By Jelmer Albada

The Köckerling tool carrier

This document informs you about the tool carrier of the brand mentioned above. Two times I have found these hard to find machines. With help of others I have shipped one to Ecuador and one to the United States. Both to be used on farms. This document gives a closer and deeper look on this tool carrier which I find to be potential for produce farming with draft animals.

The history:

In Germany the family Köckerling had a blacksmith operation and was selling agricultural machinery for several generations.

When student at a university for mechanical engineer, Friedrich Köckerling´s graduation project was on a tool carrier. He graduated (1953) on the tool carrier and got the title engineer. This tool carrier being the one shown on the images. Friedrich and his brother Heinrich, who was a merchant, founded the "Gebr. Köckerling Maschinen Fabrik". A manufacturing business for agricultural machinery in 1955. In a German town called Verl (Ostwestfalen). Being late in Western Europe´s horse farming era, the tool carrier was made in small amounts. This tool carrier was called the "Super 2-53" and produced until about 1965. The Köckerling business still exists making no-till tractor machinery.

Here is a link to their website: http://www.koeckerling.de

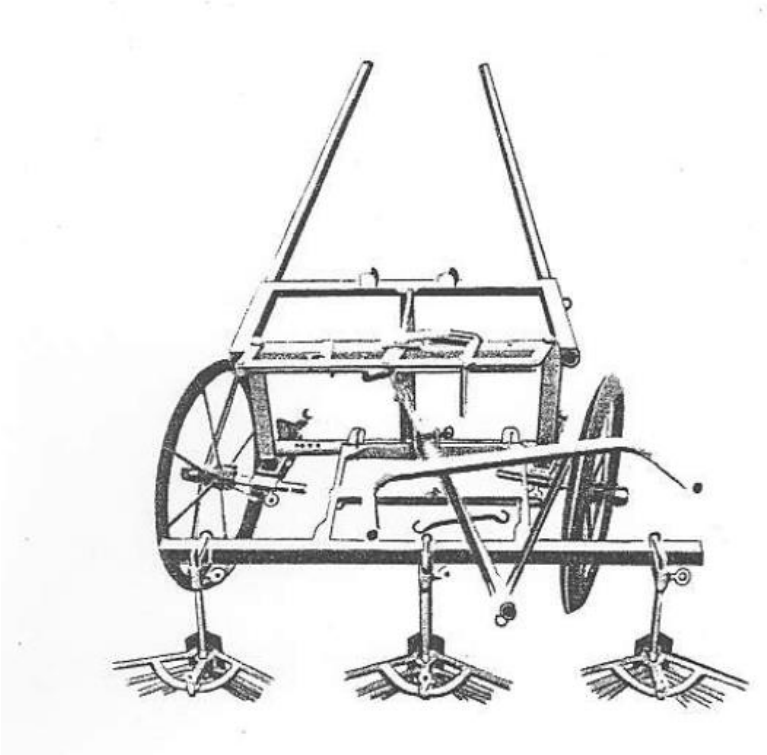

Image 1: The Kockerling tool carrier.

Design:

The Köckerling tool carrier is well designed due to the fact that it was made at the very end of the Western European horse farming era. At that time the horse machine technology was at its peak. Plus this tool carrier was given allot of designing thought in the university.

The tool carrier is light, stable in the work and versatile. It was designed cultivating two rows in one pass for the potato culture. It versatile design makes it suitable for other cultures or cultivars as well.

Attachment tools

Originally the Köckerling came with the next build on tools:

1. Plant hole makers, *these make a furrow and a hole where the potato will be seeded in. The seeding is done by hand.*

2. Hillers, *after seeding the potatoes will be covered with soil by the hillers. And are hilled again as the crop grows.*

3. Scuffels, *these can be used apart from the hilling for mechanical weed control. Additional on the scuffles are (built on) harrows or rolling shield.*

