

A Lee System Knitting Machine in the Budapest Textile Museum

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The machine described is central to an exhibition on the development of the Hungarian hosiery industry. It is a late model, based on the original Lee machine, but with some distinctive novel features.

One of the interesting museums in Budapest, Hungary's capital, is the Textile Museum. The building itself is the former living house and workshop of the textile merchant Ferenc Goldberger who established an indigo print factory here in 1784. During the following 160 years this small unit had become a large dyeing and printing company, one of the most significant textile companies not only in the Austro-Hungarian Monarchy but in Europe, whose printed cotton - and later also rayon - fabrics were sold everywhere in Hungary and in many other countries. World War II ruined a large part of the factory but it was rebuilt, later reorganised, and flourished until the 1990s, when it met its fate with the general decline of the Hungarian textile industry. The widely appreciated old factory had to be closed, its buildings and machines were partly destroyed, partly sold - its memory is alive only in this building which serves now as home of the Museum which opened its doors in 1999.

Among some old machines and relics from the former Goldberger factory and from an old Hungarian country workshop, where slippers for rural women were made with knitting and felting technology, a number of models of various spinning and weaving machines are exhibited, but the Museum has many old knitting and sewing machines too. One of the Museum's premier exhibits is

a hand-operated knitting frame made by a Czech workman, Josef Balzar in Böh-Rothwaser. It has a beautifully made patterned wooden frame and screws with ornamental heads; its working parts are made partly of wood, partly of metal.

The machine was bought in 1895 by the Hungarian Jozsef Kokron (originally Cocron) for his knitting factory. This old machine fortunately survived the storms of history at the successor com-

pany of Kokron's factory, Hodiköt, and was given as a present to the Museum. It was restored here and now it can be seen by the public (Fig. 1).

Although the first knitting frame was installed in Hungary in 1795, until end of the 19th century hand-made knitted garments were used by most Hungarian customers. After the compromise between Hungarians and the Austrian monarch in 1867 (following the 1848-1849 revolution and war of independence which was put down by the Austrians) economic activity evolved in this country, which led also to significant technical development. One of the outcomes was the establishment of the first knitting factory in 1885. Not much later, in 1889, Kokron established his factory in the Hungarian town of Hodmezövasarhely, to make knitted shirts, vests, stockings, etc. Originally, he had worked only with several knitters who made hand knitting. Some years later, in 1895, he bought two hand-knitting frames from the above mentioned Czech producer, which worked in the same way as William Lee's original 16th century knitting frames.

This machine has 120 bearded needles in a 15-inch working width, which means that the machine gauge is 8 needles/inch - as we would say today. In a textbook by A. Monostori [1], published for students of the Budapest Polytechnic University in 1942, a detailed explanation of the mode of operation of this machine can be found. This means that the machine was still known and worthy of mention at that time. We could reproduce the work of this machine from his book and Figs 2-4 are copied from there.

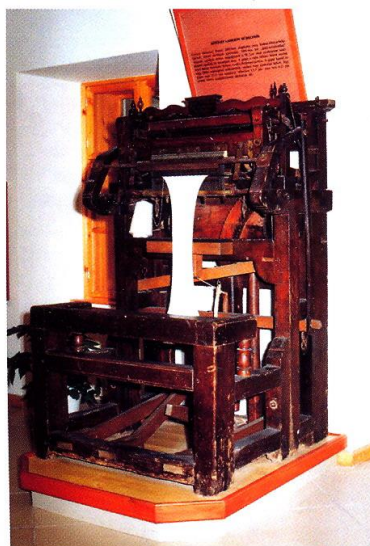


Fig. 1. The restored Balzar hand-frame in the Budapest Textile Museum.

The loop-forming elements and their operation are shown in Fig. 2. This machine worked with two sorts of sinkers: one for the first sinking of the yarn in every other needle space (*phase c*), and one (the divider) for sinking it in the intermediate ones later (*phase d*). However, at phase *b* in Fig. 2 a yarn carrier is shown but on the machine in question it was missing: the yarn had to be laid by hand along the needles.

Fig. 3 illustrates the machine construction. The loop-forming elements can be seen at the right of this side view: the needles in a horizontal line, the sinkers and dividers (covering each other) and the presser bar (17). The upper ends of the dividers are fixed in beam 3' which is mounted to frame 3. The bottom ends of the sinkers and dividers are fitted in the spaces of a comb-like beam which leads them when moving up and down. Beam 3 hangs on joint 3'' of the arm 9 which can move up and down against a spring 10 around a fulcrum O.

Each sinker has an eye where a two-armed lever 5 with a fulcrum 5' joins with the sinker to lift and sink it separately. The back-end of this lever leans against a drum (13) on which a stepped track runs in spiral form (Fig. 4, 14). As this drum rotates, the stepped track lifts the back ends of the sinkers successively, while their front ends sink the sinker to form the loop. While the drum makes one turn, loop-sinking for one whole course is executed. For the next course the drum must be turned in the opposite direction. The drum is rotated by ropes and two pedals moved by the worker's feet.

