

THE USE OF CAST IRON AS A CONSTRUCTIVE AND DECORATIVE ELEMENT IN
ARCHITECTURE UP UNTIL THE MIDDLE OF THE 19th CENTURY AS DEMONSTRATED
BY EXAMPLES FROM BADEN-WÜRTTEMBERG

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The importance of iron as a construction material in architecture was first recognised in England and France. Cast-iron rails (1), pillars (2), bridge constructions (3) are known from as early as the 18th century. There were churches in cast-iron construction - iron as a constructional material in representative interior rooms - in Liverpool in 1812 (4).

The history of iron architecture in Württemberg begins in the first half of the 19th century. It is closely connected with that of the Royal Foundry in Wasseraalfingen (5). The works - which passed into Württemberg control in 1802 from the possession of the Prince-Provosts of Ellwangen after the Peace of Lunéville - developed in the course of the next five decades from a small factory in which iron was produced and cast (stoves, stove tops, cast munition) to a works, the cast-iron products of which were equal in quality and design to any German and foreign products (6).

The king of Württemberg set this development, which also encompassed other foundries and smelting works, in motion, and controlled it by awarding contracts.

In this paper it is proposed to show with the help of two examples how cast iron found its way into Württemberg architecture as a constructive and decorative element.

Weil Castle near Esslingen (7)

Erected on a square ground plan (side length 67 feet = 20 m) as a two-storeyed plastered stone structure with a flat tented roof, Weil Castle was arranged in a fashion emphasising the balanced proportions of the classical layout by the employment of sandstone in the base area, the window surrounds, the corner masonry and in the pillared portico rising two storeys also. However, it is the elegant gallery - a cast-iron construction running round the whole of the building - which creates that impression of lightness and clear composition which also attracts the attention of the casual observer.

Nowadays, the gallery ends in the first storey in a surrounding balcony. Originally, the whole appearance was different: Iron - probably cast-iron - staffs extended the construction in the area of the upper storey and served as supports for a sun roof. We know the castle from contemporary accounts (8). Awnings and draped curtains accentuated the construction in such a way that "it is easier to associate it with the airy, luxurious tent of an Arabian prince" (9) than with a villa in the Palladian tradition. The cast-iron parts attain a different value - if one also bears the accounts mentioned above in mind. They are like a lattice-work surrounding the block-like structure.

The far-projecting roofing above the main doorway, a cast-iron construction with a metal or glass roof, as can be seen in contemporary paintings, is no longer extant today. This is also a change from the original arrangement (10).

In the interior - thanks to its exemplary restoration - the appearance is again back to the original. The superbly furnished rooms are grouped in two storeys around a central staircase with rooflight (11). New and revolutionary here - the castle was built in 1818/20 - is the cupola above the staircase, a glass and iron construction. The architect of

the castle, the Florentine Giovanni Salucci, was called to the Württemberg court by King William I in 1817 (12). Coming from Geneva, where he had planned and partially completed a town palace for the banker Jean Gabriel Eynard - there is also a staircase lit from a glass and iron cupola in that building in Geneva - Salucci began in Stuttgart with the designs for a castle. It was intended to build it in connection with the Royal Stud in Weil near Esslingen on the site of the old Dominican Convent. The contract was for a country house to be built in the Italian style. William had looked for an architect in Italy. After studying the plans for the Palais Eynard and on the recommendation of Jean Eynard, he had already spoken to Salucci in 1816 during a stay in Geneva and had invited him to Stuttgart (13). When Salucci presented the plans and a model for the country house at the end of December 1817, the king gave his enthusiastic approval. Construction was begun in Weil in spring 1818.

