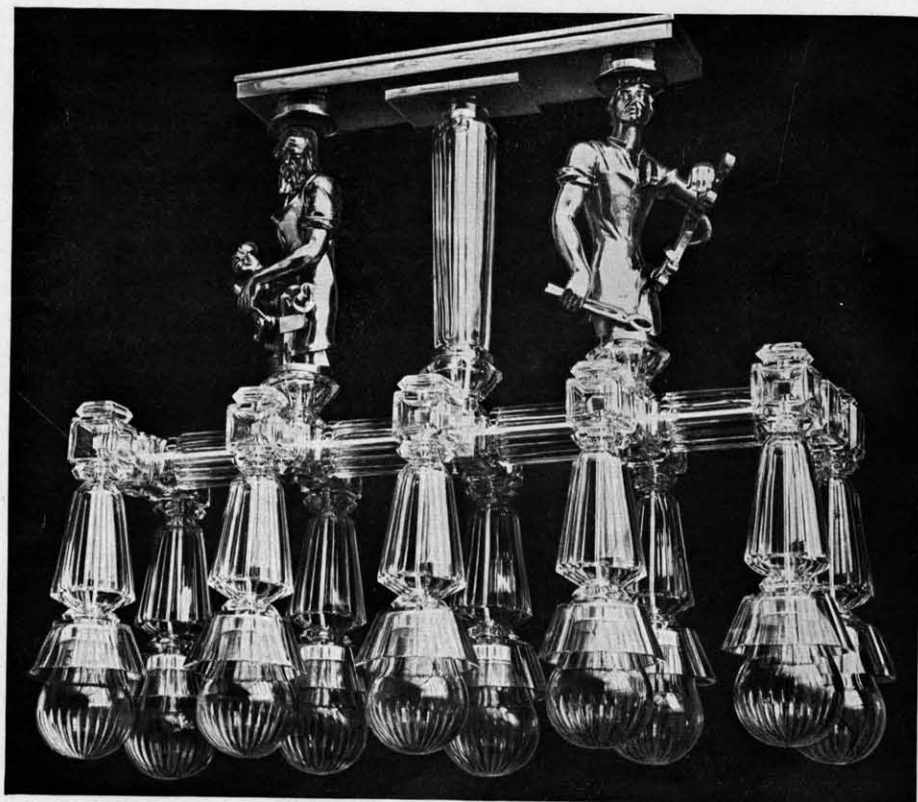
H. Dostálová

arose under the Giant Mountains in the neighbourhood of Nový Svět, and again around Bor (Haida), Kamenický Šenov, Železný Brod and Jablonec (Gablonz), where a glassmaking tradition still lived on from the XVI century, a real glassmaking area where this industry penetrated into all ranks, and developed not only up-to-date in works and factories but also in the form of a widespread cottage industry organized on a popular basis by the export houses. In that area there still live numerous families in which the art of glassmaking and glassworking has come down from father to son for generations together with a special sense and tradition in this craft. In the collective, traditional character of this glassmaking area there lurks, of course, also the danger of conservatism in production and market-

ing. In order to preserve the vital elasticity of the industry, technical schools for glassmaking were established—at Kamenický Šenov in 1856, at Bor in 1870, and at Jablonec in 1880. As these schools, under the Habsburg regime, had a Germanizing tendency, there was founded in the year 1920 at Železný Brod a school that was entirely Czech. The influence of the schools on the improvement of glass has steadily advanced since the Nineties. Under the former Austrian regime the above were the only technical schools for glassmaking, and all efforts towards improvement and expansion depended upon their plastic capacity and their publicity activities. By means of political influence and industrial organization it was formerly Vienna that attempted to dominate the glassmaking industry, and training and education in that department, but since 1919 the rôle of leader has been taken up with growing success by Prague. At the Prague School of Industrial Art, a whole series of artists and professors have occupied themselves for many years past with questions of glass ornamentation, and thus at any given moment the Bohemian glass industry secures qualified leaders, capable of giving

to modern Bohemian glass a personal character and high artistic level. At the head of the plastic artists who are working in the cause of glassmaking is Professor Josef Drahoňovský.

The two outstanding glassmaking areas: that of the Krkonoše (Giant Mountains) and that of the Šumava (Bohemian Forest) are distinguished also by the internal organization of output. The Northern area (the Giant Mountains) depends largely upon a cottage industry, and comprises some 1700 small workshops mostly of a family character. The factory output here is represented as a rule only by medium-sized concerns. A feature of the area is the large number of firms occupied with the export of glass. From a technical, social and publicity point of view this glassmaking area is well served by the



Prof. Pavel Janák

Glass Institute at Hradec Králové and the industrial review "Sklářské Rozhledy" (The Glass Review.) On the other hand the Šumava (Bohemian Forest) area has ever since the XVI century been exclusively of a factory character. The historical development here was along lines of selection and concentration, so that in time a large number of small factories have been converted into about a dozen concerns of very considerable size. The glassmakers of the Bohemian Forest formed as time passed a kind of caste linked up by kinship on all sides. This relationship contributed substantially to alleviating competition, especially as the individual concerns each concentrated on the output of one particular line.

From the classical period of Bohemian glassmaking — from the close of the Seven Years' War to the Napoleonic wars there intervened an era of new organization and orientation in work. It was the period of syncretism of the traditions of the Silesian carvers and engravers with the traditions of the Bohemian cutters. At the end of the XVII century Bohemian glassmaking was affected by the powerful influence of England which was the more pro-

nounced as the economic decline and confusion of art tendencies was all the more considerable in Bohemia. The situation became still more hopeless when the Napoleonic wars practically destroyed all export trade in glass. It was necessary then to make a new beginning from the technical, the art and also the commercial point of view. Thanks more to determination, perseverance, and good fortune than to conscious organization and plan, Bohemian glass once again conquered the world's markets in the face of West-European competition. At that time the glass was coloured, laminated and cut, and by its gay beauty recovered the lost posi-

tions. Heavy, lead glass was made in Empire and Romance forms, handsomely faceted, with English diamond cutting, was in double or treble layers and cut with a new, that is, very modern ornament, or decorated with deeply cut intaglios composed of figural scenes or portraits. The glassworks of Count Buquoy and of the alchemist-glassmaker, F. Egermann, invented new types of coloured glass which vied in splendour with precious stones (hyalite, lytholine).

Through its chemical and industrial progress Western Europe soon mastered the secret of the Bohemian coloured glass and so, from the sixties of the XIX century, Bohemian glass again lost ground in the world's markets. Up to then, Bohemian glass had been made almost exclusively by hand. The acute foreign competition and the necessity of bringing down prices led to increasing mechanisation and to a decline in the artistic standard. The great decline in Bohemian glass may be placed in the years 1860 to 1880, and it was the Krkonoše (Giant Mountains) area that was mainly affected. Glassmaking in the Bohemian Forest on the other hand, based as it was on financially strong factory enterprise,

now came to the rescue, and at least saved the situation to the extent of preserving the tradition of an output of first-class crystal and coloured material. In the hands of the enterprising and idealistic William Králík of Meyerswald, 7 big factories were concentrated (J. Meyer's Nephews), 3 of which turned out utility glass, while 2 were equipped exclusively for fine, refined glass, engraved and stained. The Adolf Works at Vimperk, conducted by Králík, consciously took up the tradition of the Silesian-Bohemian classical epoch of the XVIII century, and in the Seventies and Eighties trained up numbers of talented engravers and cutters, excellent masters of all the old methods as well as of the latest type of work. First of all old models were copied, but from about the year 1880 a kind of renaissance on the formal side set in. The Králík Glassworks were the best-equipped in the then Austro-Hungarian Monarchy, and when Ludwig Lobmeyer, the Viennese craftsman, came forward with his efforts towards a revival of glassmaking from the art point of view he met with the most complete understanding and cooperation at Vimperk and Lenora, while the glassmaking schools at Bor and Kamenický Šenov of course collaborated. The Králík glassworks at Lenora specialized in the production of stained glass and found in Jan Zacharias Quast an excellent manager and painter. Of the glassworks in the Bohemian Forest at the close of the XIX century two others stood out above the average level—that of Jan Lötze's Widow (Max Spaun) at Klášterský Mlýn near Rejštejn, and that of S. E. Schmidt (Fr. Novotný) at Anninová near Sušice. The Spaun works devoted all their care to coloured glass, especially lythaline and laminated glass. From there very much glass of from three to five layers was exported to France, where, particularly at Nancy, it was etched after the manner of Emil Gallé, producing very valuable and artistic work. Such work of equal quality was turned out in Bohemia also from the beginning of the XX century. Quite independently there was invented in the Spaun works at the close of the XIX century lustre glass similar to the Tiffany products, and in 1900 this concern won the grand prix at the International Exhibition at Paris for this product. Novotný's works at Anninová occupied themselves in the second half of the XIX century with export trade, and in the matter of form followed the taste of the English-speaking countries. For the domestic

and Continental market the concern worked in the main in cut material, turning out huge and masterly-cut table ware, ruby-tinged and gilt, while at the end of the century it produced almost exclusively toilet and table services with diamond and jewel cut of new patterns.

From the year 1900 onwards there has been observable in Bohemian glassmaking a sustained effort to meet the artistic demands of the day, and to maintain at the same time the capacity to compete with the industry in the West of Europe advancing rapidly in respect of chemical and mechanical progress. Abandoning traditions, the Bohemian industry seeks new orientations alternating in the direction of Paris, Vienna, Munich and Berlin. The glassmaking schools of North Bohemia trained up numbers of excellent engravers and cutters, and practically everything that was the pride of the Vienna house of Lobmeyer was a product of the glassworks at Vimperk or Kamenický Šenov in Bohemia. From the beginning of the XX century increased attention to glass has been given in the circles of industrial art at Prague, and Messrs. Plečnik, Benda, Horejc, Kysela, and particularly Prof. Drahoňovský have produced quantities of new designs for the improvement of glass output in the matter of form.

