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THE GDANSK CLOCKS AND THEIR CREATORS

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The fact of inventing a mechanical clock at the end of 13th century was of great importance for humanity. The independence of time measuring of the sun led to the change of time units. In the place of the old temporal hours, connected with the times of the day and seasons, equinoxial hours were introduced, identical to our present-day ones. They were equal during the day and night, in winter and summer. This fact made it possible to put life in stricter frames of definite times of activity and rest, alert and sleeping, prayer end entertainment. The clock bells guided the day and awakened the realization of time flow to a larger extend than the church bells did before, also because they signaled shorter, one-hour intervals.

The principle of operation of a clock's mechanism was a simple one. The function of a regulator was performed by a foliot balance – a horizontal lever with weights, swinging around a vertical axis, which was called a spindle. The spindle was equipped with two plates, called pallets, and opened at a slightly obtuse angle. During the swings of the foliot the pallets conctacted with the escape wheel, of an uneven number of teeth. A weight hanged on a rope turned a wooden shaft. Toothed wheels transferred the turns onto an escape wheel, whose teeth hit either the top or bottom pallet of the spindle, alternately. This forced the cross-bar balance to swing. The cross-bar's weights were used to regulate the movement: if they were moved closer to the axis, the swings were quicker, if they were more distant, the swings were slowed down. It is not known who or when made that discovery. It was definitely not known in 1271. 12 years later in England appears a real flood of information about new clocks – probably already mechanical ones: 1283 – Dunstable, 1284 – Exeter, 1286 – London (Westminster), 1288 – Oxford,

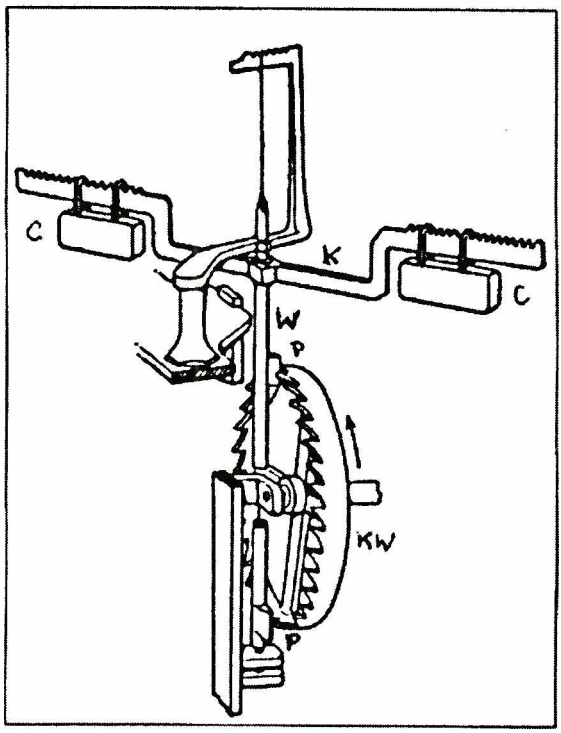

Figure 1. *Foliot movement: K – foliot, C – weights, W – spindle, P – pallets, KW – escape wheel*

1290 – Norwich, 1291 – Ely, 1292 – Canterbury, etc. After England such countries like France, Italy, Germany and Spain followed. At the end of 14th century each bigger city in Western Europe already had its clock. In Poland the first news come from Wroclaw (the 1367 bell strikes the hours on the Town Hall to this day!), Brzeg, Swidnica (1370). Kamien Pomorski and Szczecin could have their mechanical clocks in 1380. Elblag got one in 1383, Chelmno – probably around the year 1385, Torun – 1386. The next references come from Cracow – 1387, Miechow and Kolobrzeg – 1388. The Malbork case is not clear. A Teutonic Knights' annalist already in 1330 gave the time of the sun eclipse in equal hours (*at the sixteenth hour of the day*), which would not be possible without a mechanical clock, yet that was an isolated case. The first sure information from Malbork comes from 1398, and in 1401 Master Nitze built the famous big clock on the tower of the High Castle, destroyed by fire in 1644.