If one considers how exacting the monarch was with regard to the planning of the stud and the Villa Weil, then the speed with which this decision was reached is all the more astounding. Even while still crown prince in 1809, William had entrusted Friedrich Weinbrenner to deal with the project (14). And at the beginning of 1817, the English garden architect Sandys also drew up plans for the stud, castle and park at Weil (15). These were rejected in exactly the same fashion as Weinbrenner's earlier work. Little is known about how Salucci's plans came to fruition. It can only be guessed why he introduced iron as a new construction material in two instances - in the gallery and in the cupola. Two reasons should be mentioned here:

- 1) King William was - just like his court architect Salucci - well informed about the use of iron as construction material in English and French architecture.
- 2) From 1802 onwards the Wasseraalfingen Foundry - the most productive source of cast iron in the state - was in the possession of Württemberg. Notions of progress and profitability guided the monarch. It is thus hardly surprising that iron was employed for the first time to such an extent in Weil Castle - the first architectural contract awarded by the young king.

If the products of the foundry in Wasseraalfingen were restricted in the 18th and early 19th century to the production of pig-iron and casting stoves in particular (16), with the nomination of Wilhelm Faber du Fours as administrator of the foundry in 1811, a change took place. In the following 32 years, the works were modernised, the range of moulds was extended, the artistic design and the quality of the cast goods was raised to international standards.

When the Wasseraalfingen foundry was entrusted with the task of casting the individual parts for Weil in 1818/19 - the supports, the arches, the lattice-work, the railings, the cupola rings and ribs - this meant the beginning of iron architecture in Württemberg.

It was easy for Giovanni Salucci, an architect with experience as an engineer, to design the iron parts and constructions. The forms chosen by him are simple and have a functional effect. The individual cast-iron structural elements are joined together by groove and tongue connections or tenons and are held in place by countersunk bolts (17). That is to say, connections as also employed in wood construction. Wrought-iron bands and visible bolts were not used.

Weil Castle is at the beginning of the history of iron architecture in Württemberg. Cast-iron is here being introduced as a construction material. It takes the place of stone and especially of wood. The characteristics of the new material, greater load capacity and rigidity, had their effect on forms. Elegant constructions with a light appearance are now possible. The importance of the combination of glass and iron

is also recognised. Thus, in 1820 the starting position for the victorious progress of iron in architecture is also created in Württemberg.

The Wilhelma in Stuttgart-Bad Cannstatt

The fact that iron was not achieving the success as a construction material in Württemberg architecture in the first half of the 19th century that the king wished for can be seen from foundries' order books. After Weil Castle near Esslingen had been built, in which cast-iron had been employed in such an original fashion, recalling garden architecture, Wasseraufingen did, it is true, experience an increase in the amount of iron casting work it did; but it was stoves, stove plates, pipes, decorations and munition which were produced. It was not until the construction of the Wilhelma, for which iron was extensively used as construction material at the express behest of the king, that a significant re-orientation occurred, the causes and effects of which will be dealt with here.

The Wilhelma was built in the Rosensteinpark near Bad Cannstatt in 1839-1853 by Ludwig Zanth, at the command of King William I of Württemberg (18).

Zanth published a paper in 1855 entitled: "The Wilhelma. Moorish Villa of His Majesty, King William of Württemberg". In this he writes: "This villa, conceived like the country seat of a prince in Italy, consists of a residential building, greenhouses, colonnades, kiosks, a belvedere, a hall, a theatre and service buildings which are linked by gardens in which flower beds, pools, fountains and groups of trees, arranged regularly, alternate with one another" (19). The central layout encompasses the main building with the two main glasshouses, kiosks, pavilions and the hall building with roofed connecting paths. The structures are arranged on the slope in two levels in such a way that a transversal oval lower garden, with an upper rectangular terrace, came into being. Behind the villa is a steep terraced path up the hill. Steps lead up to the highest point. It is crowned with an observation pavilion, the belvedere. The so-called Damascene Hall, a pheasantry building not created until 1863/64, copying Zanth's Moorish style architecture, forms the prolongation of the Belvedere-Villa-Hall axis (20). The remaining buildings - the theatre, the glasshouse from 1852/53, the octagonal pavilion, the volaries and various service buildings - are not arranged symmetrically, but are grouped around the central layout in such a way that the largest area possible of the site can be used as a park. Even today, 125 years later, this arrangement has for the most part been preserved, even if the damage from the Second World War is still visible at some points and even if some concessions have had to be made in the past few years in the course of road planning and even if some new structures have been erected here for the Stuttgart Zoo which has its home here.