The World War brought about a change in the political and economic situation. Liberation from political subjection to Vienna brought with it also



Engraved Plate made at the Rückl Glassworks, Nová Huť, near Nížbor

a severance of relations with the art life of Vienna, and the need for independence in respect of industrial art output. From the economic point of view this meant the securing of new markets in place of those lost during the War. The War destroyed many material values, and at the beginning of the new era—in the years 1918 to 1920—there was a lack of rawstuffs (coal, sand, dyes, etc.), while again a big proportion of general production and mining output had to be rehabilitated and reorganized. The first few years following the War and the establishment of the Czechoslovak Republic were catastrophic for Bohemian glassmaking. The workers were out of work. Foreign countries, especially Sweden which had been untouched by the War, increased the number of their glassworks, and a struggle set in for control of foreign markets. Czechoslovakia was overrun with foreign agents who were not on the look out for merchandise, but for qualified workers whom, in the depressed conditions then prevailing, they easily won over, so that Bohemia was exporting skilled craftsmen instead of goods. Thus it happened, for example, that the Swedish glass from Orrefors which attracted attention at the International Exhibition of Decorative Arts at Paris in 1925, was substantially the work of Czech glassmakers. There are now big colonies of Czech glassmakers in France, Belgium, Sweden, Rumania and Germany. Since 1923 efforts have been put forward for the improvement of the technical and trade organization of the Bohemian glassmaking industry. The technical schools are being reorganized, a new Glassmaking School has been established at Železný Brod, a Glass Institute and Test Station inaugurated, and numerous exhibitions have been held. There was need of new plastic leaders. It is a piece of good fortune for Bohemian glassmaking that it found the right man at the right moment in Professor Josef Drahoňovský, sculptor, artist, and practically-schooled glass engraver.

Drahoňovský was born on the 27th of March 1877 in the "Bohemian Paradise", a region of romantic and enchanting scenery and the home of Bohemian glassmaking and precious stone cutting. His early displayed plastic talent attracted the attention of his teachers, and already as a thirteen-year-old boy he entered the technical school at Turnov, the headquarters of the precious stone cutting industry. The then director of the school,

J. Zapp, himself a talented engraver, gave his promising pupil not only an opportunity to acquire all the secrets of the art, but also taught him responsibility by entrusting to him the orders for intaglio work which came in from various members of the aristocracy. It was as a perfectly trained engraver that Drahoňovský proceeded to Vienna, and there worked for some time. There the treasures of the museums and picture galleries influenced him powerfully, and fired his longing for further schooling. He therefore left Vienna to attend the Industrial Art School at Prague, and in the workshops of Professor C. Klouček, as excellent a sculptor as teacher, his plastic talent matured so rapidly that on his teacher's retirement he himself became professor at this leading institution. A whole series of official monuments, busts, and ceramic figures have issued from his workshop. Among the best of them is the statuary at Turnov commemorating the national Liberation. As a sculptor Drahoňovský is always correct in conception and in execution. His work is always sound and well thought-out beforehand for the prescribed material, the technique of which he is sovereign master of. He is almost a classic in his adaptation of idea to form. His sculptural compositions display a rare plasticity, giving a manifold aspect from all sides. In regard to form and subject Drahoňovský is a poet of Spring and Youth and their delicate, charming, and frequently only half-unfolded forms. In pose and gesture he is always reserved and non-aggressive, and in their total character even his male figures are to some extent feminine. He never forgets the need of decorative effects. The lyrical touch predominates in all his moods together with a slight touch of eremitic sentimentality. Though, personally, Drahoňovský is extremely modest, retiring, and devoid of "push" — in fact one might say almost shy — he proves himself a teacher of strong individuality, who has succeeded in training up a whole group of young sculptors whose work carries traces of their master. In particular, great hopes are placed upon the young company who, at Drahoňovský's instigation, have devoted themselves to figure ceramics (Vlasta Dohnalová, M. Marešová, Jan Lichtág, M. Schildberger and others).

In addition to following his official calling as a sculptor, Drahoňovský is always returning to his first love — engraving. In his earlier period it was exclusively cameos and intaglios which he cut with



Glass Engraving by Emil Šprachta, Prague

an ever surer master-hand in rock-crystal and precious stones, most frequently topases. For this work he had many years of theoretical and practical schooling. As a sculptor he was complete master of modelling and the secrets of composition, and more than a quarter of a century's practice in engraving and etching enable him to enclose in the glistening material of the glass or precious stone deep-cut reliefs in which the ancient glyptic art revives in all the beauty and wealth of antique classicism. Very early Drahoňovský turned his attention to the refinement of glass. He most frequently designs grandiose forms and decorates them with a wealth of ornamental and figure work. His glass and glyptic work have attracted the attention of foreigners, especially of the Englishmen and Americans who have visited Prague in considerable numbers since the War, and the name of Drahoňovský, without any impulse from domestic sources, is to be found in reviews and illustrated magazines abroad accompanied by appreciative notices couched in superlatives of praise. Drahoňovský owes his reputation solely to the quality of his work. Specimens of that work are to be found in the collections of many notable owners: the Pope, the King and Queen of Yugoslavia, the King of Bulgaria, Sir Austen Chamberlain, Mr. Pierpont Morgan, Mr. Crane, and in numerous museums in France, Italy and other countries. The President and the Government of the Czechoslovak Republic choose his glass and sculpture work when selecting gifts for notable recipients abroad. Drahoňovský is also seeing to it that successors in his rare art shall not be lacking, and he endeavours to interest his pupils in glass work. Thus a group of young artists — Messrs. Přenosil, Hásek, Lippert, Pazourek and others — have enrolled themselves in the ranks of Czech glass craftsmen in order not only to make good the loss suffered by the severance of the connection of the industry with Vienna, but also to lead a Czech industry in the spirit answering to the plastic sense of a liberated nation.

Alongside Drahoňovský a whole group of Prague plastic artists, sculptors and architects have for years worked with understanding for the uplift of Bohemian glassmaking. The list of names includes the professors of the Industrial Art School, *Kysela* and *Brunner*, who have themselves produced very many excellent and up-to-date designs in stained glass, reflecting the originality of the characteristic Czech

conception, and have trained up a number of capable pupils. Of these, *Žd. Inna*, in particular, as teacher at the Glassmaking School at Železný Brod, has done good work in the upbuilding of a new tradition of painting. The professor of the Prague School, *J. Horejc*, a sculptor, has designed a series of engravings in glass which, when executed for the Vienna firm of Lobmeyer, attracted attention abroad by the originality of their form and the pioneer character of their decorative work. Efforts to create a new tradition in the forms of hollow glass have been pursued by several architects — among them, *Plečník*, *Stokar* and *Novotný* — while *A. Metelka*, now director of the Glassmaking School at Železný Brod, has specialized exclusively in this department. Thus the Czech plastic artists are doing what they can to provide the present-day glass craft in Bohemia with intuitive leaders, and it is only a question of whether the Bohemian industry will rise to its responsibilities and requirements, and make use of these resources of art for its own advantage and success. Judging from the results of recent exhibitions it would seem as if a new era were opening up for Bohemian glassmaking.

The glass industry as a branch of industrial art is now, after overcoming economic difficulties and after replenishing the thinned ranks of trained masters of technique, developing much energy in the raising of the artistic level of output. A survey of these efforts taken as a whole presents the impression of tendencies and currents as yet lacking in uniformity. Thus many workshops, especially in the North Bohemian district, are still dominated by memories of the period of the national, political and economic supremacy of the Germans, still cling to the traditions of the German Werkbund, this having been the prevailing mode up to the War. The surroundings of Kamenický Šenov and Bor in particular were for long, and in places still are, in subjection to this tradition, which is in other respects significant of the glass industry. The North Bohemian glass industry is, to the extent of 90 per cent, a cottage industry which desperately opposes every attempt at industrialization or centralization of organization, and it is only now that, by virtue of the influence of the schools, among which the Czech School at Železný Brod takes leading rank, it has begun to give definite direction to its plastic views and to work for a personal form of expression such as was always the mark of the old Bohemian glass-



