History of weighing – Part 4

... The evolution of weights, scales and weighing ...

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Not only the Bizerba scales was a new star in the weighing firmament at that time, but also the Chronos scales, which originated 400km north of Balingen in Hennef an der Sieg (Cologne/Bonn). In Part 3 of the History of Weighing, Heinz Weisser, who has been my fellow author since the last issue, and I reported on the Bizerba company from Balingen, Zollernalbkreis. The firm ascended into the sky over the Swabian Alps like a shining star. What neither of us recognised when we were researching the last article was that weighing history was being written at almost the same time in Balingen as in Hennef a.d. Sieg.

Eduard Reisert,
**** 16.02.1847 in Alzenau/ Lower Franconia***
† 20.01.1914 in Cologne

Carl Reuther,
**** 17.08.1834 in Hennef***
† 09.02.1902 ibid

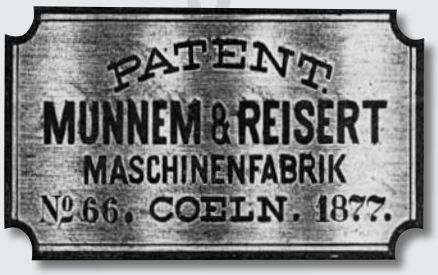
Just looking at the year 1886 in which Bizerba was founded it is apparent that both before this date and afterwards intensive research and development work was taking place in Hennef a.d. Sieg to prepare for manufacturing the first automatic weighing scales.

The real trailblazers were Carl Reuther and Eduard Reisert.

Eduard Reisert attended professional training schools in Aschaffenburg and Würzburg. In 1866 he then found employment as a young engineer in Augsburg. From there Eduard Reisert moved on to Cologne. In 1876 he founded the company Munnem & Reisert with the manufacturer Munnem from Cologne.

Eduard Reisert was fascinated by the idea of using the forces of nature to do work for mankind, so he applied the gravity that pulled on the item to be weighed as a source of power to fill and empty a weighing container shaped like a drum. The groundbreaking idea of an automatic flow measurement device for loose and bulk goods was born.

In 1877 Eduard Reisert manufactured a measurement device similar to a weighing scales known as No. 66 under the name of Munnem & Reisert in Cologne.



However, it was still a long way from the bulk flow measurement device to the approval and calibration of an automatic mechanical weighing scales. Around this time Eduard Reisert met the innovative, dynamic entrepreneur Carl Reuther.

Carl Reuther had run a mechanics workshop from 1859–1869 and later founded a factory in Hennef. There he build a variety of agricultural machines, and also the familiar decimal weighing scales, but not in an automatic version. The products he offered for sale were of a very high quality, which soon secured his commercial success.

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But where did Carl Reuther acquire the knowledge he would have needed?

After qualifying as a metalworker in Bonn, Carl Reuther travelled as a journeyman through Germany, Belgium and France. In particular during his time working in Liège in Belgium he gained a vast amount of professional know-how. At that time mechanical engineering was in its heyday in Liège and so for the mechanic and engineer from Hennef there was a great deal to learn. Carl Reuther was also particularly skilled and knowledgeable in mathematics and physics.

