

Gertrud Grenander Nyberg

LOOMS FOR LINEN

An instrument of wood from the 11th century at Hedeby (Haithabu) is interpreted as a treadle-loom pulley, and similar to contemporary and older finds from Poland, and to pulleys found in northern Europe, e.g. from the 12th century at Sigtuna. The numerous loom-weights which were also found at Hedeby, are interpreted to indicate that the warp-weighted loom, which is especially suitable for the elastic qualities of wool, and the treadle loom which is better suited to linen, were used side-by-side at Hedeby. It is argued that the loom finds from Riga, Latvia, and the pulleys from Sigtuna, are evidence for linen trade between the Baltic countries and Sweden. Finally, the *shaft-horse* listed among the range of treadle-loom parts from c.1200 AD at Riga is here re-interpreted as a *treadle-horse*, a part of a loom which is no longer used in hand-weaving today.

One of the most important productive devices characteristic of the Middle Ages is the treadle loom and the finding of a pulley from such a loom should be a certain testimony of its use. The pulley forms part of the mechanism creating the *shed*, i.e. the space between two layers of warp threads, where the weft can be led through and so form a web (fig. 1). The warp threads which are to be pulled in the same vertical direction, upwards or downwards, are held together in a *shaft*. Warp threads run through thread-loops (*heddles*) attached to shaft-rods, which in turn are fastened to treadles (fig. 2). The pulley has a casing of wood with a hole to facilitate hanging it over the warp (fig. 3). It contains a block-wheel over which a string runs, connecting alternatively moving shafts. Pulling one shaft down by pressing a treadle causes the other shaft to lift. Normally a loom has two pulleys, one on either side of the web. A tabby weave is made of a web that needs two shafts; other bindings require more.

The pulley from Sigtuna, published by Geijer (1979:650) and dated approximately to the 12th century, has long been considered the oldest treadle-loom find in the Nordic countries. Recently a casing for a block-wheel was found in Sigtuna in layers that can be dated with precision to the beginning of the 12th century (Deutgen 1993). A complete pulley has been found in the ancient site of Hedeby (or Haithabu) in layers from the 11th century (Grenander Nyberg 1984:145ff). Interpretation of the Hedeby find as a pulley has been doubted by some. The essential argument is that no other pulley has been found in Hedeby, while several loom-weights have been found (Clarke & Ambrosiani 1991:62). Loom



Fig.1. Illustration of the front and interior of a treadle loom showing hanging pulleys and under them, two shafts which regulate the warp-threads and the treadles. After a painting by Pinturicchio (d. 1513). After Grenander Nyberg.

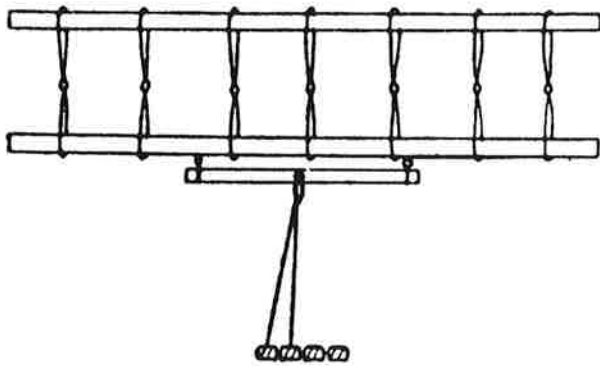


Fig.2. Schematic drawing of one shaft with two shaft-rods and heddles between them. Under the shaft are a stabilizing treadle-horse and treadles. After Cyrus-Zetterström.

weights serve to stretch the warp in the warp-weighted loom which was common in prehistoric times (Hoffmann 1964). The warp-weighted loom leans against a wall and therefore has a natural shed (fig. 4), the alternate shed being formed by pulling the back warp-thread layer to the front, by hand, without the use of a pulley.

The warp-weighted loom is suitable for woollen webs because wool is elastic: it can be stretched and subsequently resumes its original size and position. Linen fibre, in contrast, is extremely firm and rigid (Baines 1985; Fröier & Zienkiewicz 1979). The treadle loom is advantageous for weaving with linen fibres because all shafts – and thus all warp-threads – are manoeuvred in a counter-balance tie-up system with pulleys to form the shed. The advantage of this system becomes obvious in practical experiments.