This account is concerned with all those structures in the Wilhelma which are of relevance for the particular question at issue here, the use of iron.

The plans for the Wilhelma go back to 1829. Originally just a manor house baths was planned on the site in the Rosensteinpark. Mänthler (21), Salucci and - at the special wish of the king - also the Heidelberg district architect Fischer drew up plans for this (22). In 1837, work was begun, without a building contract having been awarded, initially with the construction of terraces on the slope dropping down to the River Neckar. In the same year, Ludwig Zanth designed a theatre which pleased the king so much that he awarded the architect a building contract for it. A spot was chosen as its site lying directly on the boundary of the plot intended for the Wilhelma. With this theatre, which was also thrown open to the people of Cannstatt

at certain times, the king wanted to demonstrate his generosity. At the same time one can presume a link between the theatre structure and the planned villa (23). The classical building with its range of forms drawing on Graeco-Roman inspiration, does not only differ from the later structures in the Wilhelma in style, but also in construction material. If the latter was so planned that as many structural parts as possible should be in cast iron, the same structural material plays only a subsidiary role in the Wilhelma theatre. The balcony railings are in cast-iron.

Something else makes the building worth mentioning here. For it marked the starting point for the awarding of the building contract for the Wilhelma to Ludwig Zanth. In the very same year, 1837, the king asked the architect for designs for a Moorish bath. The king's ideas envisaged the combination of baths with the greenhouses. For this purpose, he sent Zanth on a study tour. France, England and Holland were the stops. In Paris he was fascinated by the huge greenhouses in the Jardin des Plantes, the masterpiece of Charles Rouhault de Fleury. Zanth already knew these buildings from illustrations in the magnificent folio edition which Fleury had published in 1837 (24). In the middle of August, Zanth travelled from Paris to London. At that time, England was to the forefront in the field of greenhouse architecture. The technology of iron architecture was also furthest developed there. Thanks to numerous letters to his friend and former teacher, Hittdorf, in Paris we are informed about some of his destinations in England (25). Apart from London and the Home Counties, Zanth saw Chatsworth (26), Liverpool (27), Birmingham (28), Blenheim and Oxford (29). He visited old and new structures, gardens and docks, churches, bridges, market halls, railway stations and greenhouses. He met architects, informed himself about the latest literature and marvelled at the manifold use of iron as a material. The journey was thus not just a lesson in English architecture, but also a lesson in iron construction. He definitely saw Thomas Rickman's churches, St. Michael in the Hamlet and St. George's, Everton, in Liverpool, which we mentioned at the beginning and which were constructed in cast-iron - good cast-iron from John Cragg's Iron Foundry (30). He must surely have dealt with Paxton's (31) and Loudon's (32) designs. He was definitely in Kew Gardens (33) and at Dropmore near Windsor (34). On his return from this journey he turned to his new task, the construction planning for the Wilhelma, filled with enthusiasm and new ideas. That same year, 1838, he presented the king with a set of drawings and a model of the Moorish villa (35).

It would be interesting to discuss the preliminary planning stages of the castle which was still occasionally referred to as baths (36). But we must dispense with that here. With regard to glass and iron architecture, one should note that the dimensions of the greenhouses shrank in the course of planning and that the cast-iron constructions - so far as can be seen from the small plans (37) - were originally richer in concept, i.e. that fewer identical construction elements were to be used. Furthermore, it can be seen from the correspondence with the head engineer at the foundry, Stotz, that Zanth originally judged the loading capacity of cast-iron incorrectly and thus designed parts which were too heavy and clumsy in appearance (38). The structure as built, consisting of the stone residential pavilion, 26 m long and 22,5 m deep, the cold greenhouses with solid rear wall (21,8 m long) and the two square corner pavilions (side length 11,5 m), is based on the design for project VI which Zanth produced in spring 1842, after the earlier designs had failed to find royal approval for financial reasons. The central section, built in red and white stone, copying Byzantine architecture, is arranged with side recesses.