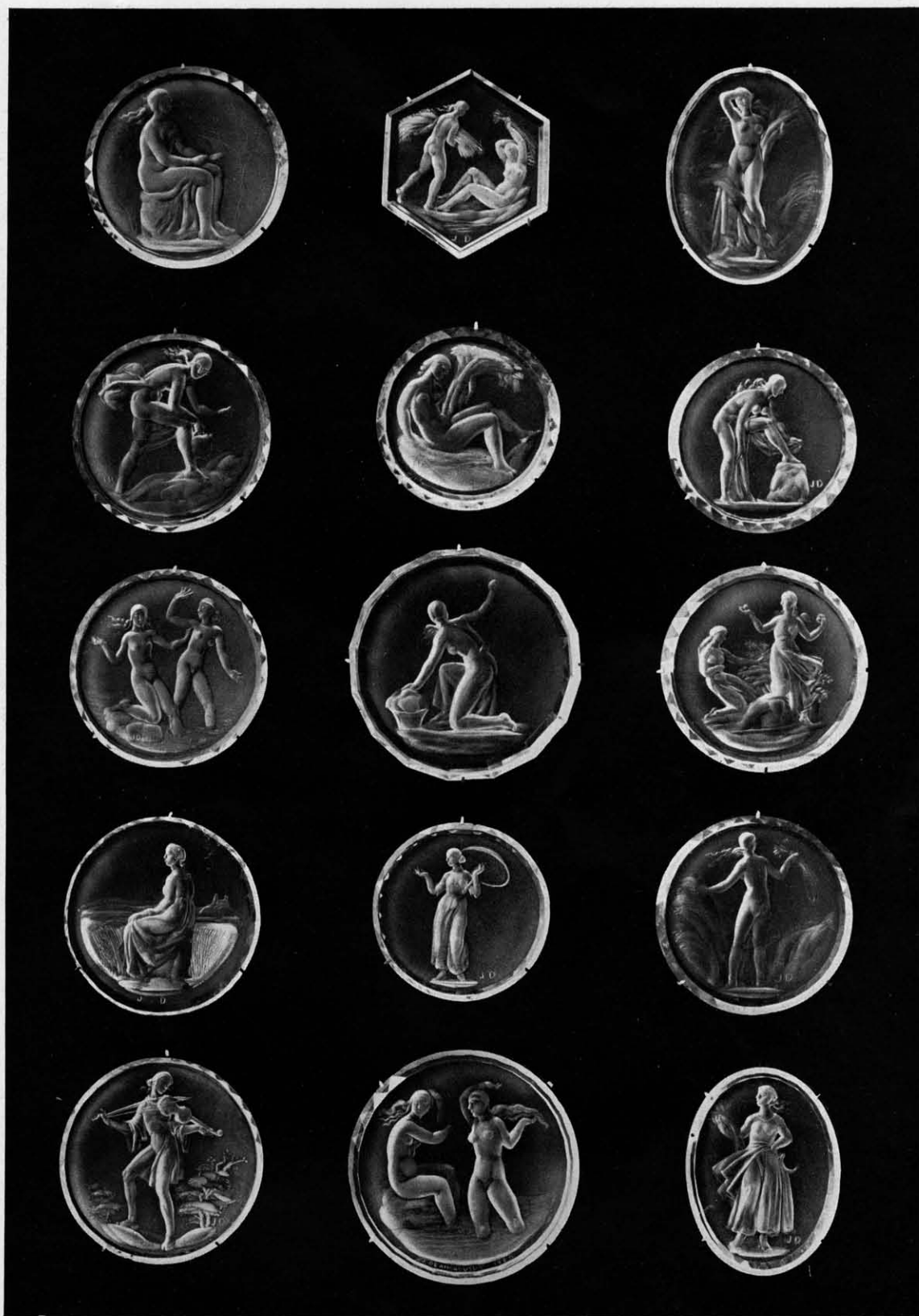
Drahoňovský: Vase

making craft. The firms of K. H. Eiselt of Kamenický Šenov, Karel Falda of Bor, A. Rückl of Skalice, R. Palme of Bor, K. Hoch of Bor, Pallme-König of Kamenický Šenov, and particularly Josef Riedl of Dolní Polubné are striking out new lines for the Bohemian glass industry in the output of engraved, etched, laminated and stained glass. A feature of the North Bohemian glassmaking areas round about Jablonec n. N. (Gablonz) and Železný Brod is a highly developed industry in imitation jewellery, imitation precious stones and glass beads. Ninety per cent of the output of this area is exported — to France (Paris), to America, to India (bangles), to Australia, etc. All the variations and oscillations of the world's markets are felt here the more keenly since the craft, as a cottage industry, is financially weak. The districts round Králové Dvůr, Miletín and Hořice in North Bohemia, and round Znojmo in South Moravia are the site of a cottage industry producing hollow glass beads.

The glassmaking area in the Bohemian Forest (West Bohemia) is growing up a new to significance. The War dealt hardly with the famous old glassworks of William Králík of Meyerswald (Vimperk, Lenora, Kaltenbach, Idathal, Franzensthal, Lučina and Ernstbrunn). Their skilful organizer died, and the majority of the skilled workers either perished in the War or subsequently emigrated. The Králík works were divided up, and after the year 1918 lack of coal and the loss of old customers menaced their existence. The old works were, however, placed on a new basis by the amalgamation of the Vimperk concern with the firm of L. Moser of Carlsbad. The management of the factories got into touch with plastic artists and accommodated the forms of their output with understanding and taste to the demands of the day. The Vimperk works now turn out as a speciality heavy, massive crystal, topas, uranium, amethyst and other glasses of great technical perfection and in beautiful tectonic forms richly cut in broad facets. Engraving, etching and gilt decoration is as a rule applied with decent reserve and tends rather to emphasize than to hide

the beauty of the material. The works of Jan Lötze's Widow (Max Spaun) at Klášterský Mlýn near Rejštejn follow their old tradition of coloured glass. Recently these works have undertaken with pronounced success the cutting of laminated combinations of transparent coloured glass (for example, blue on yellow), and have attained some striking effects. The works of F. Novotný (J. Ed. Schmid) at Anninov near Sušice are engaged on an improvement of cutting which very effectively intensifies the effects of glittering crystal material. The glassworks at Lenora remain in the hands of the heirs of William Králík. In addition to laminated and crystal glass, these works have of recent years commenced to model decorative objects from the glowing glass masses, particularly flowers which give the illusion of most natural forms. Within the sphere of industrial art fall also several species of mirror output by the big concerns manufacturing mirror glass at Holýšov and at Staříkov near Plzeň. Here it is a matter of beautifully pure and well worked material. It is characteristic of Bohemian glassmaking that even concerns devoted practically exclusively to utility output (bottles, glass as building material, etc.) turn out a certain percentage of refined, luxury glass. This is observable in the case of the big concern of Invald (Prague-Smíchov, and Poděbrady) and others.

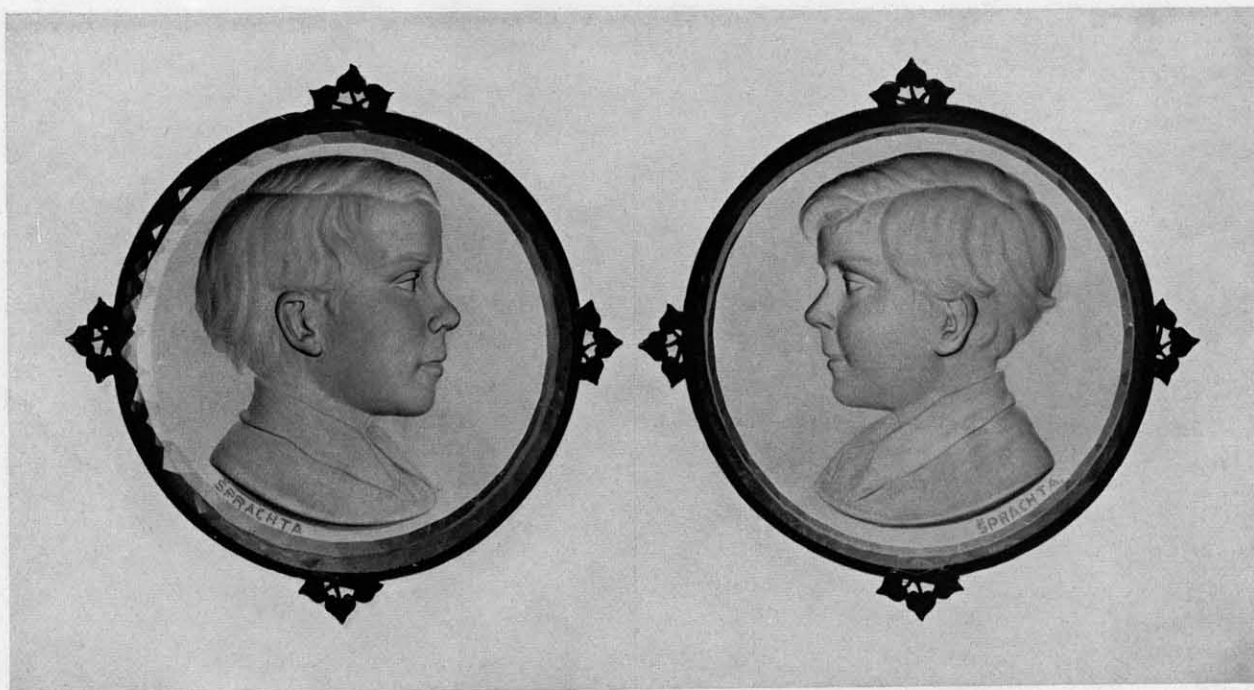
Bohemian glassmaking always has been, is now, and will be in the future, the outcome of a balance between the needs of practical life subjected to economic laws on the one hand, and a super-abundance of intuitive sentiment which permeates the collective spirit of the Czech nation. Some one has called glass "the poor man's silver" — the Czech nation has taken up this poor man's silver, and determined to make of it a material fit for the throne of kings, for it has breathed into it a spark of divine enthusiasm. The Czechs have always been lovers of glass, and their affection for it will assuredly raise this branch of plastic endeavour to, the level and to the name which it enjoyed in the days of its greatest glory.



Gems of professor Drahoňovský



The Glass Institute at Hradec Králové (Architect: J. Reichl). Façade of opaque glass



Cut Crystals by E. Šprachta, Prague: Portraits of the grandsons of President Masaryk, Herbert and Leonard Revilliod

