Klaus Herrmann, Hohenheim

Milestones in agricultural engineering

Since 1987 this spot has featured technology innovations that changed the farming scene when they were introduced and which also led to considerable progress. If one follows the milestones of farm mechanisation development 25, 50 and 75 years ago, or even further back into the past, it is astonishing to discover that many ideas and suggested solutions nowadays are not, after all, as new as they may seem.

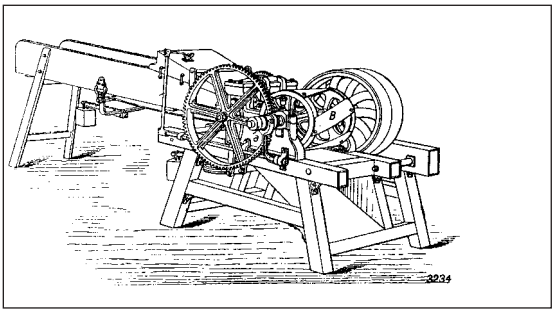

Fig. 1: The Glogowski & Son version of Robert Salmon's cylinder chopper

Dr. Klaus Herrmann manages the German Agricultural Museum in Hohenheim, Garbenstr. 9 and 9a, 70599 Stuttgart.

Keywords

Mechanisation of agriculture, important inventions and events

Agriculture is a sector of the economy that seems to take most pleasure in new ideas. Innovation follows innovation on the farm without there being much acclaim - the lack of public reaction reflecting the very modest attention paid to agricultural innovators in their respective countries. With the exception of the agricultural chemist Justus Liebig not a single one has managed the leap into Valhalla. Most of the men and women whose inventions have pointed the way out of hunger remain in the shadows of obscurity. It is more likely that a church choir be honoured with a postal stamp than a plant or livestock breeder and, at least as far as the German Postal service is concerned, letterboxes are depicted more often on stamps than are seed drills or combine harvesters.

1754

Agriculture had a higher position in society 250 years ago. For instance William Shipley saw this sector as the decisive motor for advances within society. Together with illustrious public personalities he called into life the "Society for the Encouragement of Arts, Manufactures and Commerce" in London, an organisation that initiated progress for over 50 years through offering prizes to honour advances in agricultural mechanisation.

1804

Enlightenment and new awareness typified the mood of the times at the beginning of the 19th century. Trying out new ways was a challenge which was also accepted by those US ship's captains who carried sacks filled with soybeans on their return voyages from China. The beans were initially meant as food during the journey but were then imported into the US and grounded the country's soybean culture, a culture that continues to exert a huge influence on its agriculture. Small changes lead to great results: this is the secret of successful innovation. But who can claim to recognise such associations in advance? The most one can hope for is developments akin to that started by Albrecht Thaer after his move to Möglin where he successfully carried out the orders of State Chancellor Hardenberg and founded an agricultural college in Prussia which in turn became the seedbed for the careers of many renowned agronomists. Robert Salmon from Woburn in England was, on the other hand, less demanding. He gleaned encouragement for his new ideas such as the cylinder chopper from practical farming and from then on, this iron implement eased the manual feed mixing workload for generations of farmers and at the same time made a better job of the chopping.

1829

The Mecklenburg doctor Ernst Alban proved himself as inventor again and again 175 years ago. He bought the Kleinwehendorf estate near Sanitz so that he could built there Mecklenburg's first machinery manufacturing plant. With a handful of manual workers he designed and assembled farm machinery from then on. His range stretched from feed cutters through to steam engines with seed broadcasters being the most notable because of their originality. Also receiving important development impulses 175 years ago was threshing technology. A Mr Docker from Findon in England is recognised as the first in history to establish a patent for a "vibrator", the name he gave for the straw walker, a component that, from then on, was hardly ever missing from a threshing machine design.

1854

Known as "the Patent King" 150 years ago was Cyrenus Wheeler from Cayuga County (New York). His inventions included a combined grass and grain harvesting machine with divided cutter bar. This was to allow the blade to follow ground contours more evenly. If one believed contemporary reports a wide variety of manufacturers produced around a million farm implements over the following 30 years on the basis of Wheeler patents. Another person who's inventions had great effect was the Swiss estate owner von Erlach. His research was most involved in identifying the optimum attachment point for the draught hook on harrow frames. His investigations into light crumbling, medium heavy seed, and heavy furrow harrows encouraged the establishment of standard knowledge on the subject, information that was accepted into the teaching programmes of the agricultural educational institutes in

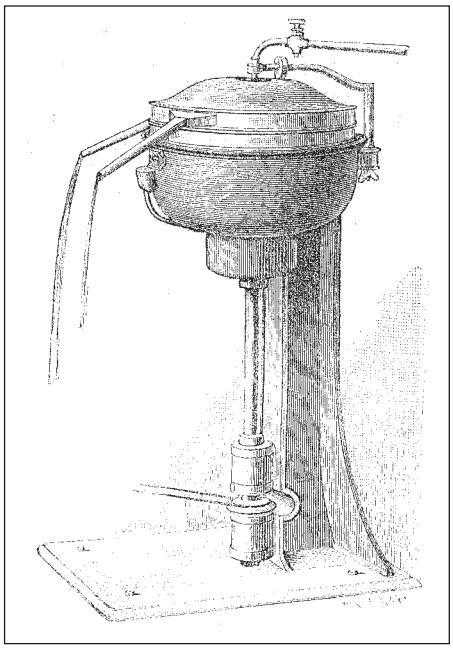

Fig. 2: Gustav de Laval's cream separator

Bonn, Hohenheim and Weihenstephan. And emphasis on agricultural engineering developments also came from those who grounded their own companies 150 years ago: Carl August Klinger in Rennersdorf near Stolpen, Albert and Wilhelm Eberhardt in Ulm or Franz Komnick in Elbing dared the leap into self-employment, an action which created further advances in farm mechanisation.