A flight of steps leads up to the central portal. Horseshoe arches above the doors and windows, richly decorated sandstone facing and the low drum cupola were characteristic for the appearance of the building. The Wilhelma was badly damaged in a bombing raid in 1944. The Moorish pavilion was also hit and burnt out. The asymmetrical glass roof solution which dominates the building today dates from 1960. It is associated with architectural notions of the nineteen-fifties and considerably detracts from the whole structure. Green-houses abut onto the main structure at the side; they end in pavilions with a square ground plan. These sections of the building give the original impression, although they were also damaged by bombs in the war. The two cold-houses are of glass and iron construction with solid rear wall (39). Just like the two end structures in the layout, they are subdivided by arches. Large arcades with small arcades above them, the whole being fitted into a rectangular frame system. Architecture in prefabricated parts, reproducible at will. Only at the corners of the pavilions are there variations, accentuations. The façades are given a rhythmical appearance through the horseshoe arches. Slender twin pillars and high bosses support the arches. Bases, capitals and imposts are decorated with elegant reliefs. The pillars, vertical dividing elements, continue upwards and bear the roof. The horizontal is emphasised by the upper and lower frames, by the pointed arch architecture fitted in between, and by the arrangement of the façade elements. The joins in this artistically and at the same time decoratively combined glass and iron architecture are formed by the impost zones and the beginnings of the arches.

In the left-hand greenhouse wing, Zanth's iron construction can be studied in unaltered form (40). Slender pillars with differentiated capitals bear horseshoe arches at the peak of which rests the drum with the polygonal cupola. The link between the individual structural elements is made by hooks and pins. Bolts mounted partially concealed - but often also visible and then disguised as rosettes - hold together the parts which are fitted into one another.

From an "Estimate for the Cast-Iron and Wrought-Iron Works for the Greenhouses in Moorish Style in the Royal Park of Rosenstein", compiled by Stotz, the chief foundry engineer, in Wasseraaltingen on the 1st March 1842 (41), one can read in how many parts the structure was delivered. For the long cold house with brick rear wall, constructed adjoining the Moorish pavilion, there were in each case "8 columns, 7 arches with fill-ins, 1 upper frame piece 60 feet long, 2 pillars, 2 feet wide and 20 feet high, 16 gallery beams (front and rear passageway), 32 rafter beams, 60 foot of gallery blocks, 120 foot of partition blocks, 48 foot of blocks for 2nd corridor, 15 rafters, 20 foot of ridge bond, 56 dormer windows and windows of 4 walbs" (42). The costs for the cast-iron were estimated at 4,400 gulden in each case, the locksmiths' works are quoted as 1794 gulden. 725 gulden were to be paid for the models - for both cold houses. The list also gives information about the difficult erection works which were to be carried out by the locksmiths from Wasseraaltingen in the Rosensteinpark. Columns were to be bolted together and fitted into one another, transversal pieces had to be mounted, arches and fill-ins had to be inserted and bolted into position. All stages in the works are listed in detail, permitting one to reconstruct them. The documents nowadays present important source material for research into iron architecture.

The list by Stotz - the cast-iron items for the Wilhelma which are so attractive in their quality were made in Wasseraaltingen under his direction - is an important document for the evaluation of this

architecture. For from this one can learn what technical difficulties had to be overcome in the construction of such a building. The items and quantities actually required form the basis of the calculations. But how often did it happen that cast parts did not survive the bumpy journey by horse and cart and reached the building site broken. Then the erection ran into difficulties and replacement parts were requested by urgent dispatch (43). The estimate of costs quoted here refers to just one of the two cold-houses. A much longer list is still extant for the hothouses, the corner pavilions (44). Stotz made a record of all the iron goods which were cast in Wasseraaltingen for the Wilhelma in lists - even the flower pots, fountains and lamps, the decorative reliefs with lions' heads set in chaplets, the iron lattice-work, the decoration on the eaves....