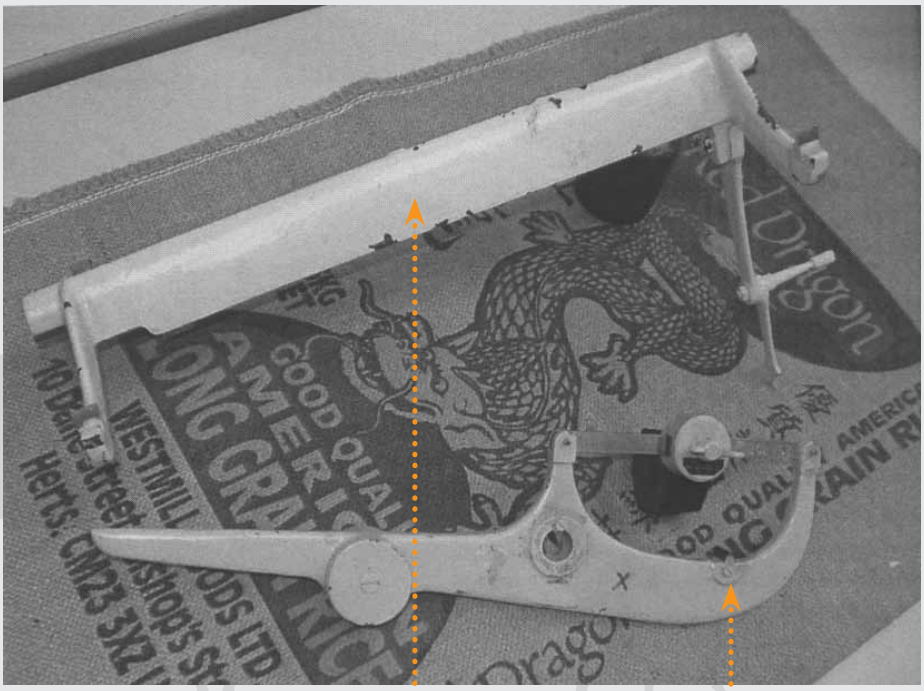
Company nameplate

Carl Reuther's knowledge of weighing scales and Eduard Reisert's know-how relating to the forces of gravity acting on bulk goods led them to establish the machine factory C. Reuther & Reisert on 1.7.1881 in Hennef, the predecessor of the Chronos factory. This was the birthplace and the continuation of the brilliant evolution of automatic weighing scales.

Former company logo
Centre beam balance

Exactly 128 years ago Carl Reuther and Eduard Reisert invented the **Chronos scales, the first calibratable automatic weighing scales in the world.** This pioneering act put an end to a 10,000 year-old tradition of weighing by hand. The era of automatic weighing had begun. Approved for calibration as a measuring device with the seal of the "*Imperial Standard Calibration Commission*" on 12.04.1883 in Berlin, the invention of the Chronos scales revolutionised weighing and measuring worldwide. It is particularly remarkable that the Chronos scales functioned fully automatically according to the principle of the **centre beam balance** which had been known for millennia (and was formerly used the company logo), for both fast and fine flows and including an after-flow regulator by using the **earth's gravity.** This meant that the Chronos scales required **no energy input** to carry out the precise weighing process.

The company when it was founded in 1881, Roberval balance since 1669



Tandem centre beam balance

After-flow regulator

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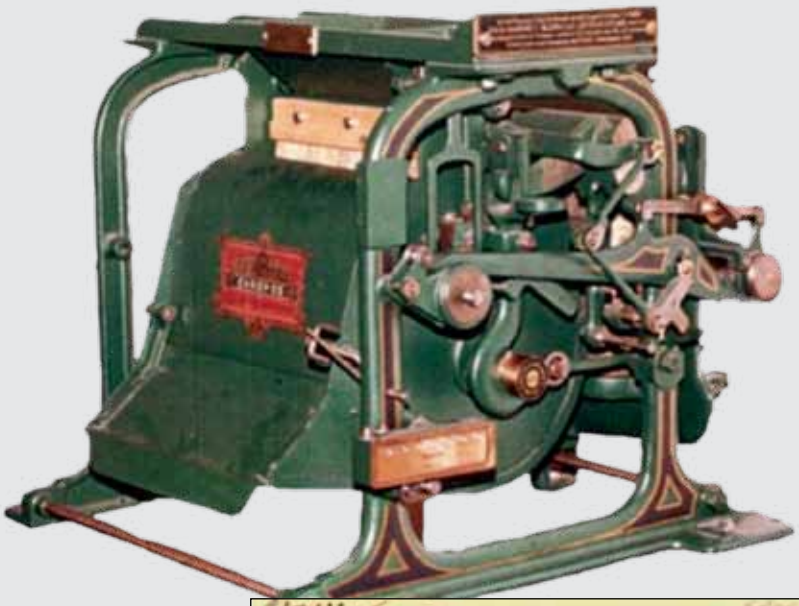
In principle the Chronos scales is a centre beam balance. However, a "normal" centre beam balance could not be used, as neither the large hoppers for the produce nor the large pans to hold the weights could be attached to it. This spurred the development of the heart of the Chronos weighing scales, the tandem beam balance. Setting the Chronos scales for various types of goods with different flow densities and flow properties was no problem and could be carried out easily.

