Herrmann, Klaus

Milestones in the history of agricultural engineering

Following a tradition which began in 1987, innovations in agricultural engineering which changed agriculture at their time or at least provided significant progress in this field are presented here. If one traces back the mechanization of agriculture along the milestones of agricultural engineering 25, 50, 75 years, and longer, one will notice with astonishment that many ideas and solution proposals are not as new as they seem.

Keywords
Mechanisation of agriculture, important inventions and events

Abstract
Herrmann, Klaus

Milestones in the history of agricultural engineering

Landtechnik 66 (2011), no. 4, pp. 297–299, 5 figures

Among the fascinating aspects of innovation history is the way in which, again and again, similar concepts are introduced almost at the same time in various locations by different people. One could be tempted to imagine that at a certain time the world is "ripe" for particular inventions, and that sensitive inventors have somehow felt this. With no knowledge of one another, such inventors brought their respective developments to fruition. More often than not, they ended up disappointed when one of their contemporary competitors reaped the rewards that they had hoped for. Most of them didn't know what each other were working on and this made it difficult later on to define the primary inventor. However, real innovators didn't allow themselves to be discouraged by such uncertainties. They were dedicated to the search, and personal success played a lesser role.

1761

This was exactly the situation 250 years ago as the conventional manual threshing process with flails was recognised in several European countries as no longer acceptable. Farmers saw the procedure as labour-intensive, ineffective and unhealthy. This encouraged the Society of Arts in London to conduct for the first time in history an official test of a farm machine. Examined was the threshing device by John Lloyd from Hereford. In many aspects, this reminded of an opening and closing window. In practice it didn't impress. But the problem was recognised. At the same time, Magnus Strindberg from Hernösand in Sweden had a more practicable idea. His threshing machine had seven axles, was 3 m long and 1.90 m wide and the action of numerous wheels separated grain from ears. Dietrich Fester from Copenhagen had still another idea for mechanising threshing. On a shaft he mounted 12 flails that could then go up and down 14 times faster than was possible by hand. Gottfried

Holfeld from Berlin had a similar idea. His flail threshing machine had 24 beaters driven via a capstan. The harvested material was fed onto a rotating 6 m circular plate kept in movement under the ascending and descending beaters.

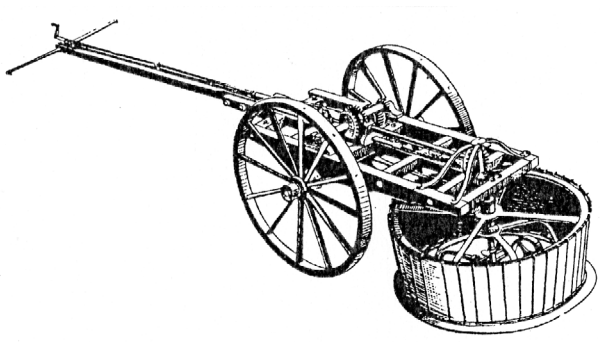
1786

225 years ago the wide variety of attempts to mechanise threshing showed first concrete results. The beater bar threshing machine built by the Scottish millwright Andrew Meikle worked so well that its principle of transporting the ears by feed-rollers into a rotating drum fitted with beater bars where the separation of grain takes place, has been retained over the centuries.

1811

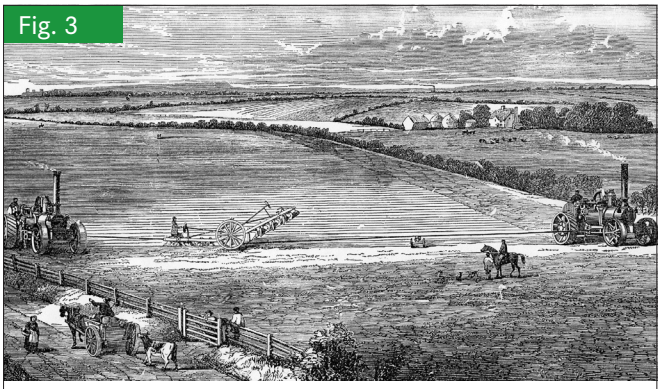
200 years ago creative minds turned from considering the threshing operation and studied how the grain crop could be best cut. Sickles and scythes were being looked upon as somewhat backward. This encouraged James Smith, manager of a textile mill in Scottish Deanston, to construct a mower for shoving into the grain crop (**figure 1**). A cutting device was fitted onto a horizontal drum and this had to be kept sharp by the whetstone usually used for sharpening the scythe blades. In the same year further prototype mowing machines were developed by the inventor Kerr from Edinburgh and by David Cumming, but without any long-term influence being achieved by them.