In connection with the main building, kiosks with huge onion-shaped domes, pavilions and a magnificent hall building were constructed (1844-1851). A covered path connects the buildings. Here we are dealing in part with purely iron architecture (kiosks, parts of the path roofing), in part with stone structures into which cast-iron parts were incorporated for construction purposes (colonnade, columns in the hall, corbels, windows in the upper storey of the hall), for decorative purposes (vases, decorative strips on the eaves). The works on the main building were completed in 1846, the interior decoration was concluded in 1851. Today, the Moorish garden, together with the surrounding orientalisising architecture form an integrated whole. Breaches in style are the unlovely glass roof of the main building, already mentioned, and the elimination of the hall, of which, unfortunately, only the entrance hall remains. The remainder of the structure - damaged by bombs - was demolished against the wishes of and without the consent of the Office of Monuments in 1962.

In accordance with an outline plan for the arrangement of the more immediate and further surroundings of the castle, the so-called "roofed terrace" came into being from 1844 on, a broad roofed passage in elegant cast-iron construction along a wall faced with terracotta blocks. It linked the theatre with the newly constructed main entrance to the park. Nowadays, little remains of this once famed terrace. Apart from a few rusty remains, the iron columns and latticework have been demolished or have collapsed. However, thanks to careful restoration, one building has again emerged in its full former glory: the octagonal pavilion, now the main entrance to the Zoo in the Wilhelma, in the middle of the long roofed terrace, included in the wall as an architectural accent, originally the king's private entrance. Once again, it is a very complex iron construction which opens outwards as a round arch arcade and surrounds a central stone structure. Again, as in the case of earlier structures, cast-iron consisting of individual parts and ingeniously held together by hooks and pins and secured by bolts. Originally there were no visible bolts in the strict sense. The bolt heads were - as can still be seen at some points - designed as rosettes. The decorative reliefs are fixed with countersunk bolts. In the interior of the pavilion, which has today been restored in accordance with the findings, valuable paintings in the "Pompeian style" were discovered and uncovered. This building gives us an original impression of the wealth of decoration which was apparently still present at that time in the courts. Doubts became audible about the much quoted thrift of the king of Württemberg. The last things to be mentioned are the small greenhouses intended for housing plants and cultivating them in winter, and the palm house. They connect the octagonal pavilion with the oval corridor. These houses were completed in 1853. They differ from the other buildings and make a simple and functional impression in comparison with the plant houses of the Moorish castle. We know that they had to be designed

as simply as possible at the king's express command. After the great financial expenses which he had incurred through the construction of the Wilhelma - not least because of the valuable interior decoration and the expensive iron architecture - he insisted on the most economic work possible. To be sure he was not able to escape the argumentation of his court architect, as the latter explained to him that cast-iron work was dealt with by weight, so that rich decoration would not necessarily result in greater expense. But the king resisted these explanations. He ordered the simplest forms and construction as he also wanted to avoid the slightest additional costs for the model.

The Wilhelma is an independent artistic work by the architect Karl Ludwig Zanth. Built in Moorish style at the wish of King William I, this unique layout represents the ideas of the late Romantic period. English garden architecture was the starting point and model. Loudon should be mentioned here. His Encyclopaedia of Gardening contains comparable things (45). Orientalising buildings were a component of many English parks (46). But inspiration from France was also adopted and modified (47). In the main building, Zanth has given shape to an architectural notion which is unorthodox. There was nothing comparable in Germany at the time. Zanth has arranged the greenhouses in glass and iron construction as autonomous buildings alongside the residential building which is constructed in stone and crowns the whole with three cupolas. Winter gardens, orangeries, even greenhouses were often adjoined to residential buildings (48). But, so far as I know, they have never so emphasised and co-determined the appearance of the architectural layout as the greenhouses adjoining the Moorish pavilion.