THE CZECHOSLOVAK GLASS INDUSTRY

By Dr. Ing. V. Čtyrský

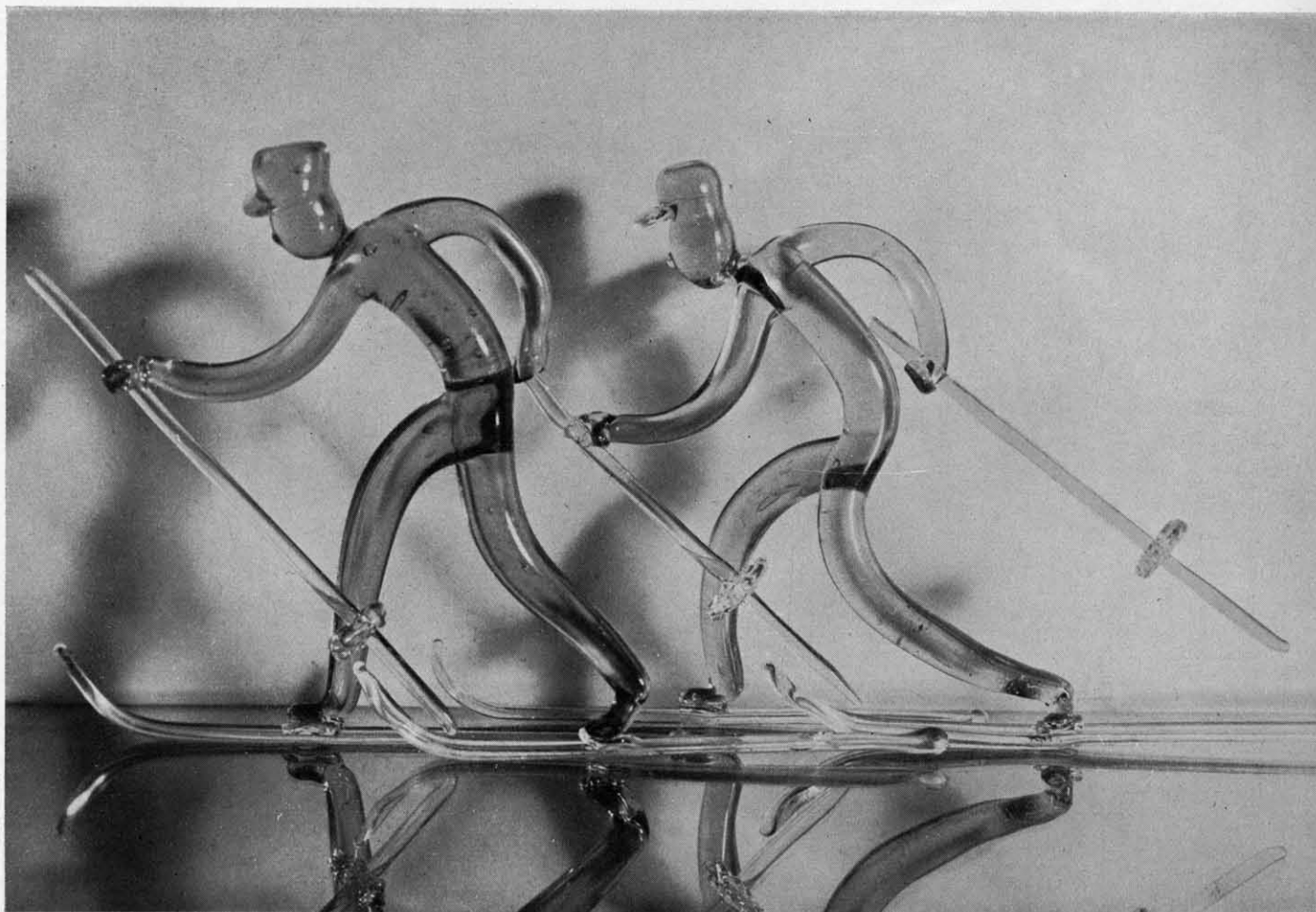
Director of the Glass Institute, Hradec Králové

One of the outstanding branches of industry in Czechoslovakia is that of glassmaking. The entire development of the Czech (Bohemian) glass industry from its earliest beginnings had a particular character of its own, and this character has, in the majority of the departments of glassmaking, been maintained up to the present day. From the time when the first primitive glass works were founded in the idyllic wooded regions of the Šumava (Bohemian Forest) and the Krkonoše (The Giant Mountains) up to the penetration of the modern principles of rationalization into the traditional and patriarchal system of glass production, originality of conception as well as originality of execution have been the significant features of the work of the Czech glassmaker. On the one hand is the primitive workmanship of the cottage worker based on experience handed down from father to son through generation after generation, and on the other hand

the domination of the world's markets by output which bears witness of the highest level of contemporary technique—as for example the plate glass produced by Fourcault machines, and the automatic production of bottles by means of the Owens machine.

Glassmaking in Bohemia can look back upon a long history, and each century has enriched the output by some characteristic item—be it typical Bohemian crystal glass, engraved, coloured, flashed or etched glass, or again the unmatched variety of the *bijouterie* turned out in the Jablonec (Gablonz) district—and these circumstances have secured for this production under the name of “Bohemian Glass” a permanent and world-wide reputation.

The unique history of Czechoslovak glassmaking—a history such as very few industries can boast of—has been largely exhausted by the preceding treatise by Dr. J. Čadík, and I shall therefore con-



Glass Figures, from designs by Prof. Brichta. Executed at the State Glassmaking School, Železný Brod

fine myself to a brief sketch of Czechoslovakia's glass output, its manifold variety and its economic significance.

The first centres of glassmaking in Czechoslovakia (or Bohemia as it then was) arose in those regions where extensive forests existed, for there was no other fuel than wood, and it was besides possible exactly in those regions to make use of the energy of the mountain streams as motive power. On this account, then, the oldest Czech glass works were to be found in the depths of the forests of the Šumava and the Krkonoše Mountains, in the districts round Bor (Haida), Kamenice—Šenov and Jablonec—Tanvald. In the middle of Bohemia mention should be made of the Kavalier works at Ostředa and the glassworks of the Rückl family.

A notable feature in the development of Bohemian glassmaking is the existence of an early independent *export trade in Bohemian glass*, due to the

energies of a number of enterprising individuals. The exports went not merely to countries in the immediate neighbourhood, but also to destinations at that time very distant. At first handcarts, and subsequently carrier's carts drawn by two to six horses were the means of transport for conveying Bohemian glass to Germany, Poland, Russia, Holland, Italy, and even to Portugal and Spain. Some traders crossed over to London, and others found their way to Riga, Constantinople, and other more distant places. To the then port of Cadiz Bohemian glass was exported in the year 1691. At a later date there arose trading companies in all the more considerable towns abroad, and glass was one of the commodities in which they dealt. Already at this early date Bohemian glass had to contend with keen competition in the world's markets, from the English and French in particular, and it was necessary to display not only business capacity but

also workmanship and invention in production. At that time Bohemia became distinguished not only for her *crystal* glass but also for coloured, flashed, painted and etched glasses.

It was mainly Bor near Česká Lípa and Kamenický Šenov that became the centres for the refining of raw glass in the fashions above mentioned. Later centres for the production of sheet glass arose in North-West Bohemia near the coalfields round Duchcov and Teplice-Šanov, as well as in the vicinity of Plzeň. At Jablonec n. N. (Gablonz a. N.) is concentrated the manufacture of imitation jewellery and *bijouterie*, and the town has given its name to the *Jablonec (Gablonz)* industry, although it was at the Czech town of Turnov that the manufacture and trade in these articles originated. Passing trade vicissitudes brought about numerous local changes, but the main seats of the industry have remained unchanged, and a glassmaking population, brought up for generations in the craft, has taken permanent root in these regions. An outstanding era for the glass industry opened in the year 1918. Czechoslovakia which secured its independence in that year took over more than 80 per cent of the glass industry of the former Austro-Hungarian Empire. It became necessary to give new directives to production as well as, and this in particular, to the export trade in glass.

At the present moment there are 140 glassworks in Czechoslovakia giving employment to some 150,000 workers. Workshops number about 125, employing approximately 30,000 skilled hands. A further 120,000 skilled workers include cutters, polishers, painters, engravers, and cottage workers, especially in the Bor and Kamenický Šenov districts. Works turning out plate (window) glass in Czechoslovakia number 10 and possess mechanical plant. Mirror glass is turned out by 3 glassworks; bottle glass by 5 concerns using Owens machines, while glass for building and technical purposes is produced by 3 glassworks.

Innumerable are the species of glass products turned out by the Czechoslovak

glassworks — from the bizarre forms of Jablonec *bijouterie* up to the 50 sq. metre sheets of mirror glass.

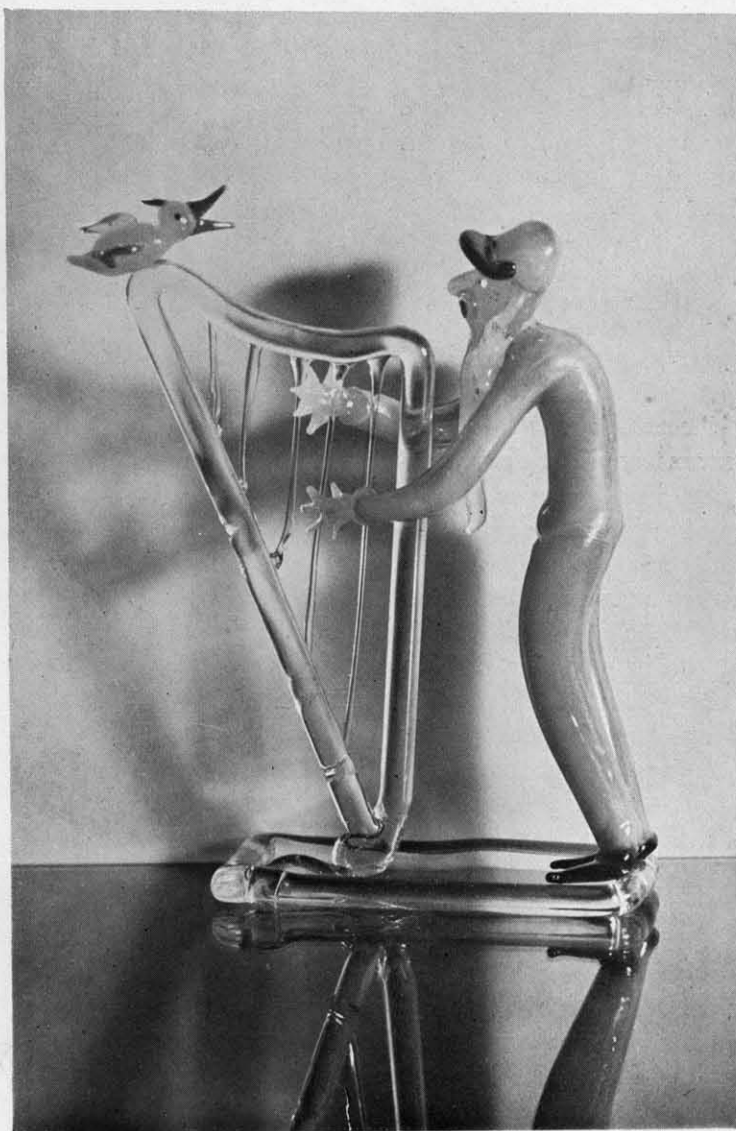
The Czechoslovak glass output is classified, according to its production and trade aspects into:

Hollow Glass: raw, refined (ornamented by cutting, engraving, painting and etching), pressed, illumination and chemical glass;

Sheet Glass: plate, mirror, building and cast glass.