Textile historians Kaminska, Nahlik, and Sage, and later Maik, have shown in their publications that pulley

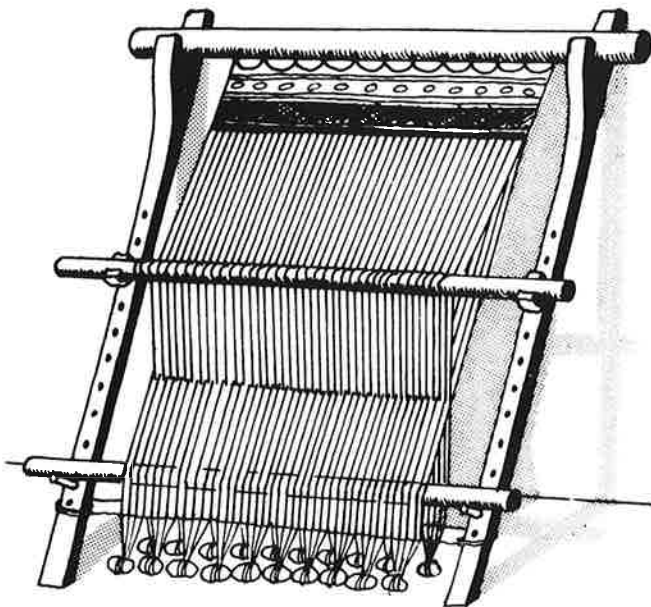


Fig.4. Schematic drawing of a warp-weighted loom, where one shaft has been pulled forward, bringing to the front the warp-threads which would naturally hang behind the others in order to form a shed. After Grenander Nyberg.



Fig.3. Pulley of oak, 23.2 cm H, found in a craftworking area in Hedeby (Haithabu). Scale c. 1:2. After Grenander Nyberg.

wheels and pulleys were used in Poland already by the 10th and 11th centuries (Kaminska & Nahlik 1958:42; 1960:94; Sage 1936; Maik 1991:348). There are several Polish finds, some from Gdansk, some from Old Opole, which support the interpretation of the unique pulley from Hedeby as a treadle-loom pulley.

Loom-parts found in Riga, Latvia, have been dated by the radiocarbon method to c. 1200 AD (Zarina 1992). No horizontal side-beams of a loom have been found, but Zarina has described finds from several sites in Riga which together form a good example of the inner functioning parts of a treadle loom. These finds include pulleys, a warp beam, shafts with heddles, a reed for distributing warp threads over a certain width, objects that are possibly parts of treadles, as well as a shuttle, which is an implement typical of the treadle loom. In addition, a loom-part was found which Zarina interprets as a *shaft-horse*, a functional alternative to a pulley (fig. 5, detail 6) (pulleys and shaft-horses can be combined to make e.g. four shafts). However, the object described by Zarina measures c. 24 cm and therefore cannot possibly be a shaft-horse. It is probably a *treadle-horse*, a mediator