The king liked this arrangement. On festive occasions the greenhouse was used for residential purposes. The two wing structures make a less impressive appearance with their grey paintwork, which they were given during the restoration works, than they did at the middle of the nineteenth century. At that time the iron parts were painted golden brown. The kiosks and the ironwork of the connecting paths also glittered in gold (49). A fairytale castle just as in the Tales of One Thousand and One Nights! The magnificence was great. The costs for the whole structure amounted to nearly 1.000.000 gulden. The question arises how such a project could be carried out at all by a ruler renowned for his thrift at a time of social tensions and restructuring.

The remarkable thing about the planning and execution of the building is the inclusion of iron as a building material. What had been just a beginning at Weil Castle was consistently further developed, indeed brought to perfection in the Wilhelma. The new construction material was fully established from 1850 on. The expenses for Zanth's journey to England were fully recouped in the subsequent period. The Wilhelma contract represented the final breakthrough for the Wasseraalffingen foundry. This is expressed in production figures, numbers of employees and the range of cast-iron goods listed in the model books (50). In 1814/15 17,938 cwt of pig-iron and 31,023 cwt of cast-iron goods were sold. In 1830/31, the production of pig-iron compared with cast-iron production was roughly equally great. However, 62 % cast-iron and 38 % pig-iron were sold. In 1854/55, the sales of pig-iron amounted to 47,831 cwt compared with 116,298 cwt cast-iron goods (51). The large orders for the Wilhelma resulted in a large increase in the number of workers employed at Wasseraalffingen. After completion of the works, they were not given the sack, but integrated. Architectural parts, such as columns, pillars, windows, etc. were now cast in series and appear in the catalogues. Large orders, particularly in connection with the construction of the railway in Württemberg, were awarded to the foundries.

The Wilhelma is the initial cause at the beginning of a development which deliberately employed the construction element iron as a construction and decorative element in Württemberg, thus forming the second half of the 19th century in both the history of art and architecture.

Notes

- 1) The first iron tracks were cast at Coalbrookdale/Shropshire in 1767. Nikolaus Pevsner: A History of Building Types. Princeton, N.J., p.225. S. Giedion: Raum, Zeit, Architektur. Ravensburg 1965, p.131.
- 2) N.Pevsner, op.cit., p.276 f. S.Giedion, op.cit., p.140-143.
- 3) The Severnbridge near Coalbrookdale, 1777-1779 by Abraham Darby III. and John Wilkinson, is the first cast iron bridge ever built. Alfred Gotthold Meyer: Eisenbauten, ihre Geschichte und Ästhetik. Esslingen 1907, p.18. Hans Straub: Geschichte der Bauingenieurskunst. 2nd Edition. Basel and Stuttgart 1964, p.219.
- 4) St. Michael-in-the-Hamlet, Liverpool, and St. George, Everton, 1812/14 by Thomas Rickman. The iron parts of the architecture were cast in the iron foundry of John Cragg in Manchester. N.Pevsner: The Buildings of England, South Lancashire, 1969, p.221 f. and p. 242f. N.Pevsner: Some Architectural Writers of the Nineteenth Century. Oxford 1972, p.28-35. R.F.Mould: The Iron Church. 1977.
- 5) Manfred Thier: Geschichte der schwäbischen Hüttenwerke 1365-1802. Aalen and Stuttgart 1965. Julius Schall: Geschichte des Königlich Württembergischen Hüttenwerkes Wasseraalffingen. Stuttgart 1896.
- 6) J.Schall, op.cit., p.52 ff.
- 7) Wilhelm Speidel: Giovanni Salucci. Stuttgart 1936, p.26-34. Georg Sigmund Graf Adelman, Max Schefold: Burgen und Schlösser in Württemberg und Hohenzollern. Frankfurt 1959, p.21 f. Bodo Cichy: Die Rettung des Schlösschens in Esslingen-Weil. In: Denkmalpflege in Baden-Württemberg. 1973/1, p.28-33.
- 8) 1969-1972 the castle at Weil was restored. During this work a fresco was found on a wall in the so-called Princes' Hall. It shows the building and the surrounding landscape. This early picture by an unknown painter, dated about 1823, is a precious document concerning especially the iron construction and presents evidence concerning the original colours. The cast iron parts of the architecture had been painted in a light greyish green, in contrast to the present-day white. In 1821 the artist Gottlob Friedrich Steinkopf received a commission from King Wilhelm to paint sights of Württemberg. One oil painting of this series gives a view of the castle of Weil. Werner Fleischhauer, Julius Baum, Stina Kobell: Die schwäbische Kunst im 19. und 20. Jahrhundert. Stuttgart 1952, p.81.
- 9) B. Cichy, op.cit., p. 29.
- 10) The portal cover as well as the iron construction in the upper parts of the gallery were no longer there when the restoration was started in 1969. (Personal communication Dr. Bodo Cichy).
- 11) The paintings on the walls and the ceilings, the equipment and the decoration cannot be treated here.
- 12) Salucci started his work in Stuttgart July 25, 1817. G.Speidel, op.cit., p.15.
- 13) G.Speidel, op.cit., p.14.
- 14) G.Speidel, op.cit., p.27 f.