And where is Gdansk against this background? Because of the lack of direct information we have to base on indirect evidence. Till 1945 there were two clock bells in the central roof turret of St. Mary's church. The bigger one had the following inscription: "*hilf Maria was ich begynne das is eyn gut ende gewynne*" (help me St. Mary in whatever I begin, to obtain a good end). The ornaments and letters were the same as on the Apostolica bell from 1383, which in addition had an

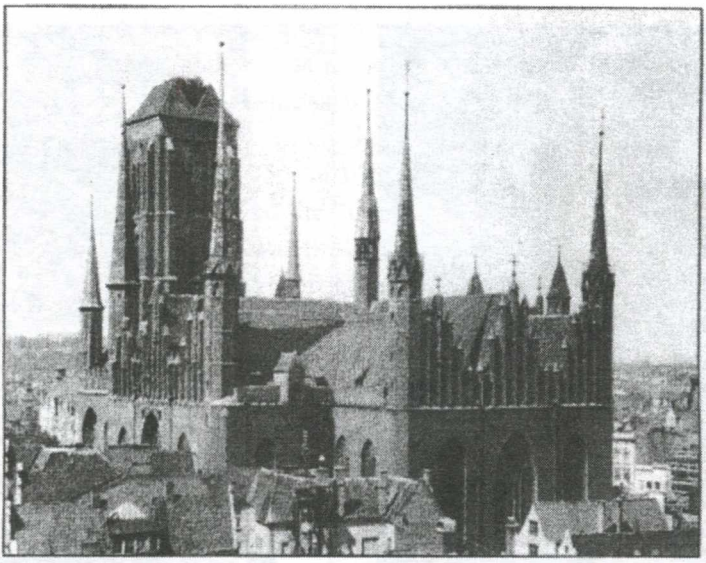

Figure 2. *St. Mary's Church before the war. In the central turret of the roof we can see the clock bell from 1389*

identical inscription, yet addressed to God, not St. Mary. Hence it seems logical that the bell we are talking about also came from the 80's in the 14th century. Its slightly flattened shape, characteristic for clock bells, is a proof that it had the same function since its creation. To decide about the exact date we can use written sources. In the statute of St. Mary's School, which was re-written in 1612, we can read: "*If there was to be a controversy in the matters concerning the construction or redecoration of the school, presbytery, or the big clock on top of the church, the church should not be burdened by that. Neither should it suffer poverty forever*". The clock was mentioned "*precisely after the old church regulations*". An incomplete duplicate of the *old regulations* dates back to the year 1389. So the conclusion that there was a clock on top of St. Mary's church at that time seems to be justified. The costs of repairs were paid by the city, so it was the first public clock in Gdansk, with a bell and a proper mechanism. Its probable remains is a 90 cm long steel hand-forged handle of a hammer for striking hours, which was found not long ago.

The second clock was bought by the Teutonic Knights and placed on the Gdansk castle. On 16 August 1401 the Treasurer of the Order wrote: "*The clock – – 11 marks and 4 scots for 18 1/2 pounds of tin and 6 marks without 1 quarter for 6 1/2 long hundredweight of copper, and 9 marks 1/2 scots for 6 pounds of copper; bought by the castle Commander from Gdansk*". In the present day language it means that the Commander bought 7 kg of tin and 299 kg of copper for casting an hour bell, and 137 kg of lead for weights. The constructor of the striking mechanism could have been the same master Nitze, who had just finished the great clock in Malbork, and left on 6 July.