Fig. 1



Grain crop mower from James Smith, Doune in Scotland

Fig. 3

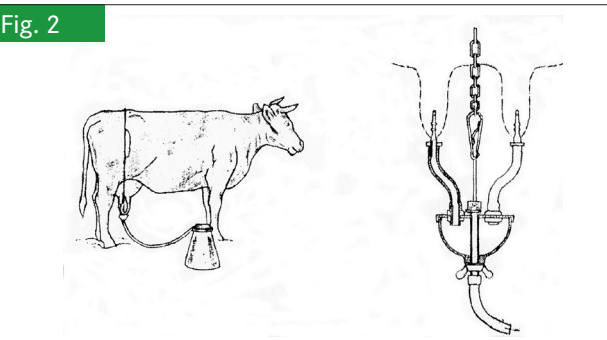


The meeting of Max Eyth and John Fowler prepared the way for the 2-machine steam plough system in the cultivation world

1836

Hand milking was one of the farm jobs often underestimated by outsiders. The reality as experienced by male and female milkers was quite different. The many hundred-fold rapid opening and closing of the fingers involved represented stress for the entire body. It was a job that cried out for mechanical assistance. The milking tubes patented 175 years ago by English farmer William Blurton from Fieldhall did help in overcoming the resistance of the teat sphincter muscles. But the device meant nothing less than torture for the cows. Nor was the application hygienic (**figure 2**). There wasn't much good news from North America at this time either. A fire destroyed the patent office and most of the records therein. The details of large numbers of inventions in agricultural engineering were reduced to ashes.

Fig. 2



Milking tubes system from William Blurton from Fieldhall, patented 1836

1861

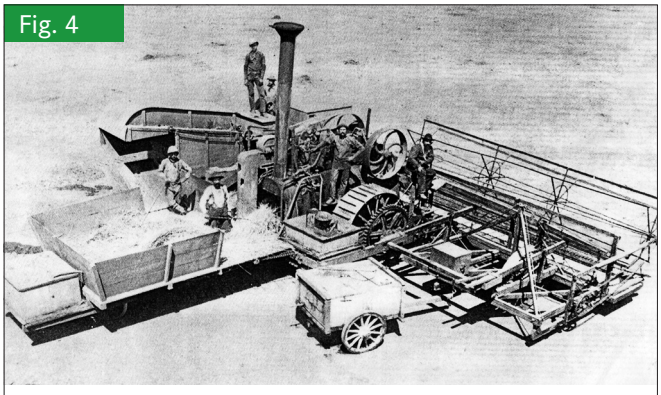
150 years ago the work-seeking Schwabian Max Eyth met the businessman John Fowler during the Royal Agricultural Society Show in Leeds. The two got on well together and Max Eyth got the job. This turned out well for everyone. But particularly helped by the partnership was the steam plough (**figure 3**). John Fowler and his chief engineer Max Eyth evolved the steam plough over the next 20 years into the most advanced soil cultivation system, one that found happy approval worldwide. Also popular at this time was the hay turning fork constructed by E. W. Bullard in Barre, USA. The sprung forks in his invention were activated via a crankshaft mounted in a number of bearings. The resulting hay turning action was similar to that carried out by the hand-held fork. The list of the successful agricultural engineering introductions at this time is an impressive one. The businesses of Claus Meifort Söhne, Itzehoe; Franz Grimme, Damme; Franz Richter, Döbeln und Friedrich Richter, Brandenburg have all promoted development in agricultural engineering to an impressive extent and if still in business will now be celebrating their respective 150th jubilees. Also remarkable was the decision by the British farm machinery factory

Garrett & Sons, Leiston to establish a branch in Buckau near Magdeburg. Its seed drills, horse hoes and locomobiles were for decades numbered among the best available on the German market.