- 15) G.Speidel, op.cit., p. 29.
- 16) Thomas Brachert: Der schwäbische Eisenkunstguß. Wasseralfingen 1958.
- 17) The connections by screws are - at least partially - later additions. The result is that in some places the iron cannot compensate for variations in temperature. Only in those places where the original joins of the iron - slot and key / tenon - remain unchanged is the construction still intact.
- 18) Ludwig von Zanth: Die Wilhelma. Maurische Villa seiner Majestät des Königs Wilhelm von Württemberg. Stuttgart 1855. Elke von Schulz: Die Wilhelma in Stuttgart, ein Beispiel orientalisierender Architektur und ihr Architekt Karl Ludwig Zanth. Tübingen 1976. (With a rich bibliography).
- 19) L. Zanth, op.cit., p.1.
- 20) The building called "Damaszenerhalle" - Damaszene Hall - will not be treated here. In spite of belonging to the Wilhelma and having iron constructions and decorations as well, it dates only from the second part of the nineteenth century, and is therefore not relevant for the point in question here. See E.v. Schulz, op.cit., p. 76 ff.
- 21) By that time hot mineral springs had been discovered in the Rosensteinpark. This was the starting point for the discussion of a project for a royal bathhouse. The architect Mänthler designed a plan in 1829. See E.v.Schulz, op.cit., p.3 and note 17.
- 22) E.v.Schulz, op.cit., p. 3-8.
- 23) A very detailed and exact representation is given by E.v.Schulz, op.cit., p.41-48.
- 24) Charles Rohault de Fleury: Museum d'Histoire Naturelle. Serres Chaudes, Galerie de Minéralogie etc., Paris 1837.
- 25) Compare Zanth's letters to Jacob Ignaz Hittorf in Paris. Stadtarchiv Stuttgart. Autographensammlung.
- 26) When Zanth visited England in 1838, Joseph Paxton was still working in Chatsworth. G.F.Chadwick: The Park and the Town. New York and Washington 1966, p. 66-94. Derek Clifford: Geschichte der Gartenkunst. München 1966, p. 428 f.
- 27) Zanth saw here the market hall, the docks and probably also the two churches with visible cast iron constructions which had been built by Thomas Rickman. See note 4) and E.v.Schulz, op.cit., p. 114.
- 28) In Birmingham Zanth studied the market hall. E.v.Schulz, op.cit., p.114.
It is very likely that he visited also the park of Alton Towers which is not far from the city. There Zanth must have seen the famous range of conservatories, which became a pattern for his Moorish pavilion.
- 29) E.v.Schulz, op.cit., p.114.
- 30) See note 4).
- 31) G.F. Chadwick: The Works of Sir Joseph Paxton 1803-1865. London 1961.
- 32) John Claudius Loudon: Encyclopaedia of Gardening. 1835. G.F. Chadwick: The Park and the Town. 1966, p. 53-65.
- 33) Zanth visited Kew, where he studied the conservatories and the landscape architecture. At that time, in 1838, the palm house and the temperate house were not yet built.
- 34) Oswald Sirén: China and Gardens of Europe. New York(1950), p.84 ff.
- 35) Zanth's letter to Hittorf from October 4, 1839. The model has not been heard of again.
- 36) E.v.Schulz, op.cit., p.10-29.
- 37) Wilhelma-Mappe. Württembergisches Landesmuseum, Stuttgart. I thank Dr. Himmelein for his kind assistance.