Jablonec Industry: *bijouterie*, moulded and twisted glass, bangles (cut, pressed, ornamented), and imitation jewellery and fancy goods.

The basic material of all the output just described



Glass Figures, from designs by Prof. Brichta. Executed at the State Glassmaking School, Železný Brod. — Harpist



Tray of Olive-green glass. Design by A. Metelák, Železný Brod

is the *raw glass* smelted in glass furnaces. The main raw materials for the manufacture of raw glass are: pure, iron-free, gravel sand, carbonate of soda, sulphate of soda, carbonate of potash, carbonate of lime, minium and oxyde colourings. Of these elements and colouring and declorizing oxydes is made the sandy mixture known as frit which is placed in pans for smelting in the glass furnaces. During the smelting process this mixture undergoes a number of chemical and mechanical changes from a sandy substance to a viscous mass and finally to a glass liquid as clear as water. For the smelting of glass a period of 10 to 12 hours and a temperature of 1000 to 1400 degrees Centigrade is necessary.

The working up of raw glass differs according to the object for which the glass is designed, taking place by hand, or by mechanical means, or by a combination of both methods. In the production of hollow glass the ancient system of blowing glass by means of a glass-pipe into wooden or metal moulds has been largely maintained up to now.

Bottles are now made exclusively by mechanical means, the automatic Owens machine which turns

out 30,000 bottles a day being employed for this purpose. The production of sheet glass by hand has also entirely fallen into disuse in Czechoslovakia, and such glass is now drawn exclusively by Fourcault machines. Mechanical means of production as a natural result of rationalization are now dominating one branch after another in the glass industry. Thus, to-day, 150,000 electric bulbs can be turned out by mechanical means in a day, 50 metres of glass tube or glass rod in a single minute, and so on.

Raw glass worked up in all these different methods is placed in the so-called cooling or annealing ovens so as to rid it of internal tension which would otherwise cause a spontaneous cracking of the glass.

It is impossible in this short survey to touch upon all the technical processes of production, their interdependence, their history and interesting features, which exactly in their details represent the characteristic features of Bohemian glass.

Plate (window) glass is to-day manufactured in Czechoslovakia exclusively by mechanical means on the Fourcault system. One Fourcault machine can turn out daily 7000 square metres of sheet glass.

The annual output of this category in Czechoslovakia is approximately 15,000,000 square metres.

Mirror Glass is made by casting. The molten mass in large pans is poured on to casting tables. Thus are made sheets of 40 to 50 square metres which, after being cooled, are mechanically cut and polished. Mirror glass is put on the market either colourless or coloured black, white, marble, etc. The annual output is some 950,000 square metres.

Cast Glass of the non-hollow category is made from raw glass by casting in steel rolling machines where it is given the desired forms. In this manner are turned out the following kinds: ecclesiastical and ornamental glass, wire glass, signal glass, glass tiles, roof-tiling, opaline glass for walls, such as is used in modern architecture for interiors and for making glass façades in manifold colours (See the architecture of the Glass Institute at Hradec Králové).

In Czechoslovakia *special kinds* of glass are also manufactured, such as, for instance, the safety glass "Triplex". As the name indicates it consists of

three layers joined together, the result of which is that though the glass may break on being subjected to a blow not a single fragment of it separates from the rest, so that injuries from splinters are impossible. Statistics show that 90 per cent of the injuries caused by motor-car accidents are due to glass splinters. "Triplex" safety glass by virtue of the fact that it cannot be splintered gives the maximum of security, and therefore various objects made of it, such as glass for motor-car wind-screens, goggles, etc., are finding, with the development of motor traffic, a steadily increasing market. Czechoslovak glassworks also turn out a "Bitriplex" glass which can stand the shock of bullets, and is used for the glass fittings of aeroplanes, tanks and exposed places on ships.

Hollow Glass is turned out by the so-called raw-glass works, and consists of natural colour, semi-white, white and coloured varieties.

Bottle Glass (beer, wine, liquer, mineral water glasses, etc.) are manufactured almost exclusively by means of Owens machines. The Czechoslovak



Service designed by M. Metelák, and turned out by the Harrach Glassworks "Nový Svět"



Glass Figures, from designs by Prof. Brichta. Executed at the State Glassmaking School, Železný Brod. — Diana

bottlemaking branch produces some 120,000,000 bottles per annum.

An important department of the hollow glass branch is the manufacture of *illumination glass*. The Czechoslovak output of illumination glass has, by virtue of its high quality, gained a leading place in the world's markets. At the present time these articles are turned out in Czechoslovakia in the most varied forms and colourings as the outcome of much scientific study, and a 90 per cent penetrability to light has been attained. The output of the Invald and Rückl works rank very high in this department.

Laboratory Glass differs from ordinary glass by reason of its chemical composition which enables it to withstand the action of alkalis and acids. In addition to this, its high content of silicate oxide makes laboratory glass hard and difficult to melt. *Czech* laboratory glass has long been turned out by the Czechoslovak glassworks — in particular by the Kavalier Works at Sázava from the year 1837

— and it was here that Abée himself who later founded the world-famed glassworks of Jena gained his early experience in glassmaking. The glass turned out by the Kavalier concern is of a quality that easily enables it to compete with all other makes of international reputation. These works also turn out special kinds of glass possessing great powers of resistance to changes of temperature — among them the “Silex” and “Palex” makes.

The effort to cheapen glass output led to the manufacture of *pressed glass* in imitation of quality cut glass.

Pressed glass is turned out by machinery, and it is used mainly for making objects of common use such as plates, dishes, ash-trays, tumblers, vases, etc. Pressed or moulded glass is easily distinguishable from cut glass. Whereas cut glass has a deeper incision and sharp edges, pressed glass is generally duller and the edges are comparatively smooth.

Glass output leaves the furnaces either as a finished article ready at once for the market, or as

half-finished product to be passed on for further treatment, that is, refining. Czechoslovak hollow glass is for the most part refined. The glass which is turned out finished from the furnace is known as furnace glass, and the Italian glass of this kind produced on the island of Murano is especially famous. There the glassmakers are skilled in blowing forms which are reminiscent of the unique and beautiful forms of antiquity. The Czechoslovak glass of this character, however, competes on very honourable terms with the Venetian output.

The production of first-class output depends upon skilful workmanship, and for the acquisition of this skill long years of practice and experience are essential. The cult of modern housing calls more and more for simple furnace glass, whether utilitarian or decorative. The form and colouring of the raw glass metal are the main conditions for the popularity of this species. Not so long ago Sweden introduced with success the manufacture of furnace glass coloured mainly grey and violet with engraved ornamentation. In the biggest Swedish glassworks at Orrefours where objects are turned out entailing the greatest technical difficulties of production, Czechoslovak glassworkers, engravers and painters are employed. A great deal of the credit for the development of glassmaking in Sweden is due not only to the very gifted Swedish artists and craftsmen cooperating with the technical experts in the industry, but also to the skilled Czechoslovak glassworkers who have instructed the rising generation of Swedish craftsmen.

The other kinds of hollow glass are decorated by means of cutting, engraving, etching or painting. The glass is coloured either throughout the whole mass, or merely on the surface, or in the interior. For colouring the raw glass metal oxides are mostly employed (gold, copper, iron, cobalt, etc.) while for special types of glass rare earths are used. Attention has been deservedly attracted by the new Czech glass coloured violet and red by oxyde of neodym and sold under the designation of Alexandrit, Royalit, and other names.

The centre of glass refining in Czechoslovakia is Bor (Haida) near Česká Lípa and Kamenický Šenov and surroundings. The raw glass, in the most varied forms and colours, is provided by the local glassworks of which there are 18 turning out this material. An important element of the organism of output here is the *cottage worker* who works up

and improves the glass in the manners mentioned above in his simple cottage home, and passes on his output to a middleman, known as a factor. The factor hands the output over to the export firms at Bor, and from there the ornamented Bohemian glass finds its way into the whole world. In these regions, just as in the Jablonec (Gablonz) district families have been working thus in their cottages for generations — hence the skilled technical craftsmanship and fertility of invention.

The main output of the Bor district is *Cut Glass*. The raw glass turned out by the furnaces is ground on stone or metal wheels or disks revolving vertically or horizontally, on which a steady flow of water or sand is maintained. The ground object is rough, and so it is necessary for it to be given a polish. This is accomplished either on wood wheels, or by submerging the ground object in hydrofluoric acid. Deep cutting is done especially in the case of the thick lead crystal glass, the specific feature of which is its bright refraction. Glass coloured throughout the entire mass produces, when cut, a multi-coloured effect. The ornamentations on cut glass are of the most varied kinds, and are selected so as to meet the taste of the users in countries that can



Prof. A. Brichta. — *Nymph and Faun*

boast of a high level of civilization as well as the inhabitants of exotic regions. The sample collections of the Bor exporters thus provide an interesting spectacle of thousands of kinds of decoration from the most refined *motifs* down to the fantastic models destined for the Far East, South America, Australia, etc.

Among the highest quality decorated glass is *engraved glass*.

The engraving of glass is done in various ways by means of revolving metal wheels which are kept moist by oil and emery powder. In Czechoslovakia glass engraving is mostly individual, and it is very honorably represented by the highly artistic work of Prof. Josef Drahoňovský and his school. Their productions are for the most part exclusive models, and not mass output as is the case with the engraved glass objects turned out in Sweden. The Swedish glassworks, however, employ several of the most talented Czechoslovak engravers. In artistic engraving of glass the work of Emil Šprachta, one of Prof. Drahoňovský's pupils, is of outstanding character. Czechoslovakia's engraved glass output and its high artistic level have met with universal recognition, and these objects frequently serve as official gifts for persons of distinction and as valuable exhibits in numerous foreign museums.

