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# Milestones of agricultural engineering

*Since 1987, innovations in agricultural engineering which changed agriculture at their time or at least provided significant progress have been presented here. If one traces back the mechanization of agriculture along the milestones of agricultural engineering 25, 50, 75 years and longer ago, one will notice with astonishment that many ideas and proposed solutions are not as new as they seem.*



Fig. 1: The first working grain mower from Cyrus Hall McCormick

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## Keywords

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**H**eat is valuable, in particular when it is really cold. 350 years ago, in 1656, gardeners in Nürnberg realized this and built the first heatable greenhouse. Since steam engines did not yet exist, they ignited fires and conducted the heat via smoke channels to the plants which were cultivated under glass. 325 years ago, in 1681, heat fascinated Frenchman Denis Papin. In trials, he had found out that food was able to be conserved by the effect of heat. His trials had a practical benefit in the form of the first steam pot, which Frenchman Appert improved as of 1795 and which has inspired the imagination not only of agricultural engineers up to the present.

## 1731 and 1756

275 years ago, in 1731, King Frederick William I of Prussia founded the Professional Academy in Königshorst. As the first dairying education institute, it focused exclusively on the “white gold of agriculture” and thus contributed to a development which allowed the simple dairying of farmers to become an internationally recognized science. 250 years ago, in 1756, K. Dettmar published information about a threshing machine invented by him. Even if no detailed description of the machine has been conserved, it was said to have replaced 40 flail threshers with ten operators, which was considered progress by some and job elimination by others.

## 1806

200 years ago, Scotsman Gladstone worked on the mechanization of the grain harvest. His combine prototype is probably the only one which was drawn by horses walking on the side next to the cutting unit (on-land!). The cutting unit itself was interesting as well. It consisted of six segments which moved around a rotating vertical axle. Emery discs automatically sharpened the knives during operation.

Albrecht Daniel Thaer was one of those who realized that innovations needed propagators in order to become effective. In 1806, he opened his agricultural education institute in Möglin in Brandenburg. Three students attended the first course and proved once more that class is more important than mass.

## 1831

175 years ago, North-American inventors put their mark on agricultural engineering. Samuel Turner from Aurelius (N.Y.) designed the pin thresher, which, termed peg drum thresher, conquered agriculture in sectors where the quality of the straw was less important. Peg drum threshers also needed less energy than beater bar threshers, which treated grain and straw more gently. The invention of Cyrus Hall McCormick, however, was even more revolutionary. Between May and June 1831, he successfully carried out the first public demonstrations of his grain thresher. They proved that two persons were able to reach the same result as previously five persons with a scythe. For the ASAE, McCormick is therefore the inventor of the first grain mower in history which was suitable for practical application.

## 1856

150 years ago, international interest in agricultural engineering focused on steam ploughing. John Fowler, Leeds, published the first company catalogue for his machines and participated in the great agricultural exhibition in Paris with a steam-drain-plough combination. Emperor Napoleon III acquired the system and used it to cultivate French wasteland, which still accounted for approximately one seventh of the area of France. In Germany, the focus was on the improvement of the horse plough. One of the outstanding features of the model S of Hohenheimer Ackergerätefabrik, an auger plough, was the mouldboard, which was “intended to form a virtually complete auger area”. However, the foundation of the Association of German Engineers on 12th May 1856 had a more sustainable effect than this detail improvement. Initiated by 12 foundation members in Alexisbad in the eastern Harz mountains, the VDI has become the top association of German engineers and (at the latest after the merger with Max-Eyth Society) also German agricultural engineers.

## 1881

125 years ago, McCormick engineers were able to develop the grain binder by acquiring Appleby’s patent of mechanical knot bind-

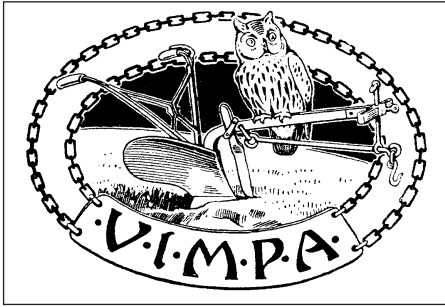


Fig. 2: The owl on the one-share swing plough - the symbol of the Association of the Agricultural Machinery Testing Institutes (VIMPA). The owl symbolized wisdom, and the plough stood for agriculture.