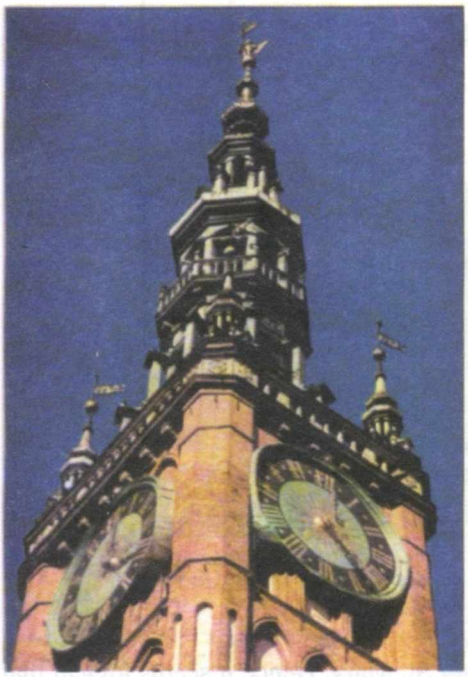

Figure 3. *The clock dial from 1560 on the Main City Town Hall*

Figure 4. *Astronomical Clock from 1470 at St. Mary's Church*

It is more difficult, however, to establish the date of creation of the third Gdansk clock – on the tower of the City Hall of the Right City. The clock-watchers, *who are to be paid 11 marks*, are mentioned for the first time in a no-date expense specification from the first half of the 15th century. Luckily, another huge sum is mentioned there, which was spent on the *great voyage* of Mayor Jan Hammer. We know from other sources that such a great trip took place in 1418, when the Mayor went to the Hanseatic Congress in Lübeck. So it can be assumed that the note comes from that year. Shortly after that in different sources we can meet characteristic references: *when the clock strikes eight* (1421), *before nine strikes* (1427), *etc*. In 1421 the clock-watchers received 2 marks quarterly. In 1460 somebody was paid 3 marks to set the clock. In 1465 the top of the tower on the city hall was finished, and the clock, which could have a dial then, was mounted. Below the present clock there is an old hole for the axis of a hand. In 1499 we meet another note of a new city hall clock mounted after the fire. It was probably installed at the present height. In 1537 it was replaced by a new clock with four dials, and called "half a clock", which means the dials were divided into 12 hours, and not 24, as before. In 1560, after yet another fire a new clock was installed, whose dials are preserved till our times. Its creator was probably the city clock-maker Jorge. A year later a 14-bell carillon was added. It was a work of Jan Moor from Hertogenbosch. In the preserved books of the city Treasury we can find a lot of information about the repairs and costs of the clock maintenance. In the beginnings of 18th century

a pendulum was added. After a new mechanism, prepared by C. F. Rochlitz from Berlin, was installed in 1889, the old one was exposed in the tower. It was destroyed in 1945. The present mechanism was installed in 1950. The hour bell from 1543 comes from St. John's church, and the peal of bells – from Bishop's Hill.

The most famous among Gdansk clocks is the astronomical clock at St. Mary's Church. It had a predecessor in 1455. In 1462 a city locksmith Krumdick started the construction of a new clock, called the "little one", which was placed in the organ loft above the sacristy. The job was probably never finished because in April 30, 1464 the church superiors ordered Hans Doring vel Düringer from Torun to build an astronomical clock. According to the contract master Hans was to perform *the whole blacksmith's job, and everything that belongs to the registry of the clock; he also has to have both wooden dials done, the one with the Sun, the Moon, and the twelve Signs, and the other one with the calendar, the Annunciation scene, and the Homage of the Three Mages*. The salary was 300 marks in small money, together with the iron mechanism of Krumdick's clock, and 6 Hungarian zlotys (54 marks) of gratification for *arriving here*. The city council itself was responsible for ordering the paintings and sculptures, including *flowers, leaves, and sculptures as beautiful as they only wish to have*.

At the beginning master Hans was commuting from Torun together with his son who helped him in the work. That was, however, neither comfortable nor safe because of the 13-year war, so he moved to Gdansk. Here he received 93 marks of compensation and a house in St. Spirit's street. In addition he got 24 marks a year for which he had to *finish the clock, and if there were parts to be sculpted or painted that were to cost more, this would be paid for by the Council. Yet he was to take great care of the clock*. In 1470 the clock was ready. This is confirmed by the fact that Duringer received a commission to build another *big clock on the church, striking hours and quarters*, for 1600 marks. This is also an additional confirmation that such a clock existed earlier. It is possible that the new clock was to be trip-geared by the astronomical clock, which explained why it was so expensive. It may also be possible that some external face was created then – – probably in the place of a later Dam Clock.

The astronomical clock from St. Mary's Church is the largest clock that has been built in the middle ages inside a building. Its 14 m high casing (together with the figures) is divided into three storeys. Going from the bottom these are: calendarium, orrery, and the figural theatre. The dials of the calendarium give chronological data: the date, day of the week, liturgical calendar, the new moon dates (exact to minutes), the Sun cycle, the Golden Number, Roman Indict (the data were used in the middle ages to stress the dates), the interval (the time between Christmas and last Sunday of the carnival), *etc*. The big dial made of wood and covered with linen gives 3005 details placed in 22 circles. The small one – made of a copper plate and papered over (!) – 579 details in 9 circles. The information concerns the years 1463-1538 and, thanks to a 532-year repetition period in the Julian calendar, it is possible to bring them up-to-date for the years 1995-2070 – with a 13 days move.