Another class of decorated glass is the *painted* category. The painting of glass is accomplished either "cold" or the painted glass is burnt in the furnaces. In the first case aniline colours and varnishes are used for painting the glass. This species of decoration is not so durable as in the case of burnt glass, and is therefore employed only for the cheaper kinds of output. Painted glass is particularly popular in South America whither the bulk of the output of the Bor district is exported. Recently the Bor glass painters have abandoned the ancient furnaces heated by direct flames in favour of an up-to-date electrical process.

For etching and frosting glass a solution of hydrofluoric acid is employed. The object to be ornamented is protected by a surfacing of asphalt and is then lowered into an etching bath, where the hydrofluoric acid acts on the bare parts. The surface covered with the asphalt layer remains unaffected, and thus the required ornamentation is secured. Of outstanding reputation is the etched and frosted glass produced by Lalique and Galle in France, but Czechoslovak glass of this category has of late

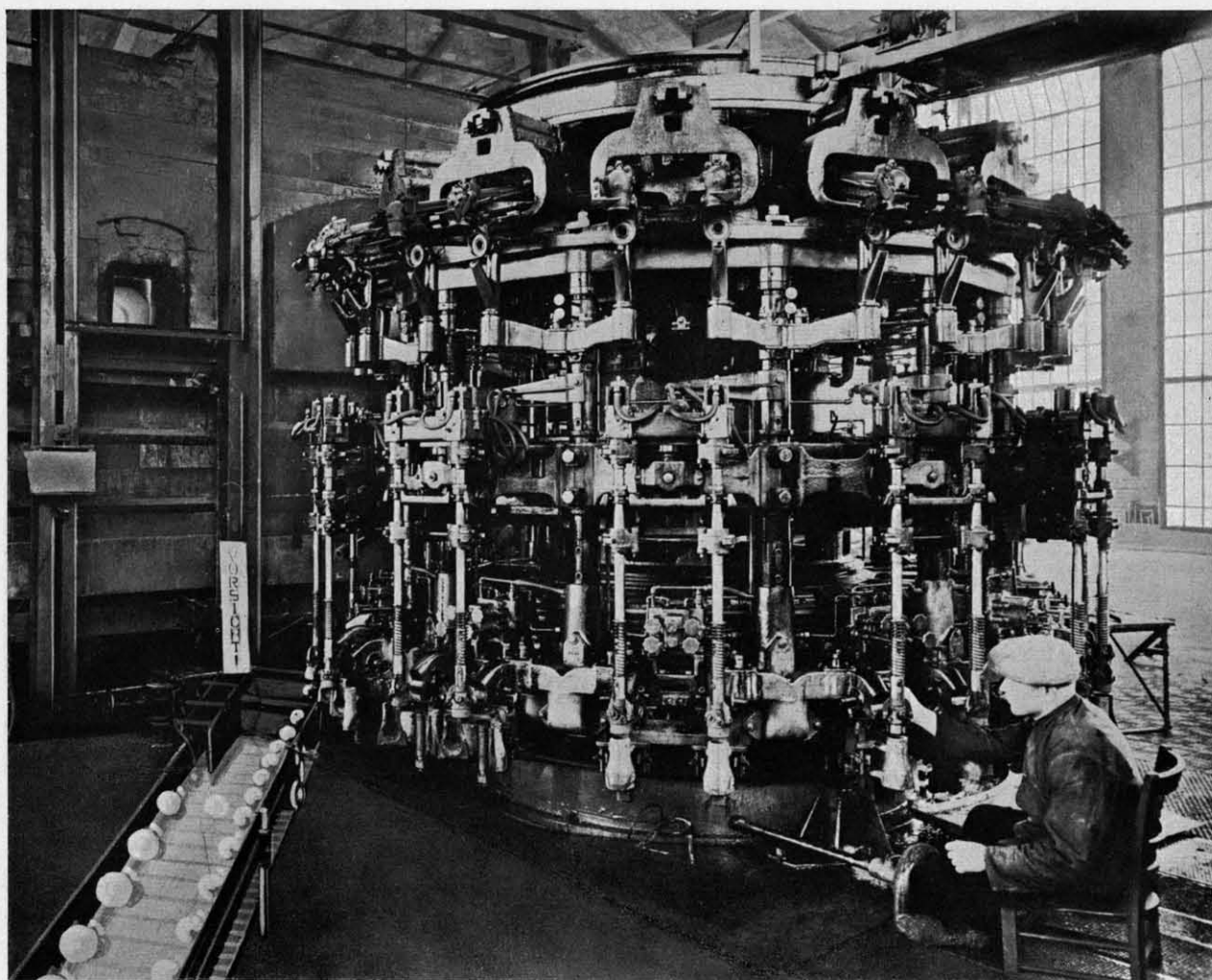
been able to compete successfully with the French models.

The frosting of glass is also carried out by means of sand. Compressed air drives a current of fine-grained sand on to the glass object, the smooth surface of which is mechanically frosted. Among the methods of etching glass is also that known as "guiloche" mostly used for glass services. The object to be ornamented is covered with a layer of wax or paraffin. The glass thus covered is attached to a revolving wheel, and by means of an apparatus — guiloche needles — the ornamental pattern is etched into the covered surface. Then the object is placed in hydrofluoric acid which acts on the sketched out pattern, etching it into the glass.

The methods of production and ornamentation of glass here roughly outlined are also combined one with another, and thanks to the unique manual skill of the craftsmen, the result of long practice, the decorated glass produced in Czechoslovakia is highly characteristic and individual.

There is one component of the Czechoslovak glass industry which is without a real rival anywhere in the world, and that is the *Jablonec (Gablonz) industry*.

The methods and organization of production and of trade in the Jablonec branch are totally different from those prevailing in the other branches of the glass industry. The aim of the Jablonec industry is to provide a substitute for precious and semi-precious stones in the form of a cheaper material of somewhat analogous properties, namely, glass. In the pursuit of this aim there has arisen a great industry with countless ramifications, the output of which is dictated largely by the fashions of the day and the customs of the European and numerous exotic peoples overseas. The beginnings of this original and important industry are to be sought at Turnov, where, according to the records, the Brothers Fischer, on the basis of experience gained in Venice, melted in 1711 the first glass — a lead composition — which possessed properties, especially a strong refraction, which made it suitable for the imitation of precious stones. Excavations in the course of building operations at Turnov, have brought to light various moulds, implements, cut glass objects etc., and historical records confirm the fact that lead glass such as is still used for the manufacture of imitation stones was made at Turnov up to the year 1864. Later the centre of trade and manufacture



Automatic Production of Glass Jugs

was transferred to the neighbouring Jablonec n. N., which, from an insignificant village, has, in the course of less than half a century, become a big, wealthy and world-famous town. Jablonec has given its name to one entire branch of output — that of the so-called *Jablonec bijouterie* or imitation jewellery. In Jablonec itself the trade is concentrated in some 600 export houses. The manufacture is carried on mainly in the surrounding villages by some 3000 firms employing roughly 30,000 cottage workers. The Jablonec industry may be regarded as all most exclusively an export industry. The mutual relations of exporter, factor, manufacturer and the cottage worker give the whole industry a special character of its own. The commercial ability of the exporter, his world-wide outlook, a widespread network of foreign purchasers in all parts of the world, the enterprise of the Jablonec manufacturer, and

the inborn character and inventive capacity of the cottage glass worker, have made of the Jablonec industry a thing quite unique and one which is difficult to imitate. For lack of the essential commercial, manufacturing and personal elements, the numerous attempts made to establish a similar industry abroad have always come to grief, and the *bijouterie* of Jablonec taken as a whole has nowhere as yet met a worthy competitor.

The raw glass for the Jablonec industry is made in 18 raw-glass works with 40 furnaces, whose 400 pans turn out daily an average of some 120,000 kilograms of glass in the form of bars and rods of the most varied colours. These bars and rods are employed as raw material by the cottage workers. There are, further, 32 glassworks which turn out the so-called composition glass (containing a high percentage of lead) for the Jablonec industry, and



Glass Set designed by Miss L. Smrčková of the Rückl Glassworks, Nová Huť, near Nižbor

their output is about 1400 tons per annum. The furnace in which composition glass is made is very much smaller than that for ordinary glass, and is as a rule heated by direct flame. The maximum temperature in the smelting of the glass metal is about 1000 degrees Centigrade. The glass mass smelted in small pans containing 25 to 30 kilograms) after cooling and the breaking of the pan, is broken up into pieces, heated up again in a special furnace and drawn in thin rods as raw material for the cottage workers.

Few industries are subject to such continual changes as the Jablonec industry. Every day, new and ever new ideas and designs are produced. An individual capacity for *creative* effort is the typical mark of the workers in this district and is the guarantee of prosperity for the Jablonec industry for long years to come. It is impossible to name in this brief survey even a thousandth part of the entire output, much less the variations which the cottage workers in their simple homes in the mountain regions devise, and which, through the medium of competent exporters, find their way into the most distant parts of the world.

We will, however, just mention at least some of the more important groups of output.

One of the characteristic branches of Jablonec production is that of bangles for India. These bangles are made of glass in every conceivable colour, and serve as talismans, religious and ceremonial objects for the populace of India and the Orient. According to Hindoo custom and belief the Jablonec bangle protects women from widowhood; it is broken to pieces on festal occasions, at marriages and at funerals; it is a necessity and a ritual requisite for the people there. The raw material for bangles is supplied by the glassworks in the form of wide hollow tubes of the most varied colours — garnet, amber, ruby, laminated glass, etc. With the aid of a diamond cutter the cylinder is sliced into numerous narrow rings which are then refined and cut in the cottage workshops, painted and gilded. The Jablonec sample collections contain thousands of patterns of Indian bangles ornamented in countless different ways. In addition to the quality bangle above described there is produced a pressed or moulded bangle, known as "smirgel" which is made from a cylinder moulded in the form of a succes-

sion of rings. These rings are chipped off, burnt in a furnace and exported without any further refining. This inferior quality bangle which at one time threatened the promising export of the better finished article resulted in the establishment of a native manufacture of pressed bangles in India itself. In addition to the kinds above described there is also made in the Železný Brod and Jablonec districts a so-called twisted or "lamp" bangle. Rods of glass of various colours are intertwined and fused together over a special lamp. This process is, however, now accomplished mechanically.