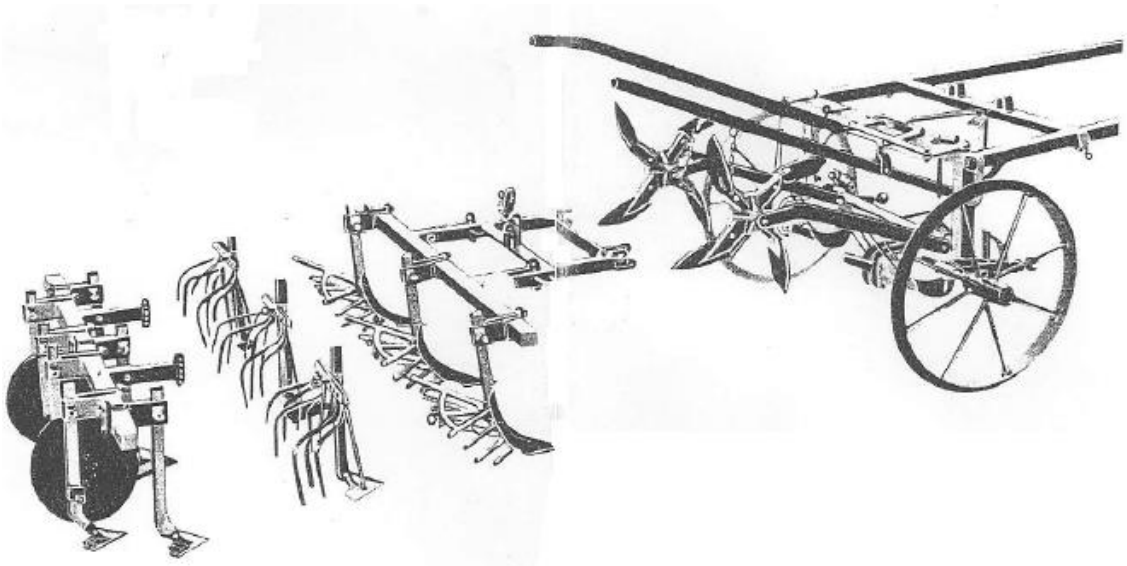

Image 2: Showing different tools that can be attached to the Köckerling.

Plant hole making, scuffling and hilling

Images 3 & 4: The tool carrier with the potato hole makers and in the other image with scuffles.

The plant hole makers can be set at 4 different potato row widths:

- 24,6 inch (62,5cm)
- 23,6” (60 cm)
- 21,7” (55 cm)
- 19,7” (50 cm)

These where common row widths. The inrow distance made by the spades is 19,7”.

Optional where plant hole makers for brassicas. The spades could be replaced by different ones to make smaller holes. The furrow makers where then be removed.

Image 5: The author hilling broccoli with the 3 built on hillers, Ecuador South America.

The steerage of the machine

To operate the machine one walks behind it. Holding the lines of the horse and bicycle like steer at the same time. The horse is steered in between the crop rows and the tool bar (with attachments) is moved sideways from the left to right by the steer on the tool bar. In this way the toolbar can be independently steered from the horse. This steering provides to work precisely and close to the crops with scuffles on the toolbar.

What an advantage is of the Köckerling is the combination of steering the tool bar and the wheels together. This was a new thing for that time. The older models of tool carriers could only be steered either by:

- Moving the tool bar from the left to the right over the frame.
- Or by steering the wheels.

The Köckerling is one of the brands that combined both steerage systems. When the steer on the tool bar is moved to left, the wheels also turn to the left. This makes scuffling go very precisely (*precision weed control management*) and light because of the quick steering response. Also it makes the hilling light to steer. This because the hilling elements follow the direction of the wheels. That is lighter than when the hilling elements are moved only by steering of the toolbar over the frame.

Image 6: The toolcarrier steering system in transport mode.

When transporting the wheels, the wheels and steerable toolbar are locked, so they follow the horse (like a forecart does).

Image7: When this pin is pulled out, the tool carrier comes out of transport position. Then the toolbar and wheels both become steerable.

Image 8: When removing the hammer shaped pin; only the steer of the toolbar can be moved over the frame. The wheels stay in the locked position.

The pin also functions as a hammer.

When using the “plant hole makers”, the bicycle part of the steer is put off the machine. The rest of that round bar is used as a lever to lift up and to lower the “plant hole makers”. For either transport or work mode. There another bar is attached to the tool carrier. Which functions as the steer. Then pin shaped hammer is stays in place and the other pin is pulled out. Making it possible to steer the wheels.

When making potato holes, in the first pass (of two rows) the wheels stay “locked”. And one steers only the horse. When needed in a new field one can guide the horse by its head for better to help with the orientation. The straightness of the first to rows, sets also the straightness for the following ones.

Than in the second pass (the next 2 rows), one can work behind the machine, disconnecting the pin to be able to steer with the wheels. One of the wheels should precisely follow the previously made wheel track. And the other wheel makes a new track in the soil. This is comparable to bed system in the tractor culture, when going to plant in the next bed where one wheel stays in the previous wheel track.

Here after the first pass, when the horse sways, one can steer the wheels back into the previous wheel track. Making sure that the straightness in the rows is continued. Straight rows make the other cultivation passes a lot easier than when the rows are crooked.


Images 8 & 9: The wheels and toolbar in the most right and most left position.

Optional is that the pin can be put back in place and the hammer pulled out. Then the toolbar slides over the round bar in between the wheels. This without steering the wheels. That is how the older tool carriers would work.

Image 10: a closer look up to the steerage system when steered to the right with wheels and toolbar.

Image 11: The toolbar with connecting part slides over the round bar of the frame (the toolbar is taken off here to give a better view).