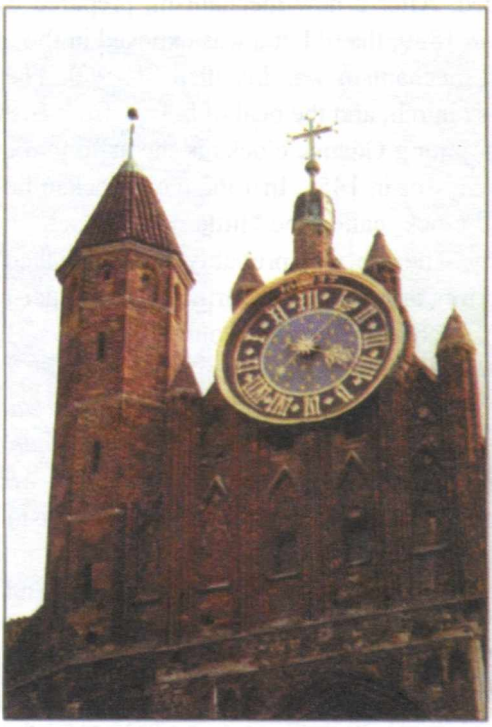

Figure 5. *The Dam Clock dial is the biggest one in Poland*

The hands and dials of the orrery show the time (on a 24-hour face), the Moon phases and the position of the Sun and the Moon in the Zodiac. The windows of the orrery showed the scenes mentioned in the contract: the Annunciation and the worship of the Three Mages. On the semicircular stages of the figure theatre we can see the four Evangelists (at the top), the 12 Apostles, and the Death (at the bottom). The doors are guarded by Angels and Deacons. The procession of the figures was accompanied by the music of an automatic organ. At the top of the clock Adam and Eve strike the hours and quarters.

The ideology of the artistic decoration is of great significance. The figures in the frame depict the four phases of human life. Adam and Eve and the Tree of Knowledge surrounded by the serpent remind us of the original sin and the inevitability of death. The apocalyptic Dragon on the face of the Moon phases warns us of the Last Judgement. Also the Latin sentences of the outer small face of the calendarium refer to the Apocalypse. The centrally placed figure of St. Mary with the Child that is going to save the world brings us hope. The Angel heralds its birth. The Three Mages pay Him homage, and the procession of Angels and Evangelists brings Good News. The paradise they enter is open for us, too. Death can not enter it!

There is a legend connected with the Gdansk clock. It probably appeared in the time of its negligence. The oldest written record of it can be found in the book of Kazimierz Haur (in 1676): "*in Gdansk at St. Mary's parish church there is*

a huge old clock inside the church. It was to exceed all the other clock-making artistry, and there were some Persons to walk around it when the Clock struck hours. The citizens of the city tell a story that the inventor or Kunstmagister of the Clock was inflicted very bad luck by the Council as a thank you for his work. Some say that to prevent him from creating another similar masterpiece he was deprived of his eyes. So to take his revenge the master took out one of the springs from the Clock mechanism, and harmed the Clock so severely that no other specialist was able to repair it and bring it up to its perfection". In reality the clock worked till 1553. Later the City stopped giving money for its maintenance. The offers of repair prepared in 1595-1866 were dismissed as too expensive. During the last war the clock was dismounted and taken away to Zulawy. After the war about 75% of the casing was found, including all the dials. In 1983 a group of enthusiasts was formed (today under the name *Horologium*), which proceeded to rebuild the clock. In 1990 the clock started to work again – –after a 437-year break! At present (1999) the work on reproduction of the moving figures is almost completed. The money comes from donations and offerings.

Further history of the big clock on the church is really interesting. In 1634, when the old Düringer's mechanism had not been functioning for a long time, the city signed a contract with a clock-maker Hans Connath (also other ways of spelling his name are known: Connadt, Konnathke, and even Konambke!) who came from Augsburg. He was supposed to make a clock at the top from the Dam side for 1100 florins. It was *to strike and show time*. The work was finished 3 years later, and was partly financed by the tenants of the Dam Street, and some of the money came from the last will of the dead mayor Eggert von Kempen (1636). A special fund was created, which in 1793 had 7120 guilders at its disposition. The dial of the clock with 5.12 m in diameter (it is the biggest one in Poland!) is adorned with 32 golden stars and Kempen's coat of arms. The clock had only one hand – the hour one – and a ball placed in the middle showed the Moon phases. Thanks to the clock-maker Kaschlinsky who described the documents found inside the ball during the renovation in 1850, we have at our disposal today very precise information about the consecutive damages and repairs. For example: "*Anno 1693, 13th November: I repaired the clock... the main shaft and the driving gear... all that was missing. Anno 1694, 4th April: shortly before Easter there was such wind that it ripped off the hand. Anno 1694, 11th April: I took away the hand and the Moon ball, repaired and brought them to their previous state on the 21st day of that month. The Noble Council's clock-maker of this City, Johann-Anton Horn*".

