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Milestones in agricultural engineering

The agricultural innovations presented in these pages, as they have been since 1987, changed the face of farming when they were introduced. At the very least, they also played a considerable role in advancing the science.

If one follows farm mechanisation along the milestones of agricultural engineering 25, 50, 75 years, and even further, in the past, it's astonishing that many ideas and solutions are not really as new as they seem.

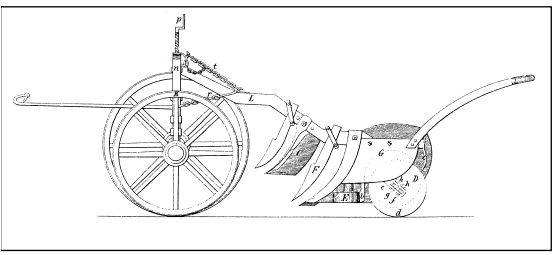

Fig. 1: The first German iron plough from Rudolph Sack in 1850

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The millennium celebrations are over now, and here and there people are getting back to everyday life. Nothing, or almost nothing, has changed – a fact that doesn't, however, surprise those who follow history. There have always been new centuries and new millenniums without the earth going off the tracks. Of much more importance, on the other hand, are the long lines leading back into the past, the secular view of things. These show evidence of a number of dramatic changes.

Population explosions, urbanisation, globalisation, gene technology and climate warming signify changes which will have massive effects on agriculture. New strategies are required. But, as everyone knows, no input means no output. Only those who know history are in a position to develop future-oriented concepts. As the saying goes, a tree without roots will bear no fruit in the end.

1750

Exactly 250 years ago the Swede Eduard Carlsson took this phrase to heart. Faced with flail threshing, which was regarded as punishing work by people at that time, he studied threshing concepts from ancient times. Copying examples from Syria, he built a 2.40 m long and 0.90 m broad threshing sledge to which he affixed 1000 flintstones. Two oxen pulled this vehicle back and forward over the spread-out grain and straw and achieved a completely satisfactory thresh.

1775

Quarter of a century later, physics attracted the farmers who were enthusiasts of innovation. In England, where the first modern agricultural revolution encouraged a mass of experimentation, some farmers hoped to promote plant growth through an "electrification machine" driven by a waterwheel and two zinc and copper plates in the seedbed.

1800

More solid developments came at the beginning of the 19th century through the contribution to farm technology progress by Robert Meares, Frome, Somerset. The two wheeled mowing implement patented by him on May 20 represented the first mower with cutting equipment utilising the scissors action. The equipment, of which no illustration remains, was designed for hand operation and was shoved along in the grain field by the operator with help from two plough handles. In other ways too, Englishmen set important examples in farm technology 200 years ago. Richard Lumbert, for instance, patented an subsoiler plough and William Lester from Paddington started the manufacturer of chopping machines that he had developed to the production stage.

1825

Even 175 years ago, England lived up to its reputation as motherland of modern technology. In the "Mechanics Magazine" schoolmaster Ogle presented a two-wheeled mowing machine with interchangeable cutting equipment which was wheel-driven. The origins of Ogle's mower, in fact, go even further back. Two years before, its development had to be interrupted because the harvest workers threatened to kill the designer should the machine take away their living. Clothmaker John Hunter didn't think he was exposing himself to this sort of danger when he patented a really exception engine. Based on the observation that a force on the outer circumference of a wheel had always the most effective result, he made the suggestion of allowing smaller wheels to run in grooves within a larger wheel rim. Hunter's idea was not without consequences. It led to the development of the off-road tracked vehicle in agriculture.

1850

The British still continued to dominate agricultural engineering developments. Pioneers that became known later such as John Fowler of Leeds and James Howard from Bedford built steam ploughs according to the single machine system with double reels, one of them anchored, running the plough back and forward across the fields. The concept was produced in great numbers. Also complicated was the improvement from R. M. Huxtable from Sutton-Waldron. He used the pressure produced from a steam engine to spray liquid manure over a wide area in fields through a system of pipes and pumps. Alongside this, North American developments began increasingly to appear. A. Adams and J.T. Gifford from Elgin in Illinois placed an operator on a mower for the first time so that he could take the cut stalks and bind them into sheaves. J. Heath from War-

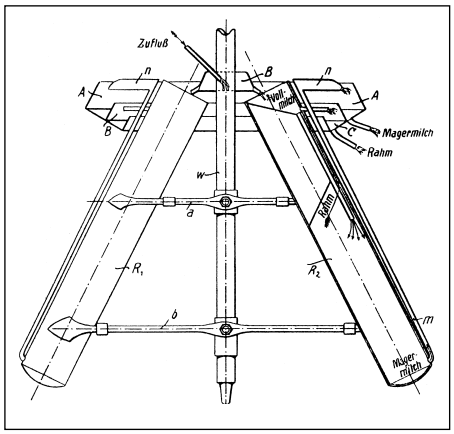

Fig. 2: A continuous milk centrifugal separator was constructed by Alexander Prandtl in 1875

ren (Ohio) preferred, on the other hand, a stationary binding machine which made a good job of binding but, however, meant much more outlay in logistics. In Germany, the plough was the main focus of farmers' attention. In the small village smithy at Peißen, Rudolph Sack from Loeben near Lützen completed his first iron plough. Only the front carriage wheels were made of wood, and even the two double chains so important for self-steering were already featured. The Dinklage miller Bernhard Holthaus was also active. He combined the threshing machine and the cleaning of the grain so well that his threshing machine can be described as the first with directly-attached cleaning.

