**The life and works of W. T. Odhner, part I**

Talk given by Timo Leipälä
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***excerpt:***

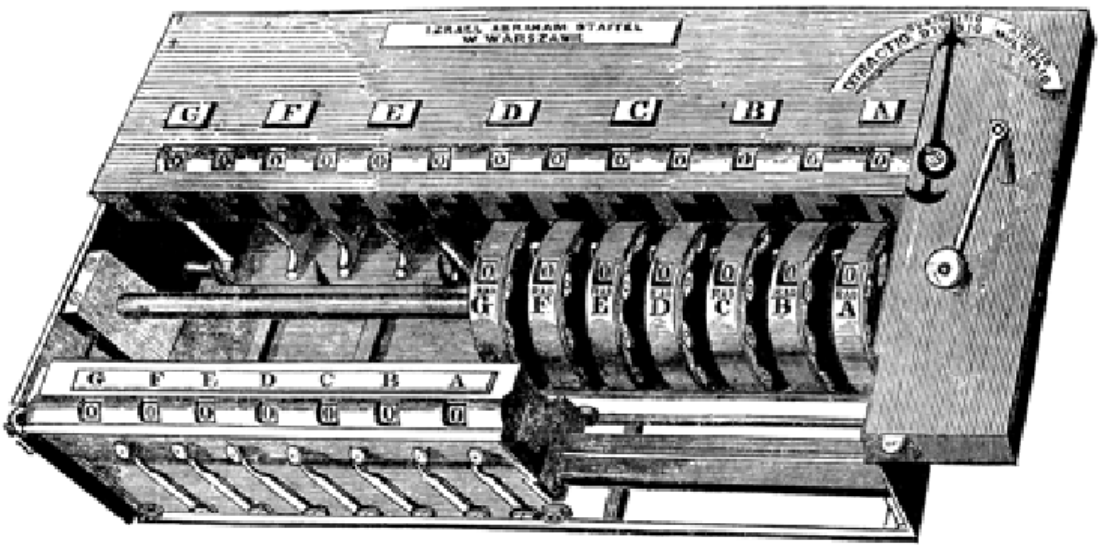
Franz Trinks who later bought the licence to produce calculating machines of Odhner's revised 1889 design suspects that Odhner may have used the calculating machine of Israel Staffel in his design. "Die [Odhner] Maschine, von der nur ein Stück gebaut wurde, ist der obengenannten Universal-Rechenmaschine von Staffel in mancher Beziehung so ähnlich, dass die Annahme naheliegt, Odhner habe sie gekannt und sie beim Bau seiner Maschine zum Vorbild genommen" [42]. Trinks must have held some correspondence with Odhner, but evidently he never asked about the details of the development history of the arithmometer.

Staffel was a watchmaker living in Warsaw, Poland being then a part of the Russian empire. Staffel's calculating machine was finished in 1845 after a work of ten years taking all the free time and a great part of his material resources [52]. It was presented at the expositions of Warsaw in 1845 and London in 1851 and it was awarded silver medal in both of them. The jury in London wrote in their report of 1852 that "the best machine of this kind exhibited is that of Staffel" [18] even though the arithmometer of Thomas was also exhibited. Staffel also presented his calculating machine to Russian Academy of Science in 1846. V. Ya. Bunyakovski and B. S. Jacobi studied the device and praised it in their statement [52]. They remarked that the calculator consisted of several identical simple parts, which could be serially produced by machines, so that the price of the the machine could be lowered. It would be very useful for institutions where long and precise calculations consisting mostly of multiplications and divisions had to be performed. The arithmometer of Thomas is not mentioned in the statement and it is evident that the referees did not know it. Staffel received a 1500 rouble state award for his invention, but there exists no information that it was patented. Evidently Staffel invented his calculating machine at a time when there still was no demand for them.

At the beginning of 1876 Staffel wanted to deposit his calculating machine at Russian Academy of Science in St. Petersburg. According to Staffel his calculating machine presents the first attempt to solve exactly by mechanical ways the arithmetical operations and could serve as a model for constructors of similar machines. He also wished that his invention would not be forgotten and the honour of inventing the first calculating machine would not be seized by any foreigner. The device was sent from Warsaw on January 13th 1876 and on February 9th the Academy of Science sent a letter thanking about the donation and told that the device was placed in the physical cabinet, so that it would be easily available [52].

As we shall see, Odhner's first calculator prototype was already finished at that time, but he may have seen and studied the printed description of Staffel's machine, which was in 1846 available both in Russian and in Polish [52], and used it in his work. Unfor-tunately this document has not been found. According to [21], relying on infor-mation supplied by London Times, in 1851 Staffel's calculating machine was placed in the Russian court, probably after the London Exposition. This must also have made Staffel's invention more known at St. Petersburg.

**Figure 2.** Staffel's calculating machine



Staffel's calculator had a capacity of 13 digits and it also could draw square roots in addition to the usual arithmetical operations of addition, subtraction and division. It is interesting that this capacity later became a standard in pinwheel calculating machines of Odhner type. A picture of Staffel's calculator is presented as figure 2 to compare it with early versions of Odhner's arithmometer given in figures 35 and 36 of [19]. Trinks describes the calculator "Verlegbare Einstellscheiben waren auf einer gemeinschaftlichen Achse nebeneinander angeordnet. Die eingestellten Ziffern erschienen jeweils hinter Schauöffnungen an den Einstellrädern in einer geraden Linie. Ebenso verhielt es sich auch bezüglich der Ziffern im festen Produkten- und Umdrehungs-zählwerk. Für positive bzw. negative Rechnungsarten galt wie beim Antrieb der Leibniz-Maschine dementsprechend entgegengesetzte Drehrichtung der Kurbel. Beim Überschreiten der Leistungsgrenze ertönte ein Warnungssignal." [42].

We could also pose the question: Did Baldwin know about Staffel's calculator and did he use Staffel's ideas in his calculator. Besides the sources cited above, there must have been much more information about it in different magazines and and books concerning London Exposition.