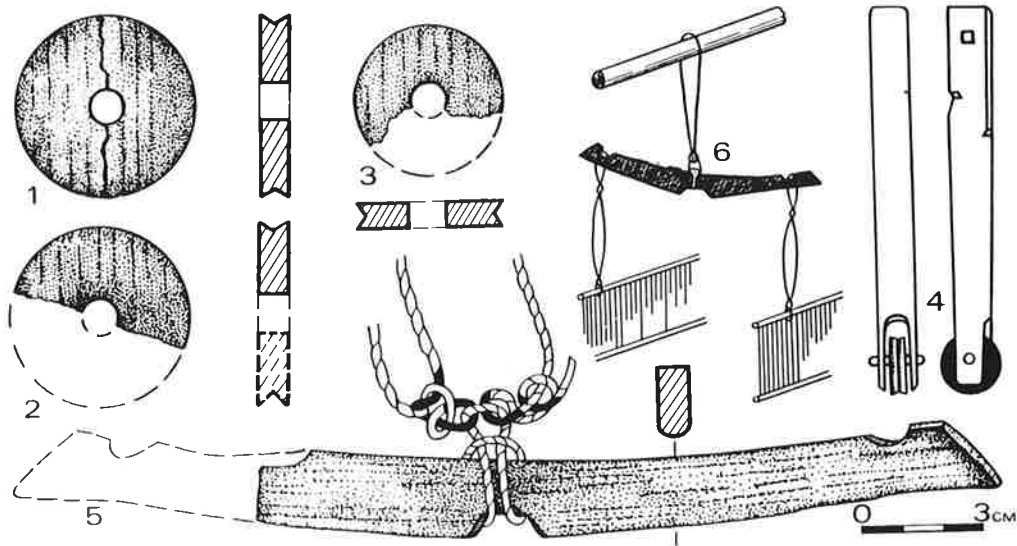


Fig.5. Some loom-parts found in Riga. 1-3 = block-wheels, 4 = pulley, 6 = suggested reconstruction of the use of the loom-part seen below. After Zarina.

between the shaft and the treadle, stabilizing the downward movement of the shaft (fig. 2). If the loom had only one pulley, which is possible with a narrow web, treadle horses would have been of the greatest importance to avoid tipping of the shafts.

A find of linen warp in association with loom parts in Riga shows that loom was used for a linen weave. The textile historian W. Endrei has established that the earliest European treadle looms were intended for linen weaves (Endrei 1960:245). Agnes Geijer in her textbook of textile history (1975:69), presumes that the treadle loom was brought to the east of Sweden from eastern Europe by the linen trade over the Baltic Sea; a hypothesis seemingly confirmed by the Latvian loom finds. (Further evidence for this textile trade, is that the word *pasma* which is of Slavic origin, is used in standard Swedish to denote a part of a skein.)

Returning to the question of early finds of pulleys, it seems very probable that treadle looms were used for linen at the same time as warp-weighted looms were still in use for woollen weaves. Thus the quantity of loom weights found in Hedeby should not be used as evidence against the use of treadle looms there.

References

- Baines, P. 1985. *Flax and Linen*. Aylesbury.
- Clarke, H. & Ambrosiani, B. 1991. *Towns in the Viking Age*. Stockholm.
- Deutgen, L. 1993. *Snaldr och opstadgogn – en utställning om textilhantverket i det tidigmedeltida Sigtuna*. Unpublished B.A. thesis (C-uppsats), Archaeological Research Laboratory, Stockholm University.
- Endrei, W. 1968. *L'évolution des techniques du filage et du tissage du Moyen âge à la révolution industrielle*. Paris/The Hague.
- Fröier, R. & Zienkiewicz, H. 1979. *Linboken*. Stockholm.
- Geijer, A. 1979. *A History of Textile Art*. Stockholm.
- Grenander Nyberg, G. 1984. Eine Schaftröle aus Haithabu als Teil eines Trittwebstuhls mit wagrecht gespannter Kette. In: *Ausgrabungen in Haithabu 19*. Neumünster.
- Hoffmann, M. 1964. *The Warp-Weighted Loom*. Oslo.
- Kaminska, J. & Nahlik, A. 1958. Włokiennictwo Gdanskie w X-XIII wieku. *Acta Archaeologica Universitatis Lodzianensis* 6. Lodz.
- Kaminska, J. & Nahlik, A. 1960. L'industrie textile du haute Moyen âge en Pologne. *Archaeologia Polona* III. Warszawa.
- Maik, J. 1991. Polnische Versuche der Webstuhl – Rekonstruktion. In: *Experimentelle Archäologie Bilanz 1991. Archäologische Mitteilungen aus Nordwestdeutschland, Beiheft 6*. Oldenburg.
- Sage, G. 1936. *Die Gewebe aus dem alten Oppeln, Alt-Schlesien* 6. Breslau.
- Zarina, A. 1992. Frühe Funde von Trittwebstühlen in Lettland. In: *Tidens tand 5. Archaeological Textiles in Northern Europe*, Report from the NESAT Symposium 1990. Copenhagen.