1875

Plough building in Germany had reached world renown. Year after year it was possible to achieve further improvements. H. F. Ekkert, Berlin presented the multi-adjustable Reform plough whilst Behrend from Großwanzleben created the Wanzlebener Rajolplough and, finally, Professor Braungart introduced a wide-spectrum type of plough testing in Weihenstephan which was won by an model from Schwartz & Son, Berlinchen. Alexander Prandtl, also from Weihenstephan, was more interested in milk, on the other hand. His continually working milk centrifugal separator built exactly 125 years ago can be wondered at even today in the Deutschen Museum in Munich. There were also successful introductions to report. The dry seed dresser 'Primus' built in 1875 by Gustav Drescher in Halle was regarded over decades as a quality product just as was the livestock feeder steamer constructed by the master coppersmith Otto Brünner in Artern.

1900

Heinrich Lanz from Mannheim exhibited the 10,000th 'locomobile' at the Paris World Exhibition. With 400 PS, this machine was also the largest of its kind so far. Along with other manufacturers, H. F. Eckert was also present in Paris where he received the 'Grand Prix' in the soil cultivator class. In the same year, the DLG presented its 14th peripatetic show, this time in Posen. 75006 visitors inspected the innovations from 286 exhibitors. Among them was A. P. Muscate from Dirschau. His chopper, combined with fan and dust extraction system, transported the chopped material pneumatically not only over the desired distance but also cleaned it at the same time. There was, additionally, a good future lay before new-type wheeled sprayers from Holder, Urach, and threshing machines from Rudolf Wolf, Buckau. Making an appearance as newcomers in the farm implement business was, among others, Bernard van Lengerich, Emsbüren. Ploughs, harrows and beet cutters belonged to the first machinery range of this company which remains successful until this day.

1925

Agricultural engineering discovered statistics. For the first time complete figures on the number of available machines were required. These also showed that the degree of mechanisation was still modest. At once, the state involved itself to a great extent in the promotion of machinery on the land. The sale of 2,250 tractors in the power class 25 to 30 PS was subsidised over the FIGELAG. The tractor competition initiated at the same time in Berlin produced exact draught power measurements and delivered data on the working capabilities of tractors. The steam tractor from Wolf had no chance when the motorised mowing machine from the Kramer Brothers from Gutmadingen also made its premier at the same time and started decades of successful tractor construction. Also worthy of note was the 'Heliaks' (Helico Axial Machine) threshing machine constructed by Dr. Felix Schlayer, Swabian by birth and living in Madrid. This differed from competitor products in that the material being threshed journeyed through the machine not only vertically but also parallel to the axis of the rotating threshing drum. Through the screw movement along the cylinder, threshing-out was achieved with very low broken grain, and shredding of the straw was also carried out in a single operation.

1950

The motorisation of agriculture was in high development. There were hardly any limits to the fantasy of the innovations. Thus, Johannes Köhler from Miesbach presented the'Elektropionier' at the Frankfurt DLG show. This was a tractor with a 28 PS diesel engine with its pto, however, powered by an electric motor. Meanwhile Allgaier, Uhingen equipped its AP17 tractor with a Föttinger electric clutch supplied by Voith, Heidenheim. Deutz, on the other hand, began the production of the air-cooled F1L 514 diesel engines and for Holder, Christian Schaal constructed a small two-stroke diesel which later achieved high production figures for Fichtel & Sachs. Also for the constructors of farm implements, nothing appeared to be impossible, however. Gottfried Kelkel from Tamm started with the manufacture of Treibachs trailers and secured higher manoeuvrability for tractor and trailer units over difficult countryside. L. Niemeyer from Oese unified sieve wheel and mesh grid to give the 'Kuli' potato digger. Lanz introduced the sieve chain lifter VR1 which first came with link chains and then belts from textile and rubber. Finally, Gustav Unkel, Gunzenhausen presented a reverse thresher which did not thresh in the way into the threshing canal but instead on the way out of it. The firm Hermann Etscheid from Neustadt/Wied was launched and this developed into an expert for milk cooling plants and fully automatic cleaning systems.

1975

The pressure for perfection increased ever more. Tried and trusted measurement units such as PS and atü had to give way to kilowatt and bar. Unbroken, however, was the continuous demand for more size. For the first time, Daimler-Benz presented a 92 kW (125 PS) Unimog and Steyr reckoned on great market opportunities with its model 1400a. Meanwhile, in the USA, New Holland had a real surprise in store. With its combine harvester TR 70 the threshing and grain/straw separation was carried out by two axial rotors. From the beginning, the result was convincing in maize and as the years passed it also became competitive in cereals. Once again, however, those interested in history saw their attention justified. The wheel was again rediscovered in that the principle of axial threshing had been known since 1925 at the very least.

Fig. 3: A motor mower from the Kramer Brothers, Gutmadingen in 1925