After completing the loop-sinking process, frame 3 and beam 3' sink and lower the dividers together, completing the loop-sinking on each needle. Sinkers and dividers together are now pulled towards the needle head. For this, the worker pulls the frame 3 around fulcrum 3'' with a handle *f*.

There are arms 18 at both sides of the machine, which hold the presser bar 17. It can be moved against a spring with another pedal. The fabric can be rolled up on beam 32.

In addition to these main parts, there are many setting and leading units are on the machine which help the worker to make fabric with uniform stitches. The machine thus operates on the origi-

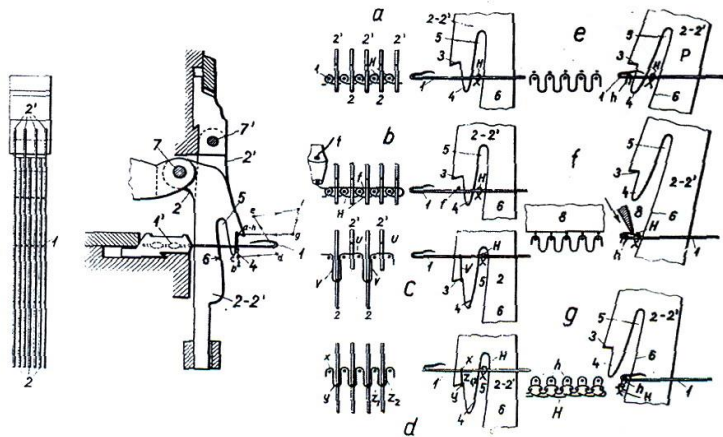


Fig. 2. Loop-forming elements and knitting sequence.

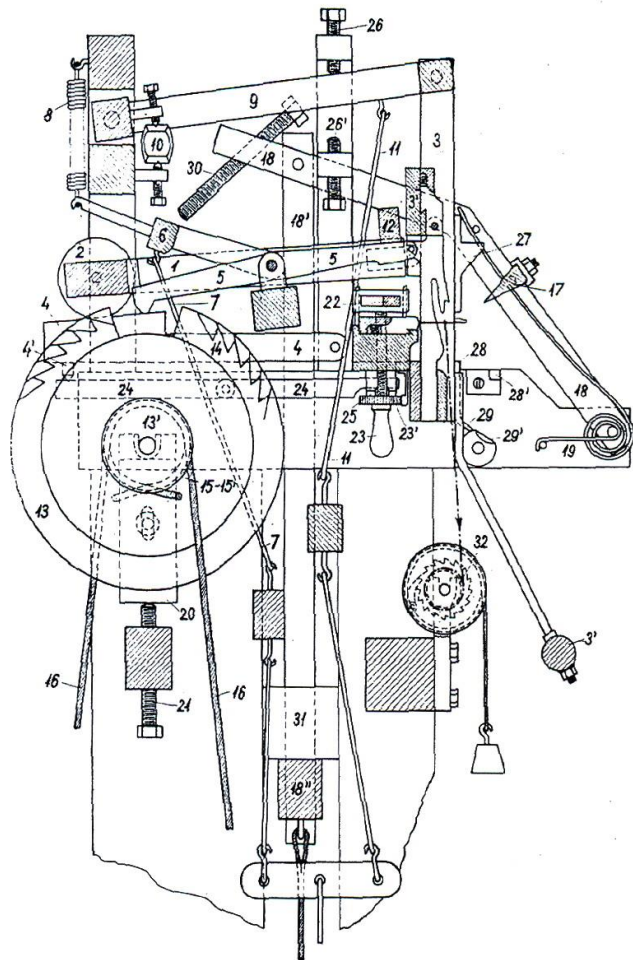


Fig. 3. Side view of the upper part of the machine, seen in cross section, with the working side (loop forming elements) at the right.

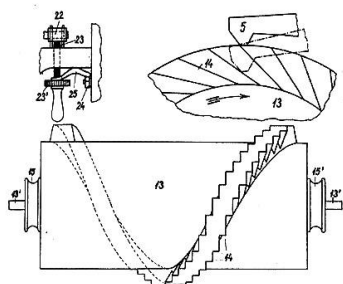


Fig. 4. Front view of rotating drum for controlling sinker movement.

nal Lee system, but is a late refined version, the drum 13 being of particular interest.

This valuable object in the Budapest Textile Museum is now in the centre of an interesting exhibition covering the history of Hungarian stocking and sock manufacture [2]. In addition to this old wooden-framed construction, some newer machines from the early 20th century and also some beautiful examples of ready-made products (made on Cotton-type straight-bar and on circular knitting machines) can also be seen.

References

- [1] A. Monostori. *Hurkolt Kelmek es Keszitesuk*. Budapest, 1942.
- [2] K. Lazar. 'Lee-rendszeru kotogep a budapesti Textilmuzeumban'. *Magyar Textiltechnika*, 2002, 55 (5), 153-160.

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