1886

125 years ago Carl Benz was awarded the patent for the first automobile. An application in farming still hadn't been considered. But farmer George Berry from the Sacramento Valley in California thought differently. Everything revolved around agriculture for him and so he built the first self-propelled combine harvester in history (**figure 4**). The machine was fitted with a 22-foot cutterbar and was powered by a steam engine. It was reputed to have a performance allowing several hectares of grain

Fig. 4



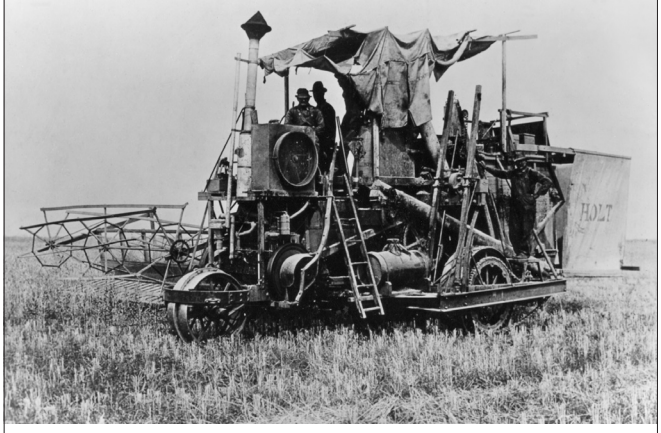
The first combine harvester, put to work on George St. Berry's farm in California's Sacramento Valley

per day to be cut. In the evenings the engine was used for producing electricity and delivering light on the farm. In Germany, C.F. Röber from Wutha established a milestone with his so-called Cascuta clover seed cleaning machine. Thanks to a number of curiously formed flatbed sieves, it achieved a cleaning quality that had been unattainable before. August Ventzki, Graudenz, constructed the first two-share frame plough with differential wheel adjustment. A single slot lever was all that was needed for adjustments. Establishment of new businesses by Robert Bosch in Stuttgart and by Johann Printz in Kettwig are still playing a prolific role in the agricultural engineering industry to this day.

1911

Benjamin Holt in Stockton (California) became the first, 100 years ago, to build a combine harvester power by a petrol engine (**figure 5**). In Germany, Siemens strengthened its connections with agriculture. From Konrad von Meyenburg the licence to built power saws was bought and these, with a range of power capacities, were brought onto the market from 1913 onwards. The German Agricultural Society (DLG) established a working group for electricity that showed the way ahead by occupying itself with questions regarding its introduction in rural areas. At the Agricultural University in Hohenheim a steam plough was premiered, although this remained only a demonstration.

Fig. 5



Built by Holt Manufacturing in Stockton, USA: the first self-propelled combine harvester powered by a petrol engine

1936

At Heinrich Lanz AG in Mannheim, then the largest farm machinery factory in Europe, tests started with the company's "Bulldog" tractors for their suitability when fuelled by gas. Among the signs that the times had changed politically was the special competition on the market for flax pulling and hemp threshing machines. Finally, history was made by the arrival on the market of the single-cylinder, 4-stroke F1M 414 farm tractor from KHD. As "Elfer-Deutz" it was to be produced over 10,000 times before the beginning of the war and, with that, become trailblazer in the motorisation of small and medium-sized farms. Normag in Nordhausen/Harz risked entry into the tractor market with the NG 22. Chief constructor with responsibility for this project was the talented young engineer Erwin Peucker.

1961

The special farm machinery association (LMV) and the working group for farm tractors (AGA) founded on January 1 the association for farm machinery and tractors (LAV) within the VDMA. The first president was Hermann Fendt with Alois Mengele by his side as vice-president. At Fahr in Gottmadingen the production of the rotary hay tedder began, a special type of success story that made it possible for almost 1.1 million examples to be delivered up to 1988. Epochal was also the "Handbuch der Landtechnik" (Agricultural Engineering Handbook) presented 50 years ago by publisher Carl Heinz Dencker. Produced by the best authors available in this sector it is unsurpassed as documentation of the agricultural engineering situation at that time. On the other hand September 10 of this year remains in memory as a day of mourning. Then, 76 farmers flying off to view modern agricultural machinery businesses in the USA were killed in an air crash at Shannon in Ireland.

1986

The 59th agricultural exhibition in Hanover became the last DLG peripatetic show. Unfilled stand spaces and a modest 180,000 visitors didn't repay the organisational input and showed that the Agritechnica formula was the way ahead for the future. Undisputed, on the other hand, was agriculture's continued capability for survival. As grower of feed and food, protector of the countryside and producer of energy it actually increased its public popularity. Trials with multi-fuel tractors capable of running on biogas and diesel fascinated people, as did the cropping experiments with topinambur as biofuel source. Special attention, however, was paid to experimental stations working on the automation of milking. At several locations, including Hohenheim, Weihenstephan and Kiel, experiments were conducted simultaneously on this aspect. Once again, the time was ripe for an innovation and success in the automation of dairy animal management was quick in coming.

Author

Dr. Klaus Herrmann is director of the German Agricultural Museum at Hohenheim University, e-mail: kh650@uni-hohenheim.de