The Chronos scales from Hennef an der Sieg; the first calibratable automatic scales in the world. Approved for calibration as a measuring device on 12 April 1883 in Berlin.

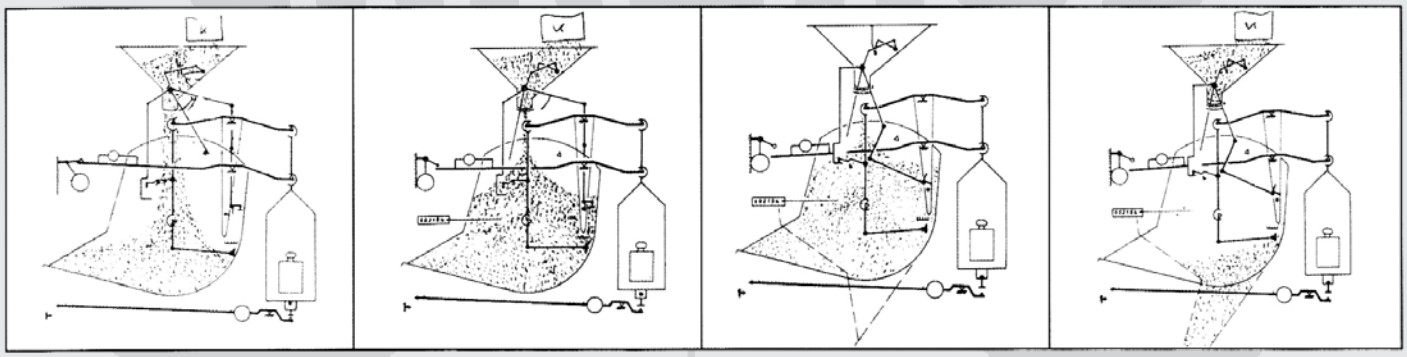


A worldwide hit! The successful automatic Chronos scales from 1883. Here for 10kg amounts.

The Chronos scales were made for weighing fixed amounts of between 0.2 kg and 3,000 kg..


Hennefer Maschinenfabrik C. Reuther & Reisert
mit beschränkter Haftung.
Rechnung

The phases of the automatic Chronos scales



Filling with fast flow

switch to fine flow before desired weight is reached

after-flow regulator and Desired weight is reached

emptying. Then repeated filling with fast flow

Extracts from a letter by Carl Reuther and Eduard Reisert dated May 1896.

„When some 20 years ago (in 1876) we began to build and commercialise our own invention, an automatic weighing scales for grain etc., this endeavour might have been be considered to be quite bold, because all attempts in this direction undertaken hitherto by others had failed and served only to confirm the general opinion at the time that the manufacture of a useful automatic weighing scales was completely impossible. Today however, nobody can deny that we solved the task we set ourselves with the utmost success.

Our automatic scales are well known and in operation at all the relevant major industrial sites at home and abroad around the world, whether they be grain warehouses, mills, breweries, oil factories or cement works.

They meet the needs of rational manufacturing, which abhors the interruption of mechanical conveyance for manual weighing, to such a degree that they have become practically indispensable. Since our automatic weighing scales were approved for calibration and for customs and excise purposes in Germany and almost all other countries of the globe they have completely supplanted the old, non-automatic weighing devices at all the pertinent larger factories."

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Shared success:
The foundation of the CARL REUTHER BERUFSSCHULE 1897 in Hennef.

Carl Reuther founded this vocational training school in 1897 with the motto *"To help build a better world was this institution founded. May its work join hand to hand, may it bind land to land, heart to heart"* and endowed it with considerable funds. It was the first professional training school in the Sieg district (Cologne/Bonn) and the wider area. In memory of this foundation the present-day vocational training institution of the Rhine-Sieg district in Hennef has been known as the Carl Reuther Berufskolleg since 2.2.2010.


METAP METROLOGY

Chronos weighing scales – the first calibratable automatic scales in the world, 1883-2008

BIZERBA _balanced information

CHRONOS

HBM measurement with confidence

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

Since 1955

1881-2005

Since 1866

The evolution of weights, scales and weighing

Greeting

More than 120 years ago, on 12 April 1883, the Chronos weighing scales became the first automatic scales to be approved for calibration by the Imperial Standard Calibration Commission in Berlin.