- 38) Archives of the Schwäbische Hüttenwerke Wasseralfingen, bunch 106. I thank the Schwäbische Hüttenwerke Wasseralfingen and especially Mr.Hildebrand, the archivist, for helpful discussions and support during my research.
- 39) This represents one of the traditional plant house constructions. See Charles Mc. Intosh: The Greenhouse, Hot House and Stove. London 1838, p.281 f.
The two temperate houses of the Wilhelma had been intended for the hibernation of the orange trees. The big windows with horseshoe shaped archs are conceived such that on hot days they could have been taken out. Such architecture is comparable to that of the classical orangeries.
- 40) In 1944 not only the main building but also both side wings were bombed. The iron constructions cracked or twisted. Today only the plant house on the left side has the original appearance; the damaged iron pieces have been carefully recast. The interior of the warm house on the other side gives a different impression. The delicate cast iron architecture is supported by heavy iron rods. Since the foundation settled after the war these construction aids became necessary.
- 41) Copy in the Archives of the Schwäbische Hüttenwerke Wasseralfingen, bunch 106.
- 42) The copy dates from March 1, 1842 and is signed by Obergießereimeister Stotz. Archives of the Schwäbische Hüttenwerke Wasseralfingen, bunch 106.
- 43) Archives of the Schwäbische Hüttenwerke Wasseralfingen, bunch 106.
- 44) Archives of the Schwäbische Hüttenwerke Wasseralfingen, bunch 106.
- 45) See notes 28) and 32). The conservatories in the park of Alton Towers were the prototype, the pattern, for the main building of the Wilhelma. Besides these formal relations Zanth made inquiries about the colours chosen for the architecture. The constructive parts in both buildings were originally painted gold. J.C.Loudon: Encyclopaedia of Gardening. London 1934, p.332. Loudon mentions the conservatories at Alton Towers "...to the right of the bridge, is a range of architectural conservatories, with seven elegant glass domes, designed by Mr. Abraham, richly gilt". I thank Dr.Ruth Maria Ullrich for this important information.
- 46) Günter Bandmann: Das Exotische in der europäischen Kunst. In: Der Mensch und die Künste (Festschrift Heinrich Lützeler). Düsseldorf 1962, p.337-354.
- 47) O. Sirén, op.cit.. G.F.Chadwick: The Park and the Town. 1966, illustration p. 178.
- 48) J.Sievers: Bauten für die Prinzen August, Friedrich und Albrecht von Preußen. Berlin 1954, p.167 ff.
- 49) A watercolour by Zanth exists in the "Wilhelma-Mappe" in the Württembergisches Landesmuseum, Stuttgart. It shows one of the Moorish kiosks and parts of the connecting passage. All the iron constructions and decorations are painted with gold colour. See also note 45). Very little has been published concerning the coloration of iron architecture in general. A.G.Meyer, op.cit., p.183.
- 50) The books of pattern are collected in the Archives of the Schwäbische Hüttenwerke, Wasseralfingen.
- 51) J.Schall, op.cit..