ing and making the knotting mechanism an integral part of the grain mower. At the same time, the Eberhard brothers in Ulm successfully designed a riding plough. On this predecessor of the framed plough, the operator was able to sit during ploughing, which, however, did not meet with much enthusiasm among most farmers. Since it was still considered a common principle that “an honest farmer does not sit during work”, farmers preferred to walk 25 km behind a horse plough during a ten-hour work day. Here, instruction was required. As a result, the Agricultural College in Berlin and an agricultural education institute at the University of Breslau were founded. The foundation of companies like Akt.-Maschinenfabrik Kyffhäuserhütte Artern, Joseph Meys & Comp., Hennef, C.F. Richter, Brandenburg/Havel, and A.J. Tröster, Butzbach, proved that this period was the heyday of industrial expansion in Germany.

### 1906

100 years ago, tractor development experienced an early boom. Frenchman Albert Gougis, for example, was able to design a PTO shaft, which International Harvester later improved until it was ready for series production. For their traction engines, North-Americans Chas. W. Hart and Chas. H. Parr (Charles City/Iowa), used the word “tractor” for the first time in history. The previously common term “gasoline traction engine” had been too long for sales manager W. H. Williams. Therefore he replaced it with the shorter word “tractor” for PR purposes. Hungarian Karoly Közegi also wrote history. His power rotary hoe had an 80 hp combustion engine. It was built as of 1912 by Lanz, Mannheim, for several years and designated “Landbaumotor” (agricultural engine). Agricultural machinery developed significantly at that time. Therefore, the machinery testing institutes looked for clear guidelines.

Professor Alwin Nachtweh, Hannover, took the initiative. On 14th February 1906, the „Association of Agricultural Machinery Testing Institutes” (VIMPA) was founded in the hall of the “Dessauer Garten” in Berlin. The six testing institutes in Berlin, Breslau, Hannover, Hohenheim, Münster, and Weihenstephan, became members of this association. Once again, new foundations stimulated the development of agricultural engineering. Among others, Bernard Krone set up a forge in Spelle, which has developed into a forage harvesting specialist who has gained recognition worldwide over the course of 100 years.

### 1931

75 years ago, renowned tractor manufacturers, such as Ford in Cork (Ireland) and Hanomag in Hannover temporarily had to quit production due to the worldwide economic crisis. However, the agricultural machinery industry was also looking for new markets. With its tracklaying model D-65, for example, Caterpillar produced the first diesel tractor in US history, while Hanomag carried out endurance tests of its own diesel tractors in the Soviet Union. In the VDI journal, Karl Vormbaum published his visionary article “A new vision of the world thanks to the combine” and declared the small number of just 22 combines used in Germany the measure of all things. Heinrich Lanz merged with the agricultural machinery factory Epple & Buxheim in Augsburg and took over the production of potato harvesters from Georg Harder, Lübeck. C. H. Dencker, professor in Landsberg/Warthe, travelled through the USA for five months in order to inform himself about trends in agricultural engineering there.

### 1956

50 years ago, the time of the hay drying systems came. The models Aulendorf, Babenhäusen, Braunschweig, Hohenheim, and Reute were intensively discussed and competed with the systems Aerovent and Haymaker, which came from the USA. John Deere also found its way from the USA to the German agricultural machinery industry. The Americans took over the Mannheim-based enterprise Heinrich Lanz with its rich tradition right at the time when the 200,000th Bulldog was delivered. Contrasts in the agricultural machinery sector were sharp. While Claas presented an entirely new tractor/combine concept with its “Huckepack” model, not even one farm in the entire Black-Forest-Baar county had a warm water boiler or a central heating system.

### 1981

25 years ago, the “catch word” was “energy”. In a “Landtechnik” editorial, unforgotten Walter Robert Blum demanded that those responsible “give agriculture a new task: it should not only produce food, but also generate energy for industrial purposes”. And in fact, changes were underway in many areas. Sugar producers experimented with “green energy”. Deutz engineers developed the first tractor for biogas operation, and MWM presented the first alcohol-diesel tractor under the motto “drive smartly – save energy”. But were the chances used? Fritz Lachenmeier, who, by the way, is celebrating his 85th birthday this year, already pointed out the following a quarter of a century ago: “It is not sufficient if the experts know what to do. Spreading knowledge is important as well.”



Fig. 3: With the „Huckepack”, Claas presented a new Tractor/combine concept.