The output of twisted bangles and their sale on the Indian market is now dominated by the Japanese who, in the sphere of Jablonec production, are carrying on a systematic industrial espionage. In addition to the output of these bangles there has been introduced to Japan the manufacture of beads (with fish-scale colouring) and hollow beads, and from Japan these beads have been dumped into the world's markets, so that the Czechoslovak output is not in a position to put up the essential competition, Japan having the advantage of geographical proximity to India, of an abundance of cheap labour,

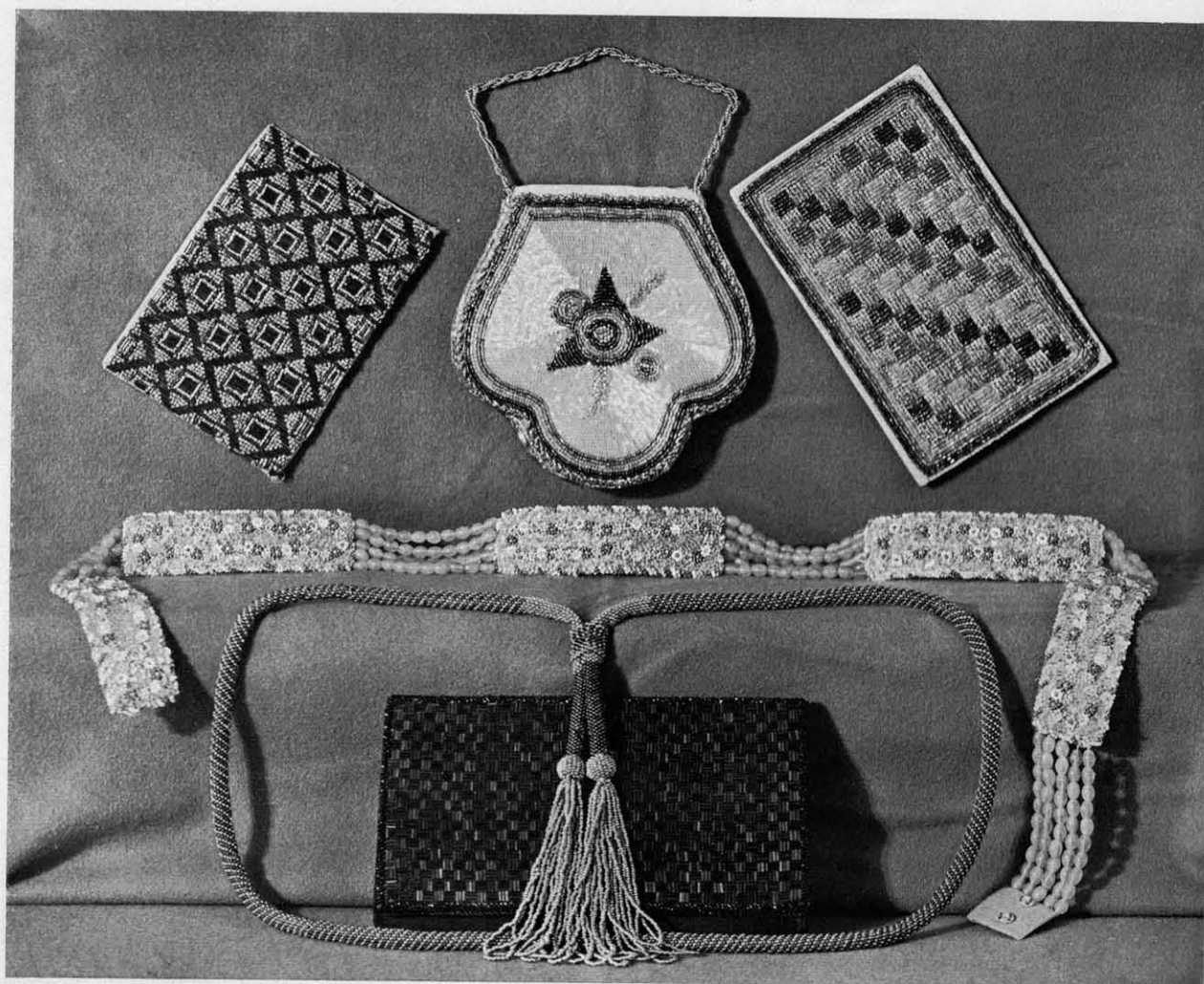
and in particular of generous support from the Government for the new branch of industry.

An attempt at making bangles has likewise been made by the natives of India. At Firozabad, glassworks have been started to produce raw material for bangles. Despite the low wages paid — a workman getting from 2 to 4 annas for turning out 12 dozen pairs of bangles — and the fact that the worker must work up to 17 hours per day in wholly unhygienic surroundings in order to earn the barest necessities of life, the bangles turned out fall far short of the quality of those made in Czechoslovakia. Moreover, owing to the lack of suitable means of packing the glass bangles are transported openly in waggons with the result that breakages are a big item. The output of the Firozabad works could so far be maintained solely on account of the tendency on the part of the broad masses of the consumers to boycott all English goods — a treatment extended more or less to all goods of European origin.

When trade is normal, 170 cutting shops and some 5500 cottage workers in Czechoslovakia are engaged in turning out bangles. The export trade



A. Metelák, Železný Brod: Brown Factory Glass. Made at Mosers Glassworks, Carlsbad



Bead Ornamentation, made at the Glass Institute's course at Žásada

is in the hands of the Jablonec and Indian (Bombay and Calcutta) exporters. The average annual export amounts to 70,000 cases. A case contains 200 dozen pairs, and the average value is Kč 600, so that the total value of the bangles exported annually from Czechoslovakia is approximately 40 million crowns.

Another characteristic production of the Jablonec branch is that of *twisted* and *pressed glass*. The basic raw material for the latter is composition glass in rods which the cottage worker buys according to the colour which happens to be in fashion, and which he works up aided by all the members of the family. A work table with petroleum or gas lamp together with a pair of bellows for driving air into the flame is the main instrument of this work. In the flame the point of the rod is converted into

the most varied shapes and the objects turned out include beads for necklaces, buttons, pendants, hat ornaments, etc. In the hands of the skilled cottage worker the output has often a really high artistic value.

Other cottage workers work up the glass rods over a table lamp by *twisting*. The composition glass is wound on a wire rubbed with raddle, and with the aid of metal moulds give the glass the most varied shapes. The finished output is then handed over to the factors or to the exporters direct.

To the preceding category belongs the manufacture of the paste stones known as "chatons". From transparent lead glass the cottage worker makes by means of press moulds what are called "points", and these are then cut automatically, polished, given a foil and set in metal. The finished

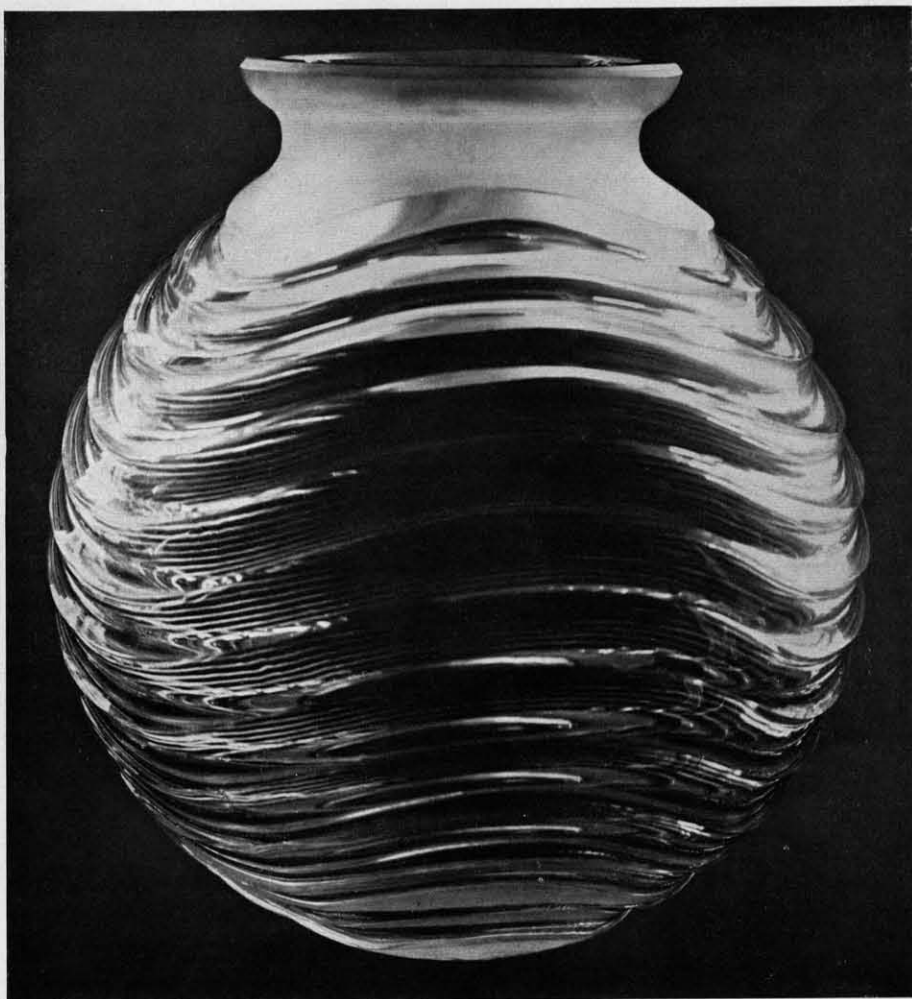
article, in so far as the brilliance of the refracted rays of light is concerned is an excellent imitation of the most beautiful diamond, and serves as trimming for ladies' dresses, for the making of brooches, necklaces, rings, buckles, diadems and tiaras, etc.