Adjustments

The machine is easy adjustable in:

- Wheel width
- Tool bar angle (*and with that the angle of the scuffles of hillers*)
- Steer heigth
- Height of the toolbar
- Changing toolbars

Image 12: Adjusting the wheel width: the ring bolt can be loosened to move the wheel axle more inward or outward.

Image 13: In the center of the image there a row of holes. There are two of these, on in the further back. By putting the pin in another hole the toolbars angle change . When pulling, both the pins disengage.

Image 14: The ring bolt can be loosened so the steering bar can be put higher or lower. The vertical round bar has holes in it where the bolt is screwed into.

The higher position (here in the image) is used when hilling. The hillers lower themselves in the soil. When scuffling, the toolbar is higher above the soil and then the steer can be brought lower.

Image 15: the tool carrier with removed toolbar.

Images 16 & 17: The disconnected toolbars for quickly changing to from for example: hoeing to hilling.

The toolbars can be disconnected to switch quickly and easy to another toolbar with different tools. Having two or more different toolbars saves a lot of time. With for example only one toolbar the tools have to come off and be switched one by one. Evenmore with different spacing of the tools, it would take quite some time to set them right.

More adjustments: Changing toolbar height & leveling the toolbar

Both wheels can be changed in height together or separately.

When for example with hilling, one can work deeper or shallower by changing the height levers on the wheels together (*see images*).

By doing so one changes the position of the wheel and thereby the depth of the hiller.

From there on the angle of the toolbar can be set to find the preferred setting. The width of the “wings” of a hiller can also be changed to preferred setting in how much soil is moved aside.

By changing both levers the same, the position of the wheels and the height of the toolbar changes. Meaning one does not have to untighten and tighten each hiller shank for changing the depth.

Images 19 & 20: Showing the height levers.

Also these height levers can be set together but each on a different height. This will change the level of the machine. When working or on uneven land, one can adjust the machine and with it the toolbar.

When I used the machine in Ecuador we worked both with the horse and tractor in the fields. The tractor doing the heavy tillage work (using the spader) and the horse for the light cultivation work. Sometimes the tool carrier had to be with one wheel in a tractor wheel track. In such situation I used the height levers to level the toolbar.

Image 21: Showing the left wheel higher than the right wheel. With that the toolbar changes, notice the outer scuffles, left off the ground, right on the ground.

Engaging and disengaging the toolbar

When in the field at the end of the rows, one lifts the toolbar by raising the bicycle steer. And locks the toolbar into transport mode. At the other end of the bar connected the steer, there is a pin or point which is locked in a “holder”. With the toolbar in transport mode, the connected tools come out and off the ground. The turn can then be made to the next rows.

Image 22: Showing the end of the steer bar, which can be locked in the holder. The holder is the lower triangle in the corner of the frame. The weight of the toolbar pushes it into a locked position (see Image 11 for the transport position).

Other

Here we look at what more there is too the Köckerling

Image 23: Next to the hammer there is also a wrench. For two sizes and the tail is used for the ring bolts.

Image 24: The profile of the wheel is V-shaped, giving the machine a firm place in soft soil. On a hard surface the machine rides on the top ridge, which creates very little friction.

Image 25: Setup for a team. The shafts for a single horse are placed in the middle.

Conclusion

The light weight of the machine makes it also accesible for the lighter draft animal. Like where the tool carrier is moved by in Ecuador. But a bigger draft animal can also do it.

The steering works good and shows quick response. Swopping toolbars from hoeing to hilling in a minute is a pleasure. The machine is easy to adjust. The hammer and mostly the wrench on the machine come in handy when working, especially in the field. The ringbolts are easy to adjust, plus when used a lot, the ring doesn´t wear out or damage that much as fast common bolts. It also is pleasant to be able to change the height of the steer.

The point where the draft animal is hitched to the machine (the hook for the evener) is placed quite high. This pushes the machine firm in the ground. The V-profile on the wheel also prevent the machine from having side draft when operated.

What I would like to have on the machine is a option put the horse off set. So when for example three rows are cultivated, than the horse doesn´t walk in the middle (on the middle row). And the horse than can be set off side. The location of the shafts should than be moveable. Side draft does occure in such a situation which should be solved. The wish to “off setting” the horse depends on the crops its distances.

Other tool carrier brands let the toolbar lower down to a certain level and there it stays locked. Comparable to a 3-point hitch behind the tractor, which is set to a certain depth. With such a toolbar secured or locked in level, the parallel suspension can be used because the toolbar puts pressure on them. With the Köckerling the toolbar “floats” an parallel supensions would push the toolbar upwards. For precise- and more than two rows scuffling work, the urge for a parallel supension grows. For two rows a time this well designed tool carrier can do good performance.

Image 26: On an organic farm in Ecuador at 9.200 feet in altitude; the author scuffling leeks with the Köckerling tool carrier.