Advance Research in Textile Engineering

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Review Article

Exploring the Loom: A Journey through Diverse Weaving Shuttles

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Received: November 01, 2023
Accepted: December 19, 2023
Published: December 26, 2023

Abstract

A weaving shuttle is a Weaving Loom accessory that is used to pass the weft thread (horizontal thread) through the warp threads (vertical threads) of a Loom. The introduction of the Fly Shuttles during the Industrial Revolution changed the course of the Textile Industry to a greater extent. In this article, I have focused on origin and historical development of Shuttles with a brief explanation of different types of Shuttles along with their functions & uses. Also covered the limitations & alternates of Shuttles in the modern Weaving Industry.

The different types of weaving shuttles. Photo by Thread Collective.

Origin & Evolution of Weaving Shuttles

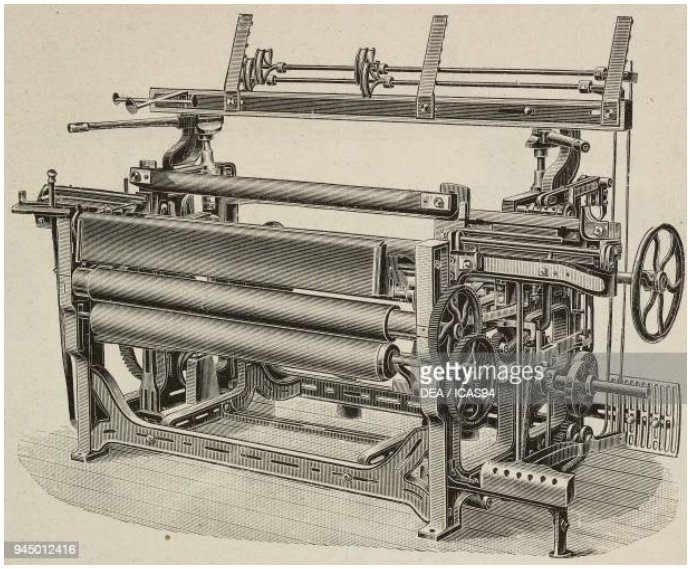
Before the invention of flying Shuttles, weaving was a labour-oriented & time-consuming process. A great number of manual labour was needed to operate a typical frame Loom where the weft thread passed manually through the shed of the warp threads. This process has to be repeated during each pick insertion which eventually limits the speed & efficiency of the weaving process.

During the Industrial Revolution, the fly shuttle was invented in 1733 by an English inventor named *John Key*. He developed a wheeled shuttle that was later known as a flying shuttle. Flying shuttle changed the course of Conventional Weaving by introducing several key developments:

- Improved Weaving Efficiency
- Reduced labour needs.
- Saved time that initiated the Industrialisation of Weaving.

John Key

Citation: Sazzad Hossain FM. Exploring the Loom: A Journey through Diverse Weaving Shuttles. Adv Res Text Eng. 2023; 8(3): 1091.



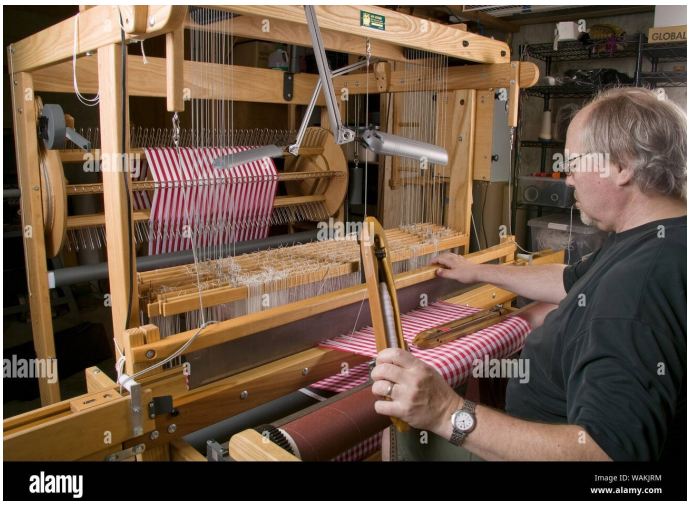
Hand Loom; Source: GettyImages

In later developments, installing guards reduced the fast-moving shuttle that injured the weaver's hands. Flying Shuttles widespread commercially around the 1950s.

Materials & Functions of Shuttles

Various types of materials are used to make Weaving Shuttles including wood, metal, plastic and even cardboard. Shuttles can be in different shapes and sizes depending on the end use and types of looms.