Many cottage workers get their living by turning out beads known as "Maco". Hollow rods of various colours are cut into tiny beads by machinery. In the same way are made beads which are afterwards cut, painted, polished, etc. These tiny beads are threaded on strings in which form they come into the market and thence passed on to be worked up in various ways. The manufacture and application of small beads is a feature of the township of Zásada, where bead bags, bead belts and other articles of ornament and trimming are made.

Beads, hollow and filled, form an important branch of output in the Jablonec industry. The

glass worker draws tubes in the lamp to thin rods and forms "tears" that is, beads, which are then silvered by means of fishscale lustre (this is secured in the Baltic lakes from the scales of fish in the form of isinglass which, after refining, is used for bead-filling). The Czechoslovak product, however, is being thrust from the world's markets by the better quality French beads and the cheaper Japanese production. Hollow beads are made by blowing from rods into moulds of 8 to 10 beads each. The bead rods are coloured by dyes and silver solutions, are then cut and the beads strung. They are mostly exported to the exotic countries.

The various species of output of the Jablonec industry here described are frequently combined and give rise to an amazing variety of objects turned out according to the interests, needs or customs of the consumers. In this regard the sense of the Ja-



Crystal Glass Vase. Cut at the State School, Železný Brod, after design by A. Metelák

blonec manufacturer and exporter is highly developed and critical.

With the Jablonec output of glass ware there is intimately connected the production of imitation jewellery. Glass in the shape of imitation precious stones is set in a countless variety of metals, and in this form is largely exported. The progress of the Jablonec glass industry and with it the imitation jewellery trade has attracted a number of experts from Pfortzheim in Germany to settle there. There are now in Jablonec some 1200 makers of imitation jewellery.

Within the framework of the Jablonec glass industry must also be included the output of "crystallerie". These products are moulded from glass rods heated in the small furnaces of the cottage workers. A skilful moulder or "presser" can work up, in a single week some 400 kilograms of glass rod. The moulded objects are afterwards cut and polished in the cottages. In this way are turned out the pendants for the well-known Bohemian candelabras, prism glass, pyramids, bars, rods, stars, paper weights, inkpots, glass spoons, lenses, buttons, signal lenses, etc. In close connection with this output is the manufacture of the necessary metal moulds, iron or nickel.

The Jablonec glass industry is an important economic organism, for the annual export of Jablonec ware attains a value of approximately 250 million crowns.

The extent to which Bohemian glass is popular in the world's markets, and the position it occupies there is clear from the fact that the Czechoslovak glass industry exports more than 80 per cent of its entire output (in the case of the Jablonec *bijouterie* the proportion is as much as 90 per cent).

Czechoslovakia occupies one of the leading places in the world's export trade in glass. The following table shows the participation of the different countries in that trade:

Country:		1929	1930
Germany	I.—IX.	1,464,336,000	1,406,272,000
Czechoslovakia	I.—IX.	984,079,000	827,383,000
Belgium	I.—VIII.	926,009,000	642,000,000
France	I.—VIII.	453,000,000	414,000,000
U. S. A.	I.—VII.	472,000,000	341,000,000
Great Britain	I.—IX.	271,682,000	236,324,000
Japan	I.—VIII.	142,000,000	107,000,000

Germany thus occupies first place in the world's export of glass, followed by Czechoslovakia and then Belgium.

The exports of glass and glassware from Czechoslovakia in past years have been as follows:

Year:	Tons:	Value in Crowns:	Price per kg (crowns):
1920	140,007	1,898,025,000	13'—
1921	135,790	2,072,702,000	15'28
1922	121,662	2,046,413,000	16'82
1923	103,411	962,498,000	9'31
1924	160,930	1,238,778,000	7'70
1925	170,725	1,298,508,000	7'61
1926	169,025	1,168,994,000	6'92
1927	173,708	1,143,970,000	6'59
1928	206,311	1,268,774,000	6'15
1929	222,800	1,378,518,000	6'19
1930	191,701	1,154,134,000	6'02
Total	1,796,070	15,631,314,000	

The exports of glass and glassware in the years 1918 and 1919 were not ascertained by precise statistics. Estimating them, however, on the basis of comparison with the succeeding years, the value of the 1918—1919 exports may be placed at about 1000 million crowns, so that it may be assumed that the Czechoslovak glass industry during the past 11 years has exported wares to the total value of Kč 16,631,314,000.

From the above figures it is clear that the Czechoslovak glass industry is accommodating itself to the very keenly felt pressure in world prices, as shown by the enormous drop in glass prices if the value of 1 kilogram in 1921 (Kč 15) be compared with the value in 1930 (Kč 6'02). The disparity in the price of Czechoslovak export glass is very considerable according to the species and quality of the exported product. Thus, for example, a kilogram of white hollow glass sells for about Kč 4, while a kilogram of cut quality beads fetch anything from Kč 150 to Kč 300.

Czechoslovak industry is in a position not only to meet the demand for a high quality product, but also can produce its output at a reasonable price thanks to a system of rationalization carried out on a big scale, and this applies with special force to the glass industry.

The biggest export contingent of glass in any year to one country was that to America in 1927. Recently export to that country has fallen rapidly away, and the figure for 1928 was only half that of 1925. As regards the value of glass exports, Czechoslovakia's second best customer is England, while



Jablonec, Cottage Industry: Drawing Glass



Jablonec, Cottage Industry: Moulding Glass



(Haida) Bor, Cottage Industry: Glass Cutting



Cottage Industry: Glass Boring

Germany occupies third place. Czechoslovak glass exported to Germany does not, however, all remain there, but is re-exported from there as a German product.

The bulk of the raw materials consumed in the glass industry is of domestic origin, and the annual consumption totals about 1400 tons. One of the main materials is glass sand of which the industry requires over 120,000 tons per annum (a minor proportion is imported from Hohenbock in Germany).

The glass industry consumes annually 900,000 tons of coal (valued at 75 to 80 million crowns), chiefly of the brown variety, only about 10, per cent of the whole being pit coal. Limestone (known as marble flour) is consumed to the extent of some 60,000 tons, valued at 3 million crowns. Calcined soda (Na_2CO_3) is consumed to the amount of 30,000 tons per annum, valued at between 9 and 10 million crowns, the bulk of which is supplied by the Chemical Union at Ústí n. L. The industry uses 40,000 tons of potash (K_2CO_3) valued at about 13 million crowns. In addition to these basic raw materials the glass industry consumes a big quantity of secondary and auxiliary materials, such as 40,000 tons of polishing sand, 30,000 tons of timber, 20,000 tons of glass sherds, 60,000 tons of straw, paper, cork and wood wool, 5000 tons of fayence ware, 2000 tons of raw and burnt clay, 400 tons of minimum, 1200 tons of various chemicals (borax, arsenic, zinc white, acids, oxydes for colouring, etc.), 400 tons of chemicals for opal glass, 300 tons of red polishing clay, 600 tons of cutting and grinding material (iron, sandstone, carborundum), 50 tons of felt, etc.

The Czechoslovak glass industry expects in the future a rapid growth of foreign competition in the world's

markets, and is therefore carrying out a healthy system of mechanization and rationalization.

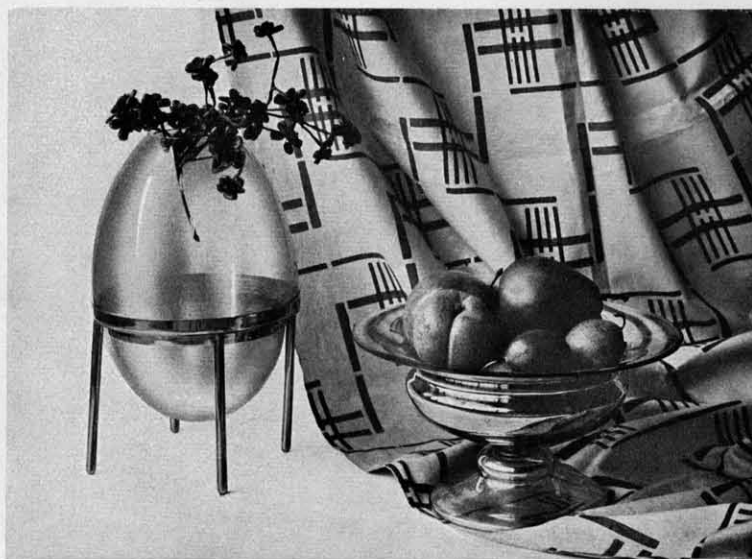
The industry is organized within the framework of the Federation of Glass Manufacturers at Prague, a body which deals with the organization and rationalization problems of the entire glass industry. Questions of research, testing and other technical matters relating to the industry are looked after by the Glass Institute at Hradec Králové, established by the Ministry of Commerce and supported by the glass industry. The aim of the institute is to further the development of the industry from the point of view of technique, industrial art and organization. The Institute follows the processes of production generally in the glass industry and seeks to discover new methods of work. Recently it has equipped a complete research department and a model glassworks for test purposes.

Technical questions relating to heating are dealt with by the Technical Advisory (Heating) Section of the Federation of Glass Manufacturers.

For the local needs of the glass industry in the Železný Brod district, an export and commercial institute has been set up at Železný Brod, and a similar one at Jablonec n. N.

Conscious of the high standard of its output, famous under the designation of "Bohemian glass", of the traditional skill of the home glassmakers working hand in hand with plastic artists, the Czechoslovak glass industry looks to the future with optimism.

These pre-requisites are a guarantee that the world-famous Bohemian glass will continue in undiminished measure to be an object of export for the benefit of the whole Czechoslovak State and its economic progress.



Prof. Hoffmann: Glass

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