The metrology institute Physikalisch-Technische Bundesanstalt in Braunschweig and Berlin, which is the successor to the Imperial Standard Calibration Commission, and the International Organisation of Legal Metrology in Paris send their congratulations on this outstanding technical achievement from Hennef.

These scales, an invention of truly global significance, are not in the museum just to look back fondly on old times. This centenarian is much too busy and active to spend all its time dwelling in the past. It continues to weigh what it has always weighed – albeit in a more modern form today – flows of bulk goods with great precision. Today we can barely imagine that a technology can remain on the market for 120 years, because we have accustomed ourselves to seeing current innovations, above all computer technology, land on the scrapheap of history after just a few years. A comparison may help to appreciate just how long this period is, in a technical sense even more so than in a biological one. In 1883 the inventor Gottlieb Wilhelm Daimler was just beginning to experiment with combustion engines; he had not yet invented his first motor car. The groundbreaking invention by the two great pioneers Carl Reuther and Eduard Reisert 125 years ago put an end to the manual weighing of bulk goods and ushered in the era of automatic scales.

I wish you and Mr Wolfgang Euler continued success and all the best for the future.

Prof. Dr. Dr. h.c. Manfred Kochsiek
Vice President of the Physikalisch-Technische Bundesanstalt
President of the International Organisation of Legal Metrology

Metrology is the science of weights and measures

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Generally speaking, weighing scales control and regulate flows of goods and funds today as they did millennia ago. Without scales it would not be possible to organise an orderly economy, even in our computer-driven age. Scales are also a guarantee of consumer protection everywhere in the world. And ultimately we are all consumers.

At the end of Part 4 we are particularly happy to note that both Bizerba in Balingen and the Chronos scales in Hennef wrought profound and far-reaching changes to the world of weighing. Via and thanks to the invention of the parson P.M. Hahn and P.G. Schaudt in Albstadt-Onstmettingen Bizerba brought the pendulum scales with variable weights to market for the first time. This made it easier and safer to operate the scales, which also saved time and enabled a more precise result to be displayed. These pendulum scales were mainly used throughout the food retailing business, by butchers, bakers and grocers.

The term and the balance symbol Chronos (Greek for time) were chosen as the name for the scales and subsequently as the company name because they represented time and accuracy. The explanation is simple. For around 10,000 years bulk goods were weighed by hand with manual scales. The invention of the automatic mechanical Chronos scales drastically reduced the time need to weigh or weigh out bulk goods. This saved a great deal of time and made the weighing process much more accurate, precise and tamper-proof. Today's modern industrial and computer-controlled weighing technology would be unthinkable without automatic mechanical scales. They are one of the topics of our next article.

The term Chronos in combination with the centre beam balance of the same name therefore has a common significance for the scales developed at Bizerba in the Swabian Alps and for the Chronos scales from Hennef an der Sieg (Cologne/Bonn). In their day, both companies were world leaders in the production of weighing scales. The authors cannot help but wonder whether there was any contact between the two manufacturers, one in the Swabian Alps and one in the Rhineland, in 1859, 1866, 1877 and 1881.

We would like to take this opportunity to thank most sincerely Mr Helmut Reitemann, Mayor of Balingen and Klaus Pipke, Mayor of Hennef, for their support in matters relating to weighing scales, which was always forthcoming, even when it was not visible to outsiders. The same applies in equal measure to the Chairman of the Executive Board of the Bizerba Group, Mr Andreas Wilhelm Kraut. ■

Helmut Reitemann

Klaus Pipke

Andreas W. Kraut

Balingen
Zollern-Alb district

Hennef
Rhein-Sieg district

On 1.7.2011 the venerable company would have been 130 years old.

Saturday, 27.9.2007
Opening of the weighing-scale footpath in Hennef and the permanent Chronos scales exhibition at the Meys factory, „The evolution of weights, scales and weighing"

In the midst of it...
North Rhine-Westfalia...
full of treasures!

Hennef, the Chronos scales exhibition „The evolution fo weights, scales and weighing" and the weighing-scale footpath are two of NRW's treasures.

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