Weaving Shuttles is mainly used in woven fabric production. The shuttle holds a bobbin of weft thread. When the weavers release the shuttles by pulling a cord using the foot pedal (Hand Loom) or starting the machine (Power Loom), the shuttle passes through the warp shed and reaches the other side of the loom. Then the weft thread carried by the shuttle finally beat up into the cloth fell by using loom's Reed to create one pick of woven fabric. Using fly Shuttles is advantageous in producing wider fabric because it overcomes the limitations imposed by the weavers' arm span.



Using the Shuttle on the Loom

Shuttle Spectram: Types and Varieties

Stick Shuttle

Stick Shuttles are generally used on table Looms (including rigid heddle looms) with a narrow shed. The shuttle doesn't glide across the warp on a shuttle race but instead passes from right to left hand and back again. Yarn is wound on a flat stick shuttle with a figure eight using the arm or notches from the top right to the top left.

Stick Shuttle

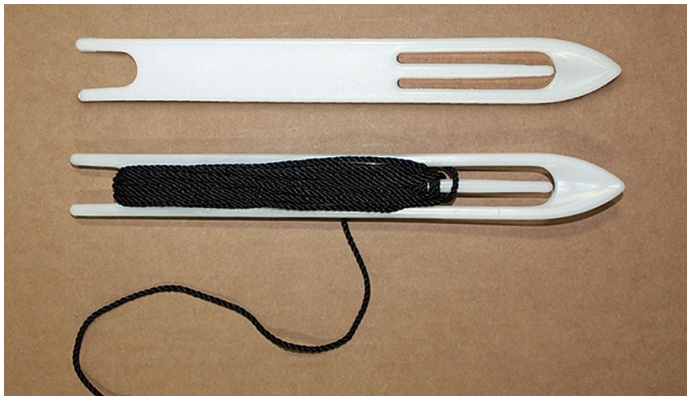
Belt or Band Shuttle

It's generally used on an inkle or band Loom. Generally, it has a knife edge on one side designed for packing in the weft and a recessed centre through to carry more weft. Despite its small size (6-10 inches), it can hold a good amount of weft yarn.

Band/Belt Shuttle

Netting Shuttle

It's used mainly in making and repairing fishing nets. But nowadays, weavers use it in hand manipulation techniques such as *Spanish Medallons* or *Brook's Bouquet* design. It can be used effectively for adding short lengths of the weft of a special colour or designer yarn.



Netting Shuttle

Rag Shuttle

It's generally used in counterbalance and counterparts Loom where large warp shed can be found. It's used to hold a flat strip of Fabric for rag rugs or other similar projects. The rag shuttle keeps the rag strip flat by winding around and around.

Rag Shuttle

Boat Shuttle

It looks a bit like a boat because of its shape and has a rod for a bobbin or a quill full of yarn. The bobbin spins around as the yarn comes off. Based on the size, it can used for both thick or thin woven fabric making.

Boat Shuttle

End Feed Shuttle

It looks like a boat shuttle but it holds bobbins. Rather yarn is wound around a pirn and is pulled off the end and through a hole in the shuttle. The end feed shuttle can maintain even tension and is best suited for weaving the edges.

End Feed Shuttle

Fly Shuttle

It's a Specialised type of end-feed shuttle that connects to the loom and automatically throws the shuttle back and forth by using different under and over-picking mechanisms. It's usually heavier and has sharp metal ends on both sides

Fly Shuttle

Skii Shuttle

It is designed in a way that the yarn is wrapped horizontally around the top of the skii. It can hold medium or heavy yarns. Its unique shape lets it slide through the shed while dragging on the warp yarns.

Ski shuttle, The middle section helps to hold up the upper ends of a narrow shed.

Drawbacks of Shuttle-Based Looms

Despite being economical and easy to use, shuttle Looms have some major drawbacks that force the modernization of the Weaving Industry.

- High noise during weaving
- Warp breaks increase for the shuttle
- Shuttle flies from the shed and can cause accident
- Production rate is lower than shuttle less loom
- Losing the value of Fabric due to shuttle movement

Modern Alternatives of Weaving Shuttles

In the modern weaving industry, shuttleless Loom has been introduced. In the shuttleless Loom, weft insertion is done by various devices such as rapier, air jet, water spray, projective, multi-spindle mouth etc.

Shuttleless Loom can be categorised as follows:

- Rapier Loom
- Projectile Loom
- Water Jet Loom
- Air Jet Loom
- Multi-shed Loom

Rapier Loom

Projectile Loom

Conclusion

The invention of the weaving Shuttles during the Industrial Revolution helped in the formation of the weaving Industry from cottage-based weaving. Shuttles Increased weaving efficiency and reduced labour cost. Despite having such benefits of usage and lower price, shuttle-based Loom has some major drawbacks that open the path of modern shuttleless Loom. Still, the shuttle is used by the rural people and different tribes for the production of their traditional woven cloth by using a hand Loom.

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