1879

Heinrich Lanz (Mannheim) decided, 150 years ago, to produce his own powered vehicles and threshing mills - a move which marked the beginning of German steam-driven threshing mill construction. This developed so strongly that soon imports of such machinery were superfluous. Also interesting in the context of innovation history was the invention of F. W. Unterilp from Düsseldorf. His mechanised dibber had the advantage of reducing the former hand labour in spade-based potato planting by half. In fact the Unterilp dibber system was initially conceived only as a component of a completely new potato planting machine. Whilst the latter was forgotten, the dibber itself developed into a marketing success. Success was also achieved by the milk centrifugal separator from Swedish engineer Gustav de Laval (*Fig. 2*). The secret of his development lay, among other things, in the elastic shaft bearings that permitted for the first time shaft speeds of 5,500 rpm and over.

1904

Benjamin Holt developed the crawler tractor in Stockton, California 100 years ago. Taking the place of four wheels were two endless chain tracks, initially made of wood. The machine was steered by wheels that were mounted in front of the tracks. This ground pressure reducing tractor received the name Caterpillar in the same year. This was due to its mode of progress being similar to the creature of the same name and Caterpillar continues to stand for quality even today. The team around B. Holt achieved a second breakthrough when they mounted an internal combustion engine onto a pulled combine harvester for the first time. The engine powered the cutter bar and threshing equipment. Privy Councillor Prof. Fisher, on the other hand, concentrated on sowing mechanisation. Under contract to the DLG he carried out the second main seed drill trials that not only thoroughly investigated the cell wheel distribution system but above all highlighted the very successful "paste-strip" drill performance assessment system. But creativity lies with more than only engineers and technicians: 100 years ago a wave of inventions also struck the science sector. Thus the Royal Academy in Hohenheim developed into an agricultural university while the farm implement factory that had been in production there since 1819 closed its doors for ever.

1929

The economic crises only slightly affected the spirit of innovation. "Black Friday" crippled banks and stock exchanges but not agricultural engineering. Thus in Bornim near Potsdam the tractor testing field where personalities such as "Schlepper-Meyer" made their mark was established. New at this time was also the "Steel Lance" constructed by engineer Mirswa. This threshing mill was finished entirely in iron and showed itself superior to the wooden competition, especially in stook threshing. At this time Massey-Harris presented the "Pulverator" - which for many farmers was the first pto-driven cultivation implement. Incidentally, the soil crumbling action here took place immediately after the plough which had its mouldboards shortened. More effective on the large scale, however, was the standardisation of grass mower cutter bars. This meant that instead of 400 different blades there now appeared a single type, markedly simplifying repairs and the spare parts business. And then were of course the tractor pioneers. The list of inventions ran from Hermann Lanz's self-propelled mower "Samson", through to the HR5 Bulldog with thermo-siphon cooling, all of which indicated how strong the signs were for progress and change within agricultural engineering 75 years ago.

1954

The troubles of the immediate post-war period were taken as surmounted 50 years ago. In many sectors the past gave place to a present where there was as much pride in the tractor numbers of 300,000 as there was in the delivery of the 100, 000th Hanomag tractor or the 350 000th Lanz potato spinner harvester. And there were also further innovations to admire at the same time. The 19 PS Eicher combination implement carrier with mounted Dettmann chain-link potato elevator harvester opened new possibilities for the one-man farm. And for pto-driven technology the Eberhardt rotary crumbler was especially impressive. Quality of work and area performance were not to be achieved with the then standard technology based on the former horse-drawn power. Individual manufacturing groups came under the spotlight in tractor production. Thus MAN launched the M-engine that, thanks to hemispheric chambers in the pistons, achieved a "softer" pre-ignition with reduced fuel consumption. IH, on the other hand, developed the first two-stage supplementary transmission with change under load possible. This was called the "Torque Amplifier". Doubling the number of gears with better practicability through the ability to change under load encouraged the competition towards similar developments.

1979

Environment protection attracted so much attention 25 years ago that sometimes environment protection technology was taken as a general description for agricultural engineering. Such disputes, however, left the inventors unimpressed. They produced high-performance "plant protection sprayers with special nozzles and controls that allowed good adjustment of application rates" for the market and thus played a greater role in reducing plant spray application than all the "word artists" together. In the East Germany of that time, too, more attention was being paid to thoughts on the environment. Trials in Bornim showed that rubber tracks on the Fortschritt ZT 300 tractor would lead to a sustainable reduction in ground pressure and the advantages of electronics for agriculture also became increasingly obvious.

Fig. 3: The ZT 300 tractor as crawler