The Dam clock worked till 1871. It was damaged during the war and in 1984 got a new mechanism – the work of W. Janiszewski (+) and Z. Kawecki. In 1991 the face was renovated thanks to the generosity of Mr. H. L. Fauth from Lubeck. We still have to wait, however, for the reconstruction of the Moon phases ball.

All the main churches of the city center had their clocks. St. Catherine's church got the first clock in 1530, St. John's church – before1543, Holy Trinity's in 1560, St. Peter and Paul's in 1565, St. Bartholomew's in 1602 (earlier it had a striking clock),

Figure 6. *Clock at the Cathedral in Oliwa – Jan Kostka's gift from 1596*

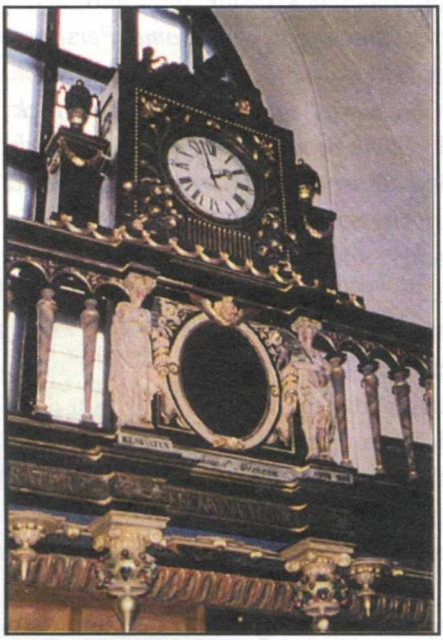

Figure 7. *J. E. Weichenthal's clock at the Artus' Court, founded by the Merchants Corporation in 1798*

St. Barbara's in 1619, the Savior's church in 1634, and the Corpus Christi in 1670. The beautiful clock with an angel's figure, in the southern transept of the Cathedral in Oliwa is a gift of Treasurer Jan Kostka, who in this way thanked in 1596 the Cistercians for leasing the mill in Nowe Szkoty. In 1735 a Carthusian monk Bruno Kadau added a Moon phases ball to it. In 1595 the Lighthouse tower in Wisloujscie got its clock.

Of all those clocks only 4 survived till our times, partly reconstructed, together with the astronomical clock. A few years ago a beautifully renovated clock of Johann Ernest Weichenthal from 1798 returned to the Artus Court. At St. Trinity's church there are remains of the mechanism, probably from 1702, which may help to reconstruct the clock tower. On the tower of the Corpus Christi church survived the dials of Johann Christian Janichen's clock from 1750. The only remaining part of St. John's church is the bell from 1543, which today strikes hours on the Town Hall. The clock in the Cathedral in Oliwa is still waiting for renovation. Sad are the remains of old splendor!

In a somewhat larger number – over 80 – are preserved the house clocks, so popular in Poland a long time ago. Most of them are today decorating the collections in Cracow, Warsaw, Poznan, Wroclaw, Munich, Paris, London, or even in New York! The oldest of them – a table clock from the Wawel collection comes from 1607. Among the biggest rarities are the cartouche clocks, and the gold, silver and enamel travel watches. Unfortunately, the famous clock of Francois Bellair is missing. Before the war it was exhibited at the Pustlowski palace in Cracow, and its

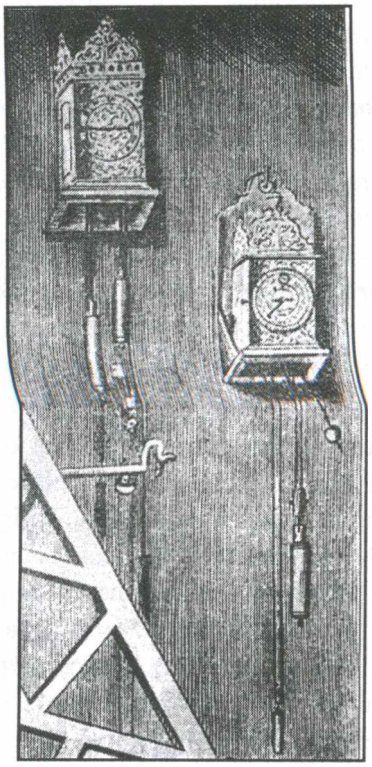

Figure 8. *Hevelius' pendulum clocks*

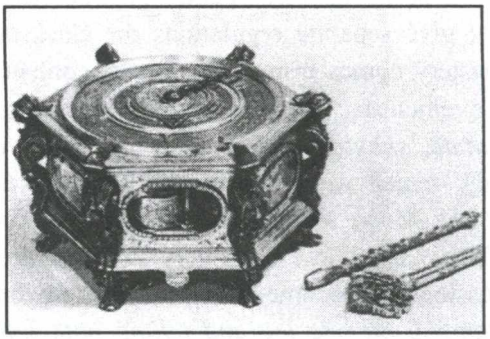

Figure 9. *The oldest preserved Gdansk table clock, a so-called tile clock of S. Ginter from 1607*

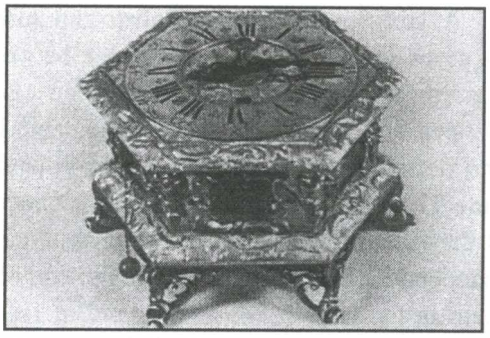

Figure 10. *J. C. Holysel's table clock from the 2nd half of the 18th century*

chimes played the melody of Dabrowski's Mazurka, written at the end of 18th century! None of the first pendulum clocks remained till our times. They were made according to the indications of Hevelius for his observatory by Wolfgang Gunther. A precedent on the world scale was a prototype of a ship *chronometer* powered by its own weight, constructed by an unknown clock-maker from Gdansk in 1716, which is 19 years before the first John Harrison's chronometer!

The creators of the first clocks were locksmiths belonging to the blacksmiths' guild. The oldest reference to a *small-blacksmith* comes from 1366, and the oldest statute of the guild – from 1387. The guild clock-makers are mentioned for the first time in the blacksmiths' statute from 1580. This is the first such mentioning in Poland, before Cracow (1585), Wroclaw (1587), Lublin (1591), and Torun (1594). In 1584 the clock-makers presented a complaint against the seniors of the guild that omitted them while distributing journeymen. In 1684 there appeared detailed regulations for trainees and journeymen. From 1652 comes a petition directed against "the bunglers", that is against the clock-workers who were not in the guild and constituted dangerous competition. Five years later an agreement was signed among the locksmiths, gunsmiths, clock-makers and constructors of ship lifts (capstans), which allowed the trainees to learn at different masters of the four specialties.

A new ordinance of crafts incorporated into the blacksmiths' guild from 1759 did not give separate regulations for clock-makers. The oldest known description of mastery comes from 1770, yet its content and terminology reveal its much earlier provenience: "*A stranger, having served two master years according to the statute, should make an alarm clock, a quarter table clock with an effaced (?) lock, which would strike and show 24 and 12, together with the light (phases) of the Moon and a day calendar, and also a clock showing quarters, without clearance*". These were very strict requirements – not far away, in Elblag, it was possible to become a master making only a *striking alarm clock mechanism, standing on one leg and telling both full and half-hours*. As everywhere in the world, also in Gdansk there were simpler requirements for relatives and descendants of local masters.

A laborious search in Polish and foreign archives led to compiling a list of 84 clock-makers working in Gdansk between the 15th and 18th centuries. This places our city among the biggest European clock-making centers, after London, Paris, Geneva and Augsburg, and on the same level as Nürenberg, Lübeck, Stockholm, and definitely on the first place in Poland. Lwow, which was second, had at that time 52 clock-makers, Warsaw – 41, Cracow – 38. In the 19th century Warsaw was at the top of the list, yet the Gdansk clock-makers, united since 1849 in their own independent guild, kept a very high level of professionalism. In 1809 there were 7 of them in the city, in 1854 – 10, and in 1861 – already 27, and in 1927 – 37. In the telephone directory from 1942 there are 25 clock-makers.

Translation: Anna